The Chemistry of Confectionery.

An interesting lecture was recently delivered before the Society of Arts in London by Mr. William Jago upon "Chemistry of Confectionery." In flour confections or cakes—not sugar confections or sweets proper—the principal substances used are flour, milk, eggs, and sugar. For confectionery the weaker and softer flours, containing much starch and little gluten, are preferable. Milk is used as a moistener instead of water, because of its richness, average pure new milk containing 4.0 per cent of fat, 3.6 per cent proteids, 4.5 per cent sugar, 0.7 per cent ash, 8.8 per cent non-fatty solids, and 78.4 per cent of water. It is not only the fat in the milk that is of service to the confectioner, but also its proteids, which, though like the white of eggs have no very pronounced taste, yet confer a fullness of flavor which a simple solution of lactose in water would not possess. In baked goods the proteids of milk produce a moistness and mellowness of character, and new milk therefore gives to confectionery richness through its fat, sweetness through its sugar, and mellowness through its proteid.

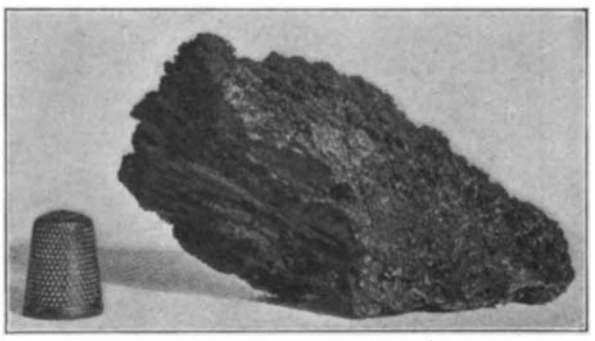
Next to milk, eggs are one of the most important moistening agents to the confectioner. In composition the white of eggs consists of proteids dissolved in water, while the yolk contains in addition to the proteid, fat and coloring matter. The white of eggs may be viewed as a solution of one part albumen in seven parts of water, while in the whole egg about two-fifths of the solids consist of fat and three-fifths of proteid, while the water of the whole egg amounts roughly to three-quarters of its weight. Another moistening agent used by confectioners is glycerin. If exposed to the air glycerin increases in volume through absorption of moisture. Chemically glycerin is a compound of carbon, hydrogen, and oxygen, belonging to the alcohol type. When used in small quantities in cakes the result is that drying is much retarded and the cake remains fresh and moist for a considerable time longer than would otherwise be the case.

Many aerating agents are used by confectioners, the chief of them being ammonium-carbonate, usually called "ammonia," or volatile sodium bicarbonate, tartaric acid, and cream of tartar. The chemical action of these on the confectioner's paste is to change the sugar present by fermentation into alcohol and carbon-dioxide gas, which has the mechanical effect of distending and lightening the dough. If, for instance, ammonium carbonate be mixed with other constituents of a dough, there is very little change perceptible until the dough is placed in the oven. With a rising temperature the liberated carbon dioxide and ammonia gases distend the mass and so produce the desired lightness. Like ammonium carbonate, sodium bicarbonate only commences to evolve gas when subjected to the heat of the oven, and even then it only evolves half its gas. When, however, it is treated with an acid the whole of the carbon dioxide gas is evolved, and of all acids the most convenient for this purpose is tartaric acid. When tartaric acid and sodium bicarbonate are mixed with flour in equivalent quantities, the result by moistening with water is that the acid attacks the carbonate, liberating all its carbon dioxide and forming normal sodium tartrate. The latter salt is comparatively tasteless, and the presence of the quantity produced as a residue from the amount of acid and soda necessary for the aeration of an average dough is not sufficient to injuriously affect the flavor of the resultant goods.

The British Admiralty has been carrying out a series of important armor-plate tests at the Whale Island butts, Portsmouth, for the first time with the 2-inch armor plates used in protective decks, and intended to form the splinter screens behind the guns in the central battery of the new 16,500-ton battleships. Plates from all the armor works were tested. The manufacturers were not on this occasion called upon to submit special sample plates. The Admiralty used those plates which they had already bought for the splinter screens. The results were highly satisfactory.

LONDON SMOKE DEPOSITS.

Of late years a great deal of attention has been drawn to the question of London smoke, and during the recent great fogs in that city, a number of experiments were conducted by Sir William Thistleton-Dyer, which showed that solid matter, consisting of soot and tarry hydrocarbons, was deposited during the worst fogs at the rate of so many tons to the square mile every week.



The size of the mass is shown by comparison with the thimble.

SMOKE DEPOSIT FROM ST. PAUL'S CATHEDRAL.

The fogs of the Thames Valley can, of course, never be avoided; but that particular quality of fog which takes its distinctive name from the great city itself could be prevented if its citizens were willing to use smokeless coal in place of the highly bituminous coal which they favor at the present time. There is a society in London known as the Coal-Smoke Abatement Society that has strenuously grappled since 1898 with the problem, and with the very best results. At a recent meeting of the Society, Prof. A. H. Church exhibited a specimen of a remarkable atmospheric deposit, which had been taken from the cornice below the dome of St. Paul's Cathedral. It is believed that this specimen, which is herewith illustrated, had taken about two hundred years to form. According to the Illustrated London News, to which we are indebted for our illustration, the mass contains one grain of carbon per 100 grains, and about half a grain of tarry matter in the same weight of deposit. The chief constituent is gypsum or crystallized sulphate of lime, produced by the action of the sulphuric acid of the city atmosphere on the carbonate of lime of the stone of which St. Paul's is built. This sulphate of lime is first dissolved by, and then deposited from the rain water. During the formation of the coral-like mass, the tarry particles of soot are inclosed within it. In order to give an idea of the size of the piece, an ordinary thimble is shown beside it in the illustration.

STREET ROLLER READY FOR TRANSPORTATION.

PORTABLE WELDING MACHINE, WITH ASBESTOS SCREEN FOR PROTECTING OVERHEAD WORK.

NOVEL USES FOR THE TROLLEY CURRENT.

BY DAY ALLEN WILLEY.

In making repairs and building extensions to its system the Union Traction Company, of Philadelphia, has in service an interesting variety of apparatus, most of which is operated by the current from the trolley wire. The company makes use of welded track joints, and for making the joints they use a portable welder, which is mounted upon a truck especially built for the purpose. The cupola has a capacity of about 1,800 pounds of iron. The blower mechanism is operated by a five horse power motor, carried on the center of the truck, which also has space for fuel, tools, etc. Two men only are required to operate it. To avoid the danger of melting the overhead construction by the heat from the cupola, a screen of asbestos, mounted on framework, is placed below the trolley wire.

For breaking joints and pigs of iron for the cupola a drop hammer has been designed, which is also mounted on a special truck, but is hauled by another car. The hammer proper weighs 1,500 pounds and has a fall of 16 feet, giving it sufficient force to break the heaviest joint in service. The winch is operated by an ordinary railway motor, and the mechanism, as will be noted, can be readily operated by one man. For supplying illumination for repair work, Mr. H. B. Nicholls, the maintenance-of-way engineer, has devised among other appliances some portable street lamps, which are connected with the overhead wiring by what is known as the fishpole circuit. The poles sustaining the wiring are merely hung to the trolley wire, so that they can be lifted off instantly to allow a car to pass, then replaced without delay. The lamps, which are of the incandescent type, are arranged in series of ten each, and furnish ample illumination for the most intricate repair work.

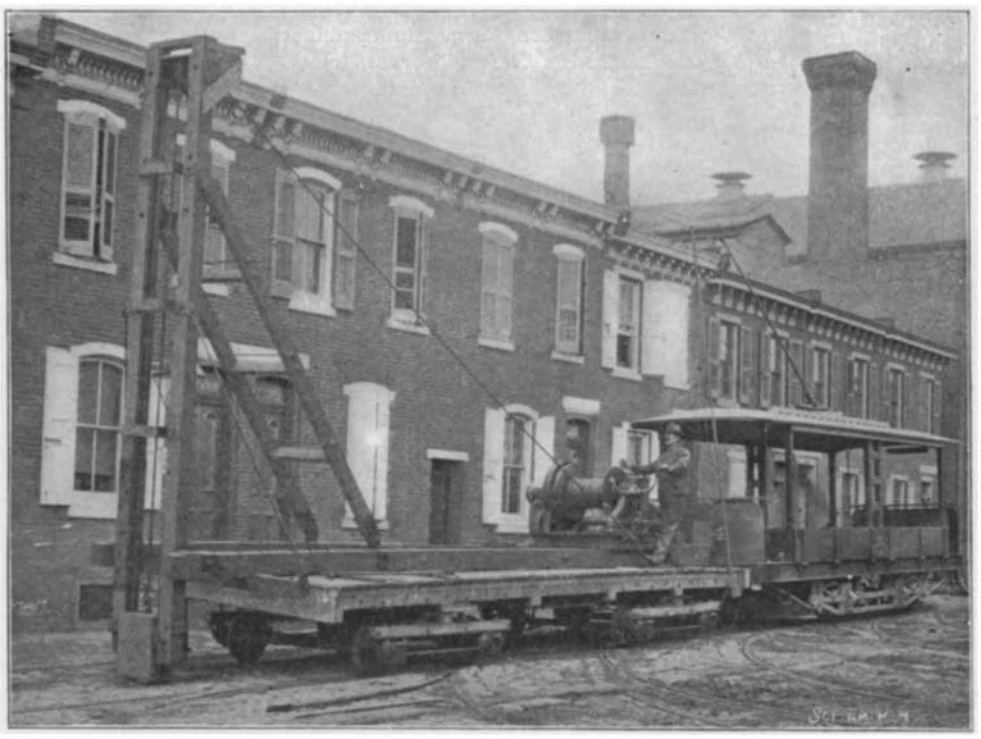
Another appliance which is of much practical value is the rail grinder, which is utilized for smoothing the welded joints. It consists of an emery wheel, driven by a two horse power motor which is placed on a barrow. It is carried on a motor car to the locality where it is to be operated, when a workman merely trundles the barrow to the joint. The motor is first connected to the trolley wire, then by a flexible shaft with the emery wheel, which polishes the joint in a few minutes. The current is then disconnected and the motor wheel backed to the car and taken wherever its services may be needed.

The charter of the company requires it to keep a certain portion of the pavement of the streets traversed by its lines in good repair. For surfacing the macadam and asphalt it employs a 15-ton road roller, which is transported by electric motor power on a flat car especially built for the purpose. On arriving at the street where the work is to be done, a detachable inclined platform is fastened to the end of the roller car, and the roller easily transferred to the surface. It can be loaded again by its own power. It is about the only special application in which steam is used in repair or other work by the company. Even in the system employed of greasing the curves, a large number of men have been dispensed with by the use of what the engineer poetically terms "grease chariots." These consist merely of small carts drawn by one horse, the greaser standing on a low rear platform. Each chariot is equipped with a broom, a crowbar for removing stones and other obstacles from the switches, a pail of grease, and swabs.

Another valuable addition to the company's equipment is a portable sand-blast apparatus. This is also hauled by horse power, and consists of an air compressor driven by an electric motor which takes current from the trolley wire. The work of cleaning the

rails and joints, where necessary, is quickly and thoroughly done by the application of the sand blast.

By drawing upon the trolley current for the variety of purposes above outlined, the company, as may be imagined, has been able to cut down its payroll considerably, and yet keep its system up to a high standard of efficiency. Engineer Nicholls and his assistant, not satisfied with the ordinary method of track welding, are now experimenting with the use of zinc for the rail joint, and the success which has attended their efforts will probably result in this metal being substituted for pig iron.



ELECTRIC PILE DRIVER FOR BREAKING RAIL JOINTS.

How Jugs Are Made.

BY THOMAS C. HARRIS.

Among the arts and crafts known to man there is probably none older than the making of pottery of some sort. Fragments of rude pottery are found among the remains of prehistoric man everywhere and some of them appear to have been made by machinery, other than the hands alone.

The old-time potter's wheel, of the time of Moses, may still be found in use in some parts of the Southern States, notably in the middle counties of North Carolina.

To any one accustomed to large manufactories, with special machines for turning out certain articles rapidly and cheaply, the hand-made methods of a hundred years ago would be curious and interesting.

A visit to one of the backwoods "jug factories," where the primitive potter's wheel, run by foot power, is still in use, would suggest to the modern mechanic that the wheel of time had slipped a cog and that that part of the world had gone back several centuries. When a boy, the writer was told that the molasses and vinegar jugs were made by plastering a layer of clay over a coil of rope which was afterward removed by uncoiling and withdrawing it through the mouth of the jug. Such a method would, of course, be impracticable.

The jug maker at one of these rude "factories" is frequently a small farmer, who devotes his spare time to the pottery business. Using the clay from his own farm, he employs no help, doing everything with his own hands, and cares nothing for strikes, freight rates or labor agitators. The product of his wheel is sold for so much per gallon in his immediate vicinity, or the country towns where he takes it for sale in his own wagon.

Under a rude shed the potter sits astride a rough bench while he revolves the wheel with one foot. To make the seat more comfortable he often uses an old saddle to sit upon. In front of him is a horizontal wheel or disk of heavy boards, revolving in a shallow box of wood. The wheel is carried on the upper end of an upright shaft with a heavier wheel on the same shaft, but near the ground. The lower wheel serves only to keep up a steady motion imparted to it by the movement or sidewise thrust of his foot on the swinging foot lever.

The foot power is simplicity itself. The foot lever is a stick or rod of wood with a pivot or peg at its outer end, while the end next to the operator is suspended to the bench by a piece of rope or chain. A short piece of wood connects the crank in the vertical shaft to the foot lever, and the side-way movement of the lever keeps the wheel in motion.

Having previously tempered his clay from the clay pit, he divides it into lumps of the proper weight for a jug of a certain size. One of these plastic lumps is placed on the center of the revolving disk and the potter proceeds to give it form and shape, mainly by the manipulation of his hands alone. It is interesting to watch the soft clay grow into symmetrical shape under the simple manipulations of the potter's fingers, sometimes assisted by some simple tool of wood or bone.

The first step in shaping a jug is by inserting one or two fingers of one hand into the center of the revolving lump, while the other hand is used to press on the outside. This produces a hole in the clay, which may be as wide as necessary, by simply moving the fingers to one side of the center. The clay now assumes the shape of a thick ring and is made thinner and drawn upward to form the side walls of the jug, by simply raising both hands at the same time, pulling the clay up between them. At this stage the article has assumed the form of a cylinder or wide-mouth jar, which a few touches at the brim will complete. To make the cylinder into a regulation jug, the upper rim is forced or bent inward with the hands, into the form of a dome, while the neck and lip are shaped with one finger inside the orifice and a stick on the outside.

The revolving mass of soft material responds readily to every touch of the fingers, bending this way or that, but the speed of the wheel must be comparatively slow; otherwise the centrifugal force would throw the walls outward and spoil the shape. If the jug is to have a handle, it is molded separately with the hands, bent into shape and the ends pressed into good contact with the moist jug. At the bottom, the jug is still stuck fast to the center of the wheel, but may be lifted off after drawing a fine wire under it.

After being properly dried, our farmer-potter proceeds to bake his pottery inside a long arch of brickwork. This arch has a chimney at one end and the fuel, which is wood, is fed into the other. In the arch, or oven, at intervals, there are loose bricks which may be removed during the firing, and common salt is thrown through these openings to produce a glaze on the surface of the ware. Some skill or experience is necessary to conduct the firing properly, or the pottery will be spoiled.

Though often ungraceful in shape, this pottery is still in common use wherever the distance from trade centers makes freight rates too dear on such bulky and heavy articles.

PORTABLE LIGHTS FOR CONSTRUCTION AND REPAIR WORK.

House Cleaning for Fishes.

In cleaning the tanks at the Aquarium they go about the work always in just the same order. In most cases the fishes come to be familiar with the process and govern themselves accordingly.

According to the New York Sun, the water in the tank is lowered to about half its usual depth, and the ends and the back and the glass of the tank are cleaned and scrubbed. The cleaning might easily be made very confusing, disturbing and dangerous to the fishes, for fishes are very easily frightened and likely then to do themselves injury, if not to kill themselves; but any such occurrence is avoided by going at the work on a system to which the fishes speedily accommodate themselves.

The cleaner always begins work on one end of a tank and always at the same end. The fishes appear to know perfectly what is going on, for when the cleaner begins there they always go to the other end of the tank and stay there quietly until the first end is cleaned, when they shift over to that end, staying there while the cleaner is at work elsewhere in the tank.

Next the man at the work tackles the back of the tank, the fishes then loafing around the front by the glass, and when the man gets through with the back and tackles the inside of the glass front of the tank, the fishes take possession of the back of the tank. The cleaner takes pains always, of course, to keep the long-handled brush with which he works close to the end or side upon which he is engaged; he doesn't slash around with it over into the part of the tank where the fishes have temporarily congregated, but is careful to let them realize that where they are, they're all right, and that nothing is going to interfere with them.

In many of the tanks, so well, apparently, do they understand it, that the fishes are scarcely disturbed by this systematic cleaning work at all; whereas with the work done in a helter-skelter way, even seasoned fishes would be thrown into a state of dangerous excitement.

In the valley of Camonica, in northern Italy, electric furnaces have been erected for the purpose of manufacturing pig iron under the Stassano patent. There are three furnaces, taking 500 horse power each, in each of which furnaces electrodes are employed, placed in the lower part. The ore is pulverized before being put in the furnaces, and a sample carefully inspected and analyzed with the object of ascertaining how much carbon will be necessary to reduce it successfully, likewise the required quantity of fluxes. After a determination of the lime, carbon and silicate, the proper proportions are added to the pulverized ore, and briquettes are formed, to which are added from 5 per cent to 10 per cent of coal tar. The furnace heat developed around the electric arc decomposes the iron ore, the oxygen with the carbon uniting to form carbon-dioxide. The figures given show that 3,000 horse power hours of the current, costing $3.42, are required to make one metric ton of iron.

PORTABLE MOTOR AND EMERY WHEEL FOR SMOOTHING WELDED JOINTS.

Automobile News.

Apart from the desirability of obviating the danger which attends the use of the highly volatile petroleum spirit in oil engines for motor-car purposes, the question of the difference in cost of the heavy oils and the spirit is of quite sufficient importance to encourage inventors to persevere in the direction of producing an engine which can utilize ordinary lamp oils without causing a nuisance and without becoming clogged up by oleaginous deposits resulting from combustion. According to the Engineer, still another method is working at the Sheffield Technical College and elsewhere with good results. In this case a new type of carbureter—the Moorwood-Bennet—is used, in which the oil, and not the air, is heated, and the air is caused to percolate through the former. In this instance a residue remains in the carbureter, but is not allowed to enter the motor cylinder; thus the exhaust is free from vapor and odor. The residue can be discharged at intervals.

Automobile goggles are a hideous necessity, and are particularly obnoxious to women automobilists. In order to provide an effective guard for the eyes which will be somewhat more sightly than the usual contrivance, various expedients have been resorted to. Paper fans, or screen-like masks, with designs of neatly-drawn heads, have been proposed by one ingenious artist. But the specimens which he produced, although greatly admired, were too artistically impractical for the purpose of the chauffeuse. Ladies found that the faces (portraits of Bernhardt, Rejane, Yvette Guilbert and other celebrities) were wonderfully attractive, but that they were by no means an adequate protection when the pace was fast and the dust flew up. Still another artist conceived the idea of using beaten silver masks representing the countenances of Greek goddesses. Although the faces of Artemis and Pallas were just as pleasing to look upon as those of French actresses, their weight was found to be unbearable. A milliner now comes along with a "creation" which springs, not from any artistic idea, but from a true appreciation of what is needed. He —for it is a man—has invented a mica veil perfectly transparent and yet absolutely dust and air proof. The veil is tied over the hat like the ordinary gauze fabric, and lends itself to manipulation just as readily. That the veil should sparkle and shimmer fantastically in the sunlight is by no means an objection.

M. Camille Jenatzy, a French automobile engineer, has devised a combination electric and petrol motor on the same vehicle. The system is economical and ingenious in its design. The apparatus comprises an internal combustion petrol engine, of which the flywheel on the crankshaft is replaced by a dynamo which acts as a flywheel at the same time as it sends current into a storage battery. The advantage claimed is that the petrol motor need only be of just sufficient power to propel the vehicle on the level at the highest desired speed, and that the energy stored in the battery can be utilized in the second (electric) motor when additional power is required. By this arrangement the petrol consumption is reduced by about 50 per cent. The car can be started by the electric motor, provided that a store of energy is present, and when the car is started the petrol engine can be thrown into gear. M. Camille Jenatzy, on a racing vehicle fitted with this electric-petrol combination motor, has covered a kilometer at the rate of 65 miles an hour, and has also made satisfactory trial with a public service omnibus weighing about five tons. Messrs. Lohner & Co., of Vienna, are also building automobiles propelled with electric-petrol motors, but which are entirely different in design from the Jenatzy apparatus. In the Lohner system an ordinary Daimler petrol engine drives a dynamo, which in turn operates electric motors on the hubs of the two front wheels. It is claimed that this arrangement gives a higher efficiency than the usual transmission through a change-speed gear. When full power is not wanted for immediate use, there is an arrangement by which part or all of the power of the engine may be diverted to storing energy in accumulators.

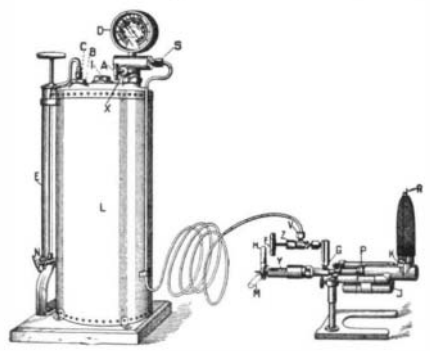
An exhibition is soon to be made on the Boulevard of this city of a new style of motor vehicle by Mr. C. L. Dorticus, lately perfected by him, which it is thought will be of special interest to automobilists, since it is an electric vehicle, without batteries, said to have a running limit of 150 miles without stop, and capable of being speeded anywhere from 5 to 30 miles an hour. This is at least three times the distance that any of the autocars now on the market are supposed to travel without having to stop to recharge batteries or replenish fuel. The inventor states that the operator of his machine can, after a delay of about ten minutes and the expenditure of a few cents at the most obscure country town, be ready to proceed another 150 miles. The new auto, it is stated, resembles a light runabout wagon in appearance, weighing altogether less than 800 pounds. There are said to be no gear wheels or chains visible or concealed in the whole make-up, and the running is noiseless and easy, the vehicle being under the perfect control of the operator at all times.

A NEW STEREOPTICON LIGHT.

The apparatus herewith illustrated is an improved form of a hydrocarbon burner in combination with a glow mantle of the Welsbach order, for the production, by the use of ordinary kerosene oil, of a brilliant white light particularly adapted for lantern illumination, as well as forming an artificial actinic light for photographic purposes. We are advised that it has lately been introduced by Williams, Brown & Earle, of Philadelphia, Pa.

The essential feature consists in vaporizing minute quantities of kerosene oil in a heated state under air pressure, which in mixing with air burns in the form of a gas and renders a mantle over the burner highly incandescent. The complete apparatus is quite light, easily set up and is readily put into operation.

The small air cylinder, *L*, carries at the bottom on the interior the kerosene oil (which should be of the best quality) under an air pressure of fifty pounds to the square inch, maintained when necessary by an attached bicycle pump, *E*. A small pressure gage, *D*, at the top registers the pressure. The oil is forced up by the air pressure through a tube extending in the interior to the bottom of the cylinder through a regulating valve, *X*, on the exterior and a very small spring coiled wire pipe to the burner, and the supply there is regulated by another valve, *F*. From this valve the oil passes through a hot tube at *P*, and is admitted by a needle opening further along in the form of a vapor to the concentric Bunsen burner located just to the front of *P* (not shown), which consuming part



IMPROVED LANTERN HYDROCARBON-BURNER.

of the vapor constantly keeps the tube hot; the rest continues to the main burner located under the mantle, *R*, at *K*, and burning the gas there renders the mantle incandescent. *Y* is the needler for the purpose of keeping the needle aperture clear.

To start the burner it is necessary to heat for a few minutes the vaporizing tube, *P*, which is done by igniting a small quantity of alcohol placed in the supplemental cistern, *J*, suspended underneath the vaporizing tube. Small inlet air tubes are arranged on each side of the inlet burner tube.

It will thus be seen that it is a very economical light to maintain.

Some English Bicycle Novelties.

The English Humber Company has brought out a novelty in the way of frame construction which it is hoped will attract buyers during the coming summer. It is a cross frame with double members in lieu of the lower main tube. This pattern is also shown with a spring attachment, the steering post working up and down inside a coil which is said to take up any vibration in the handle bars.

The Enfield Cycle Company has adopted a frame in which the ordinary diamond is stiffened by the use of extra tubes, one of which connects the bridge of the chain stays with the saddle pillar tube, while the other passes to the lower part of the head.

Searching for Baldwin.

A searching party is to be sent out to hunt up the Baldwin-Zeigler expedition. The steamer "Frithjof," which conveyed the Baldwin party to Franz Josef Land, has been chartered for the purpose. She will leave Tromsoe on July 1, under the command of Capt. Kjeldson, her former captain. From Tromsoe the "Frithjof" will go to Camp Zeigler, on Alger Island, 80 degrees 24 minutes north latitude. At this camp Baldwin's last instructions will be secured, after which the auxiliary expedition will proceed northward.

News of widespread desolation comes from Guatemala; all the towns, villages and plantations of the rich section of the country have been destroyed by earthquake. The loss of life is said to have been slight, owing to the easy means of escape offered by the low houses. The earthquakes are due to the activity of the Chingo volcano. Great damage was wrought in Solola, Santa Lucia, Nahuala and San Juan.

Electrical Notes.

At Stangfjorden, in Norway, a factory for the treatment of turf by electrical methods has been erected, and 400 kilowatts energy are now utilized in this manufacture. The process is patented by T. Jebsen, and is dependent upon the use of the electric current for heating purposes, in specially designed retorts. The turf is first dried, and formed into blocks by pressure, the water contents in this way being reduced to 20 per cent. The dried blocks are then inclosed in the retorts, and heated to the requisite temperature by the internally placed resistance coils. A gas useful for heating and illuminating purposes is obtained, while a tarry liquid also distills over, which can be worked up for paraffine, ammonium sulphate, and methyl alcohol. The turf charcoal remaining in the retorts is a useful substitute for either wood charcoal or gas-coke. The electrical installation at Stangfjorden comprises five 128 horse power turbines, direct-coupled to five dynamos of equivalent size and capacity. The current from these is used for heating the retorts, while a separate turbine supplies the requisite mechanical power. The 12 retorts are designed to deal with 1,000 centners of air-dried turf per day.

A curious parallelism is presented between the well-known Hoepfner process for the extraction of copper from its ores and compounds, and a method just patented by Paul Bergsoe of Copenhagen for the electrolytic recovery of tin from scrap and waste alloys. The Hoepfner process, it will be recalled, depends upon the varying valence of copper, and consists in bringing a salt of copper in its higher state of oxidation into contact with the ore, whereupon copper passes into solution and the solvent is reduced from the cupric to the cuprous condition; this solution is then electrolyzed with insoluble anodes to deposit one-half of its metal, restoring the remainder to its original valence and reconstituting the solvent. Bergsoe reacts upon tin-bearing materials with stannic chloride, and subjects the stannous salt formed to electrolytic treatment as above, restoring its valence and solvent power, and recovering an amount of metal equivalent to that dissolved. Both methods are simple, and indeed identical in theory. The Hoepfner process has encountered in practice the very serious obstacle of a low reaction velocity—a solvent action so slow as to render its application to the most commonly occurring ores of copper, the sulphides, of doubtful practicability. From this defect the new process is free, for the stannic salts are energetic solvents. The successful treatment of tin scrap, however, has proven in the past a difficult problem, not only on account of its very low tin content, but because of the tendency of the iron to pass with the tin into solution. As applied to this purpose, therefore, the value of the new process is to be demonstrated.—Electrical World.

The conversion of the Mersey Tunnel Railroad to electric traction, by the British Westinghouse Electric and Manufacturing Company, Limited, is rapidly approaching completion. This railroad, upon which at present steam traction is utilized, has never been a paying concern and has passed through many vicissitudes. Yet the traffic over the railroad is sufficiently heavy to render it remunerative, and it is anticipated that by the utilization of the more economical electric system of haulage this end will be attained. The present steam traction, which necessitates the provision of an elaborate system of ventilation, is so abnormally expensive that there is no possibility of any profit being made. The Westinghouse Company, convinced that the railroad would pay if electricity were adopted, approached the directors of the company and offered to effect the necessary conversion at a cost of approximately $3,175,000. The railroad is being reconstructed upon the third-rail system, the current rail being laid in the center of the existing track. The Board of Trade, however, have insisted that the track rails shall not be utilized for the return current, as is generally the case, so a fourth rail is being laid outside the track. The necessary conversion is being carried out without interfering with the traffic, the third and fourth rails being laid at night, during the suspension of traffic. The current is being conveyed from the generating station to the tunnel by means of huge cables. The rolling stock is to be similar to that at present in use upon the Central London Electric Railroad. A large generating station is being erected at the Birkenhead terminus of the line. It is an imposing building of brick with stone facings, and is 145 feet in length by 135 feet in breadth and 74 feet high. It is divided into two departments, the generating and boiler houses, respectively. The station is now ready for the reception of the generating plant and machinery, which are being manufactured at the Pittsburg works of the Westinghouse Company of this country. There will be three generators of 600 kilowatts each, and two of 200 kilowatts each, capacity, the necessary steam power being supplied from nine Stirling boilers. The trains will be run with a voltage of 550, the same as that by which the electric cars in Liverpool Street are propelled.