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SCIENTIFIC AMERICAN SUPPLEMENT

No. 618.

For the Week Ending November 5, 1887.

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DISTILLATION OF WOOD.

The Cadosia Chemical Co., at Cadosia, N. Y., has several establishments in that vicinity for the distillation of wood, which has now become an extensive and important industry.

Almost any of the harder varieties of wood will answer, but those chiefly found and used by this company, in the region it now occupies, are birch, beech, and maple. Pine, hemlock, and soft woods will not answer. The general operations and products of the company are as follows:

Contracts are made with the neighboring farmers for the purchase of standing wood, on which an agreed amount is paid in advance, balance payable as fast as the wood is cut by the company. The wood is delivered at the works in ordinary four-foot lengths and is then piled in the distilling retorts, of which there are in the Cadosia still house 24 pairs. These retorts consist of cast iron, somewhat in the form of a steam boiler, about 10 ft. long and 4½ ft. diameter, having a large manhole at one end and condensing exit neck at the other end. When a retort is filled with wood, the manhole is closed and sealed; a slow fire is then started under the retort. The first products of the distillation, consisting of alcoholic vapors, are passed through a condensing worm, and the liquid thus produced is subsequently redistilled, and this product then sold. Most of it goes to Binghamton, N. Y., where it is refined, and put on the market as wood alcohol.

The second products of the distillation, consisting of acetic vapors, are condensed as before described, and the liquid is mixed with lime, thorough mixture being effected by mechanical means, thus producing acetate of lime—used in cloth-printing works. The crude acetate is placed above the retorts on racks, where it is dried, and is then ready for market.

The third products of the distillation, consisting of tarry matters and naphthas, are shipped as produced, and subsequently refined.

The last products, consisting of heavy tars, are used at the works as fuel. When the distillation is finished, there remains within the retorts a mass of clean and beautiful charcoal, ready for market, and all of it is sold to the steel makers. Most of it goes to Troy, N. Y., where it is chiefly used in the production of fine steel.

The principal fuel used in these works is bituminous coal, which together with the crude lime required is brought to the works by railway.

We are indebted to a correspondent who resides in the vicinity for these particulars, which are only intended to convey a very general idea of the mode in which some portions of the forests in Delaware County, N. Y., are now being utilized.

The tanning of leather has been and still is a leading industry in this region. This involves the use of large quantities of bark, the trunks of the trees being sawed up and converted into lumber.

Many of the hills in the above vicinity are underlaid with bluestone, and there are several fine quarries of this noble building material.

COALING AT SEA.

In the days when war ships were under sail, and relied for propulsion only upon the winds, no thought was taken when they set out on a long journey how they should return. The same winds that bore them away fetched them back, and though the course was not always straight, and often longer one way than the other, there was not any danger, even when maintaining top speed, of falling short of motive power. Wind is easier found than coal at the end of long voyages, and now that the modern war ship is a steamer, the question of coaling becomes of the highest importance. Big ships cruise between coaling stations, and, when they set out on long voyages, their destination must be a coaling station, otherwise they cannot return. The recent maneuvers in the Irish and English Channels and North Sea showed that the great war ship of to-day requires enormous quantities of coal. Its furnaces seem insatiable, and there is good authority for saying that during the recent fortnight's maneuvers of the British fleet, it was an occurrence by no means uncommon for a ship to empty her bunkers before she could get into port, notwithstanding that a fifty mile run would have brought her there. When we consider ocean voyages, the question of fuel supply becomes really serious. Should she come into hostile waters after a long run, the chances of maintaining anything like effective activity would depend upon making a port bearing her own flag, because, under the neutrality laws, she could not coal even at a station belonging to a friendly power. The English naval authorities, always alert and far sighted, realized long ago the importance of having coal at hand, and when the present great steam fleet was yet under construction, they set themselves to the task of establishing fortified coaling stations all over the world's waters. Experience with the big ships, however, has shown that even this is not enough, because of the imminent likelihood of running short of coal while yet in deep water, and for some time they have sought to discover a practical means of coaling at sea.

So far, none has been found, though many plans have been suggested. The system of broadside coaling, to wit, laying a collier alongside, as in dock, is looked upon as wholly impracticable, and very reasonably so, because, save in a smooth sea, it cannot be accomplished without great danger. Another plan, not new, save as to apparatus for carrying it out, was recently described by a retired naval officer before the Royal United Service Institution. It consists in passing coal by means of a whip and running sling from a collier in tow of the ship to be coaled. The colliers to be used should be steamers, fast ones at that, and they ought to have straight stems, with no hamper forward in the shape of bowsprit or head gear. The originator of the plan says that she could then be brought up stem on to within only a few feet of the stern of the ship to be coaled, that is to say, near enough to permit hauling lines to be hove aboard. This, of course, could be done as easily in rough as in calm weather, if both vessels have a full head of steam up. With the aid of the hauling lines, two stout towing hawsers are passed aboard, and then other and heavier hauling lines follow. The hawsers are crossed from the stern pipes of the war ship to the bow ports, hawse pipes, or to any other apparatus convenient to special coaling, and are then made fast for towing. The two vessels now start up, holding a moderate rate of speed, just enough to keep the towing lines fairly taut. Two flexible steel wire ropes are now passed and secured in the following manner: Aboard the war ship, the ends of these steel wire cables, previously rove through two travelers with patent hooks, to be rove in turn through stout blocks, secured by wire straps at sufficient height up the mizzenmast, and the ends brought and secured to the foot of the mainmast. Aboard the collier the ends must be rove through leading blocks on each quarter of foreyard or heads of coal derricks, and ends set up to ballards or other conveniences in the gangway. Then the coaling begin either by means of tipping tubs or coal bags; the former, the designer of the plan estimates, should be of half a ton capacity, or, in the case of the latter, five bags to one hoist. The hauling lines are attached to the travelers and brought to either steam capstan or winches. Each collier has two whips in each quarter of her foreyard for hoisting and lowering away.

In the discussion which followed the description of the new plan, the general sentiment, as expressed, was of unbelief in its feasibility, the grizzled old sailors present insisting that it would be perilous to have a collier so close astern of their ships as was necessary for that; a heavy load swinging on a line between the two ships would tend to bring the collier in collision with their stern posts and rudders.

It is not unlikely that this vexed and vexing question of getting fuel at sea may be settled in the near future by the adoption of oil for fuel. Then the problem will be an easy one, for, even in rough weather, a steam vessel loaded with oil can safely come near enough to leeward of another steamer to take aboard a slack hose pipe, whence oil may be pumped into the empty tanks of war steamers.

Clean Castings.

Industries says: A Dusseldorf firm has recently introduced a device for separating the light impurities from molten iron or other metals in the operation of casting, with a view to securing pure and clean castings. The "separator" is placed upon the inlet aperture of the moulding box, and consists of a rectangular casing provided with a number of transverse partitions, dividing the casing into a series of separate chambers, which are in communication by means of openings at the bottom of the partitions. The molten metal, being poured into the separator at one end, is caused to pass through the several compartments in the apparatus before it can enter the moulding box, the light impurities being in this way caused to rise to the surface, and prevented from entering the mould with the metal. As the metal passes from compartment to compartment, more and more of the impurities are separated out, until the metal reaches the inlet to the mould in a practically pure state. Air is also effectually prevented from entering the mould together with the metal. In the second chamber there is arranged near the inlet a round iron rod, which produces ebullition of the metal, causing the impurities to rise to the surface. It is stated that by the use of this apparatus exceedingly dense and pure castings may be produced.

Two new vegetable perfumes are said to have lately become articles of commerce. One of these is a kind of *xylopia* from the province of Chirigui, in Costa Rica. The odor closely resembles that of *Canaga odorata*, and the flowers are now used, like those of that plant, in the manufacture of ylang-ylang. The other is named *ouco*, and is the highly odoriferous blossom of a kind of acacia tree which is found in Central Africa, and which Serpa Pinto was the first to describe. The *ouco* flowers are brought down the Cubangin River for sale. They cover the trees on which they grow with such profusion that they fill the atmosphere with the overpowering richness of their scent.

Wealthy Indians.

A visitor to the Osage reservation, Idaho, if he has a mind to study the human race under varying conditions, finds much of interest. He is *inter primos* among the aristocrats. The Osage Indians are about the only example now left in the United States of a real aristocracy. They do not depend upon government rations, as do the Cheyennes and others, at all, but have enough as their own undisputed property to make them the wealthiest community in the country. Besides the land of the reservation, which belongs to them by a title hard to assail, they have about $7,000,000 bearing 5 per cent interest in the hands of the government. They are paid about $250,000 a year in cash. The entire tribe numbers only 1,600, so that they are actually the richest body of people we have.

The Osages have all the attributes of an aristocracy. They own the land, do absolutely no work, have plenty of money, know nothing of barter and sale, and therefore not much of the meanness which characterizes all commercial classes. They envy nobody, and are satisfied with themselves and their customs. With the virtues of aristocracy, they have its vices. With generosity, they have shiftlessness and laziness in perfection. Though magnificent pastures lie before them for miles, few of them take the trouble to own cattle, the majority preferring to buy beef already slaughtered and cut up from the traders. They are not even hunters and fishers. Their lives are spent in lying around under tents and shanties, eating to repletion, and filling their blood with impurities which they do not take exercise enough to get rid of. Bad habits have brought on bronchial and scrofulous diseases, which are helping to still further reduce their numbers. They have no faith in white physicians, and their own medicine men have as much influence as a hundred years ago.

The government puts a premium on reproduction by the system of distribution adopted. Each member of the tribe, including women and children, receives about $160 every year. The more wives and children an Osage has, therefore, the richer he is. In spite of this encouragement, the tribe is decreasing. A white physician at the agency estimates that the rate of decrease is not less than 2 per cent a year among the full bloods. The half breeds are increasing. It can be at once reckoned that in another half century the full bloods will have gone and the splendid inheritance will be in the possession of white men and their children, even if no new policy is adopted by the government to hasten the catastrophe.

The full bloods are nearly all honest and manly in their way. They have an idea that everything on the reservation belongs to them, and they go behind the counters and among the goods of the post traders as freely as though they were proprietors. Up to a certain point they understand business—debit and credit—but not much beyond the simplest forms. As might be expected, they are chronically in debt. They want to buy everything they see, and think little of prices, and give away as readily as they buy. Other tribes not so well provided with worldly goods are fond of visiting the Osages, and on these occasions the custom of smoking presents works to the disadvantage of the wealthier. Several hundred ponies and large amounts of various property have thus been given to the Kaws and other poorer tribes within a few years.

Can the Osages be civilized? Of course they can. They are not civilized, to be sure. They speak little English, and wear the blanket and breech clout; allow their women to die by scores in childbirth, and compel them to do all the work; they are too lazy to raise cattle when pasture and feed cost neither money nor work; they keep up the dances and paints, and cut their hair in helmet fashion. All these things they do, but they could be easily taught to adopt the customs of civilization. Five years of education scientifically applied would make them equal to the Cherokees in civilization and superior to them in force of character.—*Kansas City Times.*

Edison on the Labor Question.

Thomas Edison, the electrician, when asked by a newspaper interviewer what he thought of the Keely motor, replied: "I have never seen it, so I have no opinion about it. But all the results he is said to have obtained can be got from compressed air. All the air in this room can be condensed into a liquid that could be carried in a filbert shell, and its explosive force would be tremendous. Skillfully released and reconstructed, it would move a great machine." In reply to the question, "When motive power gets to be four times as cheap as it is, Mr. Edison, what will become of the laboring man?" "He will be enriched by it. Machinery will be his slave. See how machinery has multiplied in the last fifty years. As a direct result, workingmen get double the wages they did then, and the necessities of life cost only half as much. In other words, a hand worker can to-day buy four times as much with ten hours of work as his father could fifty years ago. For the first time in the world's history, a skilled mechanic can buy a barrel of flour with a single day's work. The machinery in the United States represents the labor of a thousand million men, or fifty times as much labor as that of all the men in the country. When motive power is still further cheapened—say in another generation—I believe that the unskilled laborer, if sober and industrious, can have a house of his own and a horse and carriage and a library and a piano. It is terrible stupidity that leads some laboring men to suppose that machinery is their foe. It is the thing that gives them independence and even freedom. Without machinery society would drift into the condition of master and slave. The multiplication of machinery means for every worker more food, better clothes, better house, less work. In fact, I believe that the indefinite increase of machinery is going to solve what folks call 'the labor question'—that is, the desire of hand workers to get a bigger slice of the margin of profit."

Distribution of Power.

The tendency of modern manufacturing is toward larger and larger establishments, owing to the fact that the *pro rata* expenses are less than in smaller ones.

The recent advances in the production of electricity and its use through electric motors seem destined to soon change our system of distributing power, if it does not bring the abnormal growth of single establishments to a sudden halt. It is well known that large powers can be produced much more economically than small ones. Hence one of the great advantages of a large manufactory. But with this advantage there is an attendant disadvantage in the accumulation of long lines of shafting and innumerable belts that have to be kept running whether they are performing any work or not. In cases of dull times, when the shop or mill is running but a small force of men, the unnecessary amount of friction thus produced has led many mechanics to recommend, and in some cases to use, a number of small engines instead of one large one. The objections to this plan are, first, it does not fully accomplish its mission, and, second, the steam and exhaust pipes are a nuisance and source of loss through condensation.

The use of the electric motor, however, accomplishes the purpose perfectly. The small motor may be run as economically as the large one. Hence there is no objection to using one for each machine. The motor may be started and stopped with less trouble than it takes to shift a belt, and when not running it is not calling for the expenditure of any power to keep the main line or countershafts going.

It is quite possible and practicable to have a large manufactory running without main shafts, countershafts, hangers or boxes, and with very few pulleys and belts. Such a plan is not at all chimerical, as it is to a certain extent in actual use in several places. In England motors have lately been applied to calico-printing machines, each machine having its own motor, which may be stopped and started independent of all others.

The ability to transmit the power over considerable distances without appreciable loss will give the small manufacturer a chance to rent a small room and obtain his power as economically as his wealthy neighbor.

This ability to subdivide and distribute power successfully and cheaply to small users is destined to put a check upon very large establishments that are likely to come into competition with them. Let us suppose a maximum amount of business distributed equally between one thousand manufacturers and one very large one, when all are able to obtain power at equal cost. In cases of shrinkage of business, the one thousand small concerns, by reason of their having more persons to solicit business, will obtain more than one-half of the business, hence they will be able to stand the pressure better.

There is another and more important result that would accrue to the community at large from a more general distribution of power to small manufacturers, and that is that in cases of depression the burden would be more equally divided, instead of falling almost entirely upon those who lose their positions in a large establishment.

But without any regard to the social side of the question, the financial remuneration to accrue from the establishment of central stations from which electric power may be measured out to small consumers, as gas and water are now measured out, will soon bring about this final result.

In general, we may expect that the development in the future will be more toward larger powers in steam engines and the division of these into smaller powers through electric motors with the necessary consequence that there will be a greater demand for persons who understand something, at least, of electrical engineering.—*Wood and Iron.*

A PAIL filled with fresh mortar fell from the top of the new Court House in Macon, Ga., and struck squarely on its bottom on the head of a colored workman who was standing on the ground. The bottom was split into flinders, and the pail and the mortar completely incased his face, so that he was in great danger of smothering until relieved by a fellow workman.

Death of Prof. Gustav Robert Kirchhoff.

The death of this eminent physicist, one who has secured for himself a historical position in the scientific world, is just announced. He died on October 17, at Berlin. At the time of his death he held a chair in the great university in that city.

He was born on March 12, 1824. His scientific work began at an early age. In 1845, a year before his graduation, he published an essay on the passage of electricity through planes. In 1846 he graduated at the University of Konigsberg. In 1848 he began lecuring in Berlin on mathematical physics. In 1850 he was appointed lecturer on experimental physics in Breslau and in 1854 he assumed the chair of natural philosophy at Heidelberg. During this period, and up to 1858, he published many essays on magnetism, electricity, heat, vapor tension, and similar subjects. He held the Heidelberg professorship for over twenty years. In 1859 he discovered that the Fraunhofer lines in the solar spectrum were due to a correlation of emissive and absorptive powers of the same ignited vapor. This led him to his great discovery, and a step further brought him to the crowning work of his life. In this he was aided by Prof. Robert W. Bunsen, one of the greatest experimental investigators the world has ever seen. The two scientists working together evolved the method of spectrum analysis, and in 1860 perfected it in its essentials. When published to the world, it at once was recognized as a classical discovery. The immense influence of it as an analytical method of investigation in terrestrial and celestial chemistry cannot be overestimated. In astronomy, the constitution of the heavenly bodies, their motions, directly toward or away from the observer, have all been investigated or determined by this method. Its applications to astronomy have recently, in some of their forms, been illustrated and described in this paper. In chemistry, new metals have been found by it, that otherwise would never have been known. Were it only for its part in completing the relation of the atomic weights of the elements, by Mendelejeff's law, the indebtedness of chemistry to it would be great. Its importance is so great, and of such increasing influence on scientific work, that Kirchhoff's name will be more celebrated through it than through all his other achievements.

In 1870, he became a member of the Berlin Academy of Sciences, and received the highest honor awarded in Germany, the Prussian order *pour la merite*. Many works and essays were published during his life. In his death the loss is felt of one who, by his genius, had made himself a pioneer in modern chemistry, physics, and astronomy, for each of these branches owes much of its recent development to him.

An Electrical Stratagem.

According to the *Electrical Review*, when the electric telegraph was first introduced into Chili, a stratagem was resorted to in order to guard the posts and wires against damage on the part of the Araucanian Indians and maintain the connection between the strongholds on the frontier. There were at the time between forty and fifty captive Indians in the Chilian camp. General Pinto called them together, and, pointing to the telegraph wires, he said: "Do you see those wires?" "Yes, General." "Very good. I want you to remember not to go near nor touch them; for if you do, your hands will be held, and you will be unable to get away." The Indians smiled incredulously. Then the General made them each in succession take hold of the wires at both ends of an electric battery in full operation. After which he exclaimed: "I command you to let go the wire!" "I can't; my hands are benumbed," said the Indian. The battery was then stopped, and the man released. Not long afterward the General restored them to liberty, giving them strict injunctions to keep the secret, and not to betray it to their countrymen on any account. This had the desired effect, for, as might be expected, the experiment was related "in the strictest confidence" to every man of the tribe, and the telegraph has ever since remained unmolested.

Trade Mark Decision.

Judge Taft, of the Superior Court of Cincinnati, has just rendered a decision of interest in the trade mark case of Societe Anonyme de la Distillerie Benedictine de l'Abbaye de Fecamp *vs.* Mihalovitch *et al.* The plaintiff, the French corporation which manufactures the liqueur known as Benedictine, brought suit against the defendants for infringement of its trade mark. The defendants contended that the word "Benedictine" was a generic word, and opposed the plea for equitable relief on the ground that the plaintiff had deceived the public into believing that its product was manufactured by monks in an abbey at Fecamp. They adduced evidence to show that the Benedictine abbey was destroyed in 1795, and that no Benedictine abbey now exists in France. Upon the part of the plaintiff it was shown that its distillery was on the site of the monastery, and that its liqueur was made from the original recipe, which is still preserved. Judge Taft decided in favor of the plaintiff, and held the defendants liable for infringement.