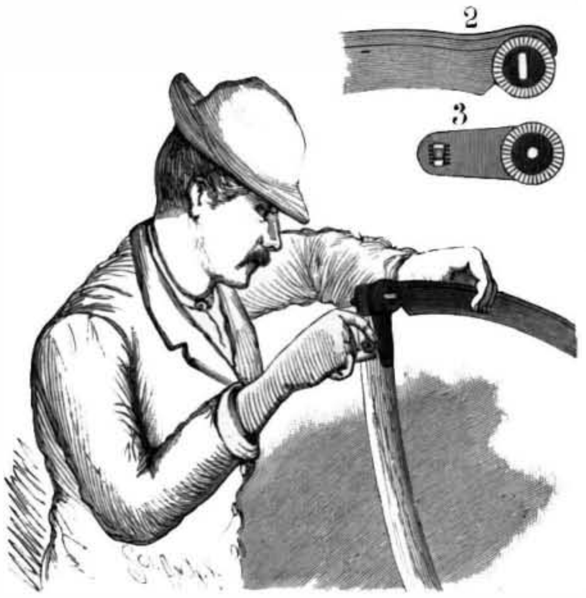
A READILY ADJUSTABLE SCYTHE.

The illustration represents a device adapted to facilitate the adjustment between the blade and snath of a brush, a cradle, or a hay scythe, enabling the operator to adjust the blade at any desired inclination to the snath, by means of a gage engaging the heel portion of the scythe and the contacting portion of the snath. The improvement has been patented by Christian Frederickson, of Cameron, Wis. Fig. 2 is a plan view of the heel portion of a scythe blade, and Fig. 3 is a bottom view of a plate having interlocking engagement with the blade, and for attachment to the snath, according to this invention. The annular toothed rib on the scythe heel has a transverse slot, and on the opposite under face of the heel are right-angled recesses, in which fits the head of the bolt by which the scythe, with the interposed adjusting plate, is attached to the snath. The adjusting plate has a clutch surface for interlocking with the similar surface on the heel of the scythe, and at the other end of the plate is a transverse slot, with teeth at each side, the slot receiving a squared portion of a bolt by which the plate is locked upon the snath, which rests upon the upper face of the plate. By loosening the bolt at the heel of the scythe, the blade may be adjusted at any desired angle, the clutch of the adjusting plate being brought into proper registry with the clutch of the scythe heel, and the bolts holding the respective parts firmly in the desired position. By this construction also the heel of the scythe blade is materially strengthened.



FREDERICKSON'S SCYTHE-ADJUSTING DEVICE.

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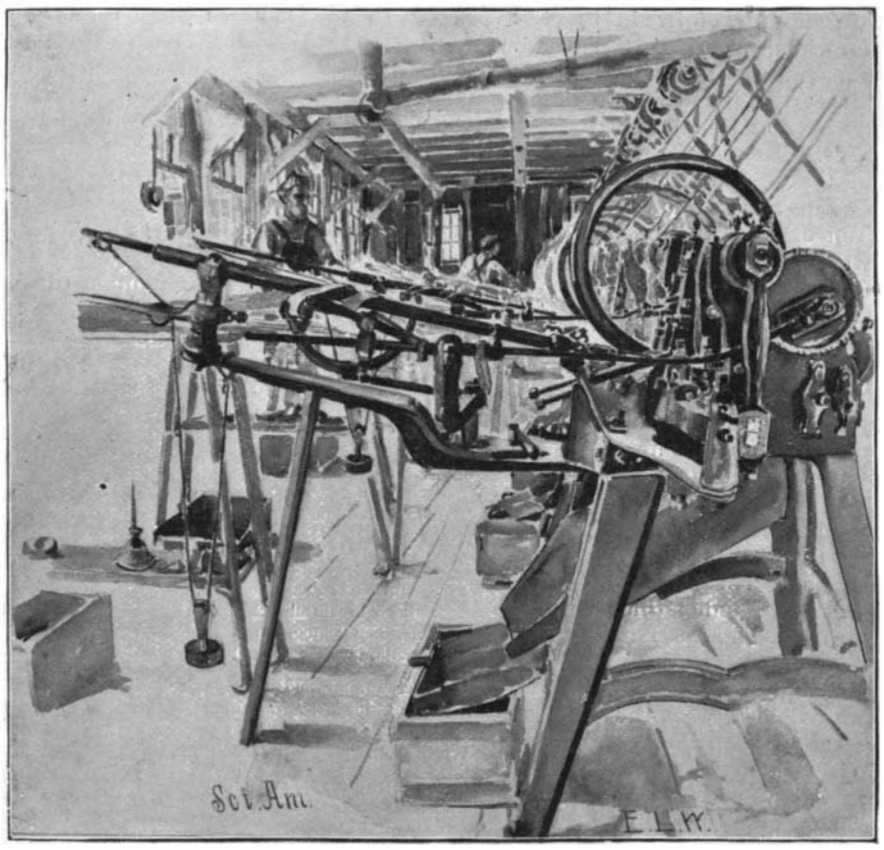
Explosion of an Aerolite.

A large aerolite exploded above the city of Madrid, Spain, at 9:30 a. m., February 10. The explosion was accompanied by the vivid flash of light and a loud report; the buildings were shaken and many windows were shattered. The concussion was so severe that the partition wall of the United States legation building collapsed and nearly all of its windows were broken. The officials of the Madrid Observatory state that the explosion occurred 20 miles above the earth. A general panic prevailed in the city.



STRIPPING SHEETS FROM WHICH TACKS ARE MADE.

Coal Consumption on French Tramways.

Comparative figures of coal consumed per car mile run on French street railroads, employing different methods of propulsion, are contained in an article on electric roads, by E. Cadiat, in the Portefeuille Economique des Machines of October and November of last year.

Storage Battery Traction.—On the lines at Paris from St. Denis to the Madeleine and from the Opera to Neuilly the car mileage aggregated in 1893 502,060, or per day 1,376 car miles. (The cars have room for 50 passengers.) The steam engines at St. Denis furnished for this service 250 horse power 23 hours and 125 horse power 6 hours, a total of 6,500 horse power hours, or 4·72 horse power hours per car mile. Mr. Badois, who reported these figures, gives 2·75 pounds of coal as the consumption per horse power hour, and arrives at 12 98 pounds of coal per car mile.

Trolley.—At Marseilles, during the first two weeks of operation, 150,348 pounds of coal were consumed to run 19,970 car miles, and during the second two weeks 150,975 pounds for 18,983 car miles. The average is 7 73 pounds, which, however, includes the coal used in lighting the cars and the power station.

At Havre the following figures were obtained during October and November, 1894. It took from 1·75 to 2 horse power hours to develop a kilowatt hour; 1·28 kilowatt hours were consumed per car mile, or from 2·24 to 2·56 horse power hours, equivalent to about 6·72 pounds of coal. The cars have room for 50 passengers.

At Milan, with cars having room for 34 passengers, 0·88 to 0·91 kilowatt hour, or 1·6 to 1·76 engine horse power hour, or 4·6 pounds to 5·0 pounds of coal produce one car mile. (From a paper by M. De Marchena.)

Compressed Air Traction.—The line at Nogent-sur-Marne has grades of 4, 4·5, 5·8, and 6·2 per cent. The cars have room for 50 passengers. Mr. Badois made a test from October 29 to November 4, 1894, and found 34·5 pounds of compressed air consumed per car mile.

To arrive at the corresponding coal consumption, Cadiat makes the following considerations: In an engine, as there used, from 100 to 150 horse power, 17·6 pounds of steam will develop a horse power. One horse power delivered to an air compressor of good design will produce 10 pounds of compressed air at 600 pounds per square inch (the pressure adopted on said line).

Expressed in steam, the expenditure is, therefore, $34{\cdot}5 \div 10 \times 17{\cdot}6 = 60{\cdot}7$ pounds, to which he adds $\frac{1}{12}$ for a certain loss, and arrives at 66 pounds of steam consumed per car mile, which, he states, can be generated in best French boilers with 4·8 pounds to 5·5 pounds of coal.

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Lactates for Electro-plating Baths.

Metallic lactates are strongly commended to electro platers by Dr. Jordis, in a communication made to the German Electro-Chemical Society. He affirms that lactic acid affords an excellent solvent in electro-plating baths, and yields good, adherent metallic deposits. He reports that he has succeeded in obtaining from lactate baths, coatings of copper and brass, of varying shades, on iron, zinc, and copper; of zinc on iron and copper; and of iron on nickel. Silver lactate yields a pure white coating of silver on amalgamated brass, which takes a high polish.

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PREPARATIONS are in progress at Glasgow University for celebrating Lord Kelvin's fifty years' connection with that body.

THE MANUFACTURE OF TACKS.

In many villages and towns of southeastern Massachusetts, the manufacture of tacks, or "tacking," as it is termed, is one of the foremost industries. Abington, Whitman, Taunton, Middleboro, Plymouth, Kingston and other adjacent places furnish a greater part of the supply.

In Kingston much of the earliest work in this line was done, and here the first machine for making tacks was invented. The manufacture of tacks was begun in this section, about the year 1820, according to the memory of one of the oldest "tackers." Like all first products, they were rudely made.

At intervals, through the countryside an old man traveled from house to house, much as did the tinware man, and peddled tacks. This old fellow, a native of Taunton, named Albert Field, made his tacks by hand, using a vise and dies, and with a clamp so arranged that by pressing with his foot, the blank (a small piece of iron) was held, while with a hammer he fashioned the tack.

BURNISHING TACKS IN THE "TUMBLER."

The inventive faculty of the Yankee found a field in making tacks, and soon a machine was invented in Kingston, by one named Reed. This contrivance cut a headless sort of tack. Melborne Curtis, of Middleboro, then invented a machine having a lever attachment, which headed the tack. About 1840 an improved machine, called the Blanchard, came into general use. About fifteen years ago, steel was tried. This was domestic steel, manufactured in Pennsylvania, Virginia and Ohio.

The majority of shoe tacks are cut from Bessemer steel. Shoe tacks have been used only about forty-three years, the first having been made in Whitman, by H. H. Brigham and Deacon Cook. These tacks are fine, with small heads, so that the awls and other sharp tools used by the shoemakers cannot be greatly injured by contact.

The machine tack is finely pointed, quickly forced into leather, and remains standing firmly until driven. To test the point, a tack is pressed into the thumb nail of the "tacker," when if it penetrates and stands easily, it is considered all right. Twenty-five or more different varieties of shoe tacks and nails are used for shoe manufacture.

Among the many styles are the roundhead, flathead, brass, countersunk, shankhead and lasting, while new styles are constantly being made.

A large supply of tacks is exported. Quantities go to England, South America, Australia, France and Germany. The sheets of rolled steel come in bundles, usually thirty-six by twenty inches.

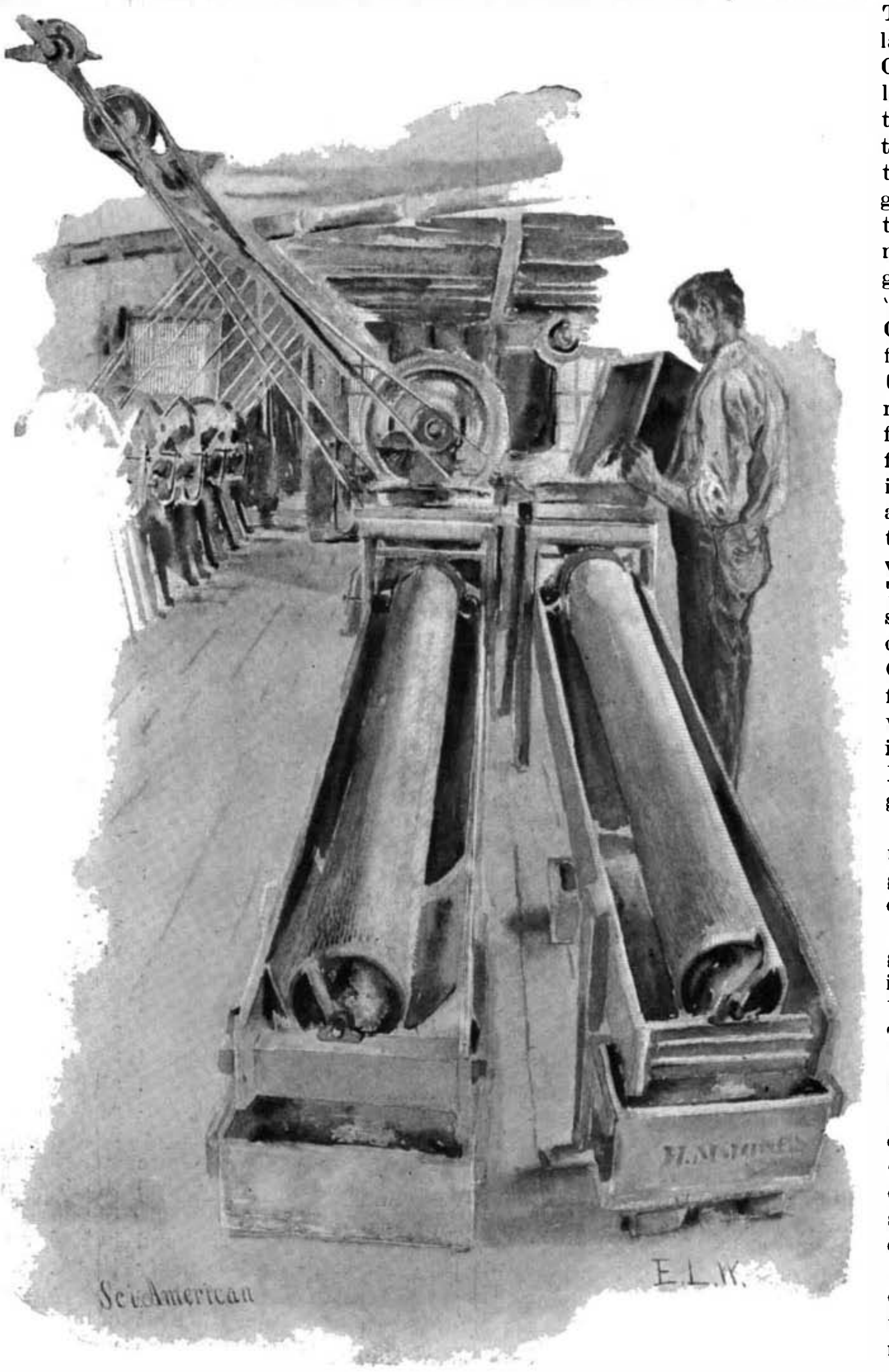
When ready to be used, a workman called a "scaler" takes these sheets one by one, and puts them into a vat of vitrol, which removes the scales. When the scale is removed, the plate is washed in water, and dipped into a bath of lime or white wash, which neutralizes the acid. Another workman passes the sheets into the jaws of a great machine which cuts them into slender strips twenty inches long.

The man in charge of the line of machines then goes from one to another, placing in the end of a long wooden shaft one of these strips. The steel strip is forced by an arrangement for feeding it into the jaw-like aperture, where a tack is quickly bitten from it, headed and dropped beneath, where it makes one of many others already received in a box, which when full is replaced by another. At each revolution of the machine one tack is made, and two hundred and seventy in a minute.

The tacks are then poured by the boxful into another machine called the "rattler" or "tumbler," whereupon the tacks are "rattled" about thoroughly, and an air blast forces out the dust of lime, while the friction caused by their contact with each other gives them a peculiar luster; black lead is also used with them as a factor in the burnishing process.

They are then taken to the "sifter," an ingenious but simple machine for sorting them. A boxful is poured into a hopper at the head of the "sifter," and passes down into a slowly revolving, perforated cylinder, which is set at an incline. This is punctured with narrow and quite long holes, too narrow for a headed tack to go through. Down this cylinder the tacks slowly sift. Those that are perfect drop into a box. The imperfect ones, either headless or too small, drop through the perforations into receiving waste boxes.

In the packing room young women put the tacks into pound packages. An experienced energetic girl can pack sixteen hundred pounds a day, which is considered good work, as the average is ten hundred.



CUTTING TACKS 270 A MINUTE.

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The Pioneer Technical Schools.

In an address before the Engineering Association of the South, delivered at the annual meeting at Nashville, Tenn., on November 4 of last year, President Dudley gave a deal of information upon the early history of technical training. His subject was the "Development of Technical Education in the United States," and we are indebted to the Inland Architect and News Record for the following notes:

The first school in the United States to give a course of engineering was the United States Military Academy at West Point. The first two students who graduated as engineers graduated there in 1802. The military academy continued to graduate the only engineers in this country until 1840, when the Rensselaer Polytechnic Institute graduated its first class of thirteen civil engineers, being the first graduates in civil engineering in any English speaking country. The Rensselaer Polytechnic Institute was founded in 1824 by Stephen Van Rensselaer as a "School of Theoretical and Applied Science." In 1849 it was reorganized as a general polytechnic institute, and it still devotes itself to civil engineering, dividing the course into general and sanitary engineering.

The total number of engineering schools or schools giving engineering degrees, in 1889, was ninety-four. Previous to 1802 engineers were self-taught, and from 1802 they were either trained in the office of some engineer or graduated at West Point.

Until recently in New England, and at present in old England, "students" or pupils were apprenticed, so to speak, to practicing engineers. This custom, however, has never prevailed to any very great extent in the West. No articles were signed by the "pupil," but he was supposed to pay $100 per year for three years to the engineer in whose office he was serving, and he was paid 12½ cents per hour for his work in the field, which was credited on his tuition account. "After the war" this system began to die out, and the pupil was paid 12½ cents for his office work as well as field work, and in this way he could frequently more than pay his tuition. This, however, did not cause any loss to his "instructor," because his services were charged at a rate of from $2 to $6 per day, according to the skill of the pupil. By this system the pupil learned much or little, as he chose. He asked such questions as he pleased, and got such answers as he could, but what he learned he usually learned well, because he put into practice immediately and constantly what he learned.

Up to 1830 the word engineer conveyed to the minds of the vast majority only the idea of a military officer. The phrase civil engineer had been but lately coined. In 1828 the Institution of Civil Engineers was incorporated in England, and when civilians assumed the title they incurred the wrath of the military men. In 1835 the Rensselaer Institute first resolved to form a distinct "engineering corps," receiving on graduation the "Rensselaer Degree of Civil Engineer." As we have seen, their first class graduated in 1840.

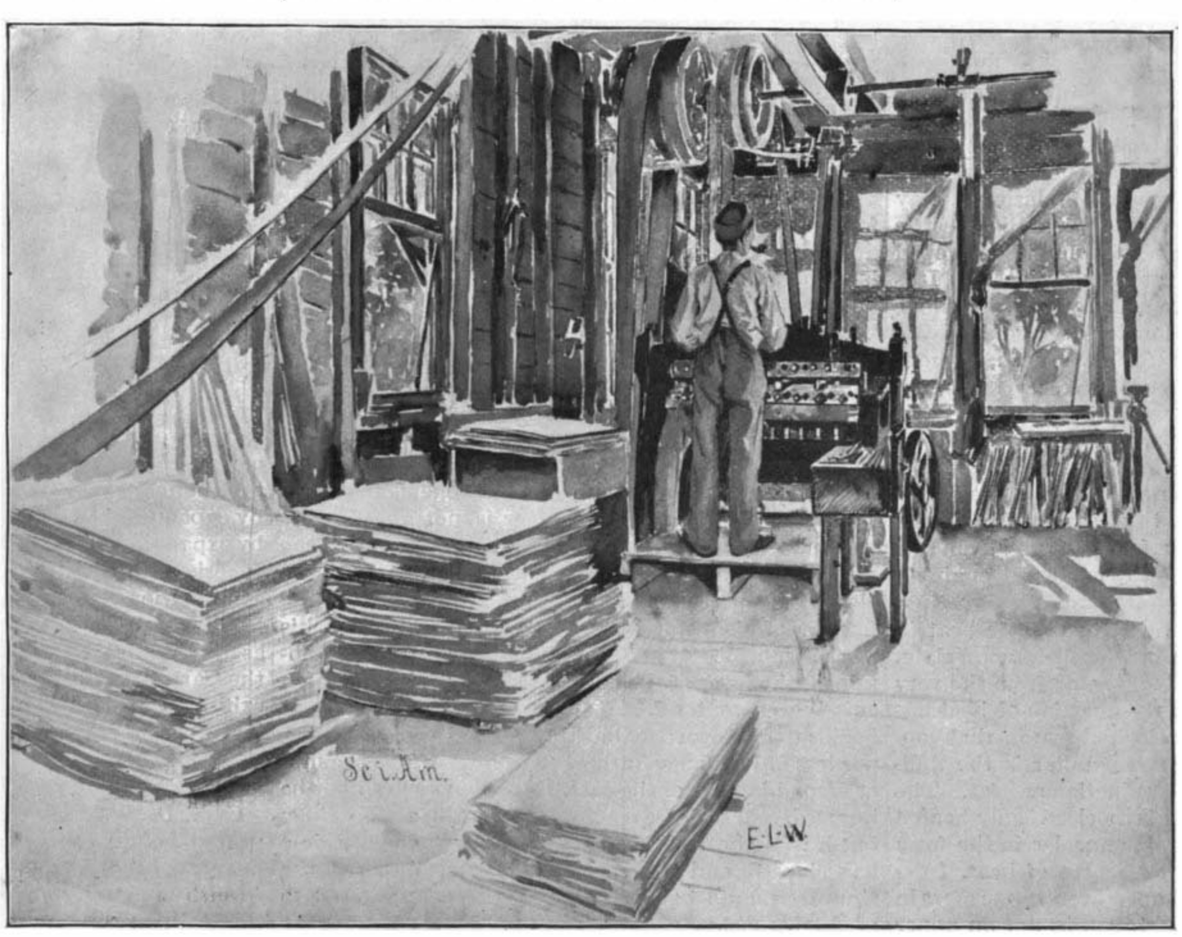
The School of Engineering of Union College, at Schenectady, New York, founded in 1845, was the second in the United States. The third was the Lawrence Scientific School, at Harvard, founded in 1846. The fourth, the Sheffield Scientific School, at Yale, founded in 1847, nominally, but was not a live and active school until 1861. The fifth was the engineering department of the University of Michigan, founded in 1852. The sixth, the Brooklyn Polytechnic Institute, founded nominally in 1845, but did not begin graduating until 1866. The Columbia College School of Mines was founded in 1863 and opened in 1864. It was the first school in the United States in which mining was taught as a science. Here the college course in mining engineering started in the United States.

The Massachusetts Institute of Technology was incorporated in 1861 and began operations in 1865. In 1868 the first class, composed of thirteen, graduated.

The first degrees in mechanical engineering were conferred in 1868 by three institutions—Rensselaer conferring five, Yale one and Massachusetts Institute of Technology one.

Stevens Institute was founded in 1870; its electrical course was instituted in 1880. Sibley College, Cornell, was founded in 1870. The first civil engineering degree was given in 1871. In 1875 the course in electrical engineering was instituted, as well as a course in marine engineering.

The latest course in engineering is chemical engineering, which is given at the Massachusetts Institute of Technology.



REMOVING SCALE FROM THE SHEETS IN MAKING TACKS.

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Brussels a Seaport.

"Bruxelles Port de Mer" is the new name for the capital of Belgium, says the Nautical Magazine. The burgomaster signed a decree to this effect at the beginning of last month in anticipation of the contemplated ship canal. The present waterway by means of the Scheldt and the Rupel and Willebroeck Canal is 200 years old. The contract for this enlargement has now been signed and will provide for navigation by vessels carrying 2,000 tons. There will be a depth of 21⅓ feet, obtained not by dredging but by raising the water level, and there will be three locks. Although provisions are made in the stone works for the above named depth it is not contemplated to exceed a depth of 18½ feet at first. The waterway is to be finished in five years, and the estimated cost is £14,000,000. At present the sea traffic of Brussels is not very extensive.

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MINING SCHOOLS IN RUSSIA.—The Russian Ministry of Public Instruction has decided to establish mining schools on a large scale in the mining districts, especially in the province of Ekaterineslav. The school will cover all branches of the subject, and the idea will be followed up to a considerable development if the results are sufficiently encouraging.

Electric Heat in Dental Practice.

BY DR. LEVITT E. CUSTER, B.S., D.D.S., IN THE SOUTHERN DENTAL JOURNAL.

Electric heat, when obtained by heating a conductor that does not oxidize, differs from other forms of heat in that it is without gas, noise, or odor, and on that account is of special value in dental practice. Electric heat also differs from that obtained from other sources in that it can be controlled and regulated with the utmost precision.

No case in dental practice, or in any other practice for that matter, calls for a blast of air exactly at blood temperature, so much as an almost exposed pulp. And no instrument so nearly meets this requirement as the electric warm air blast. With air at a constant pressure, which is carried over electrically heated wires at a constant heat, the air escapes from the syringe nozzle at a uniform temperature. The heat can be varied by the operator in three ways: by manipulating the air pressure, by altering the electric heat by means of the rheostat, or by varying the distance of the syringe point from the cavity. After a little experience, the operator can dry out the cavity without the slightest pain to the patient, and, if the air has passed through a wash bottle of alcohol or any such agent, it carries its vapor with it.

The cautery and electric root drier are both familiar to you, and are examples, on a small scale, of the heating power of electricity. These instruments can both be successfully operated on the Edison current by throwing in about ten ohms resistance and taking off the cautery heat by what is known as a "shunt" current.

The value of any heat for sterilization is duly recognized, and for some time I have been satisfactorily using the electric oven, raised not quite to the beat of withdrawing the temper of the instrument. The heat may be maintained all day long, and the cleanliness and simplicity recommend it. Gutta percha is softened with accuracy, when placed on a soapstone slab resting on the oven, and the waste heat rising from the whole appliance is utilized for keeping water warm for the syringe.

There are two processes in dental practice which call for absolute purity and uniformity of heat. Upon recognizing the special fitness of electricity for meeting these conditions, I some years ago devised an appliance for annealing gold thereby, and one more recently for fusing porcelain.

The heat produced by electrically heating a mat of coiled platinum wire is the cleanest, most uniform, and most accurately controlled of all forms of heat. The cohesive property of pure gold is supposed to be developed by heating to such a temperature as to drive off the gases condensed upon its surface, principal of which is ammonia. The alcohol and Bunsen flame are ordinarily used for this purpose, but who is certain that better results may not be obtained by subjecting to a heat free from the products of combustion as well as to the danger of smoking and the exposure to unconsumed gases. The electric annealer effectually overcomes these dangers. The heat, being derived from electrically heated platinum, itself a noble metal, is absolutely free from gas of any kind. The heat is radiated from a mat of platinum coils and is quite uniform at all parts, so that the gold is not only thoroughly annealed, but is evenly annealed. It is impossible to evenly heat a piece of gold, held with a pair of pliers, over a flame of any kind. The thin edges of the gold will be fused, while the part between the pliers will be scarcely warm. The accuracy with which electric heat can be controlled also recommends its use for annealing. By means of the rheostat, any degree of heat to the melting point of platinum may be obtained. From my experience with the electric annealer, however, I find that cohesion is developed at a much lower degree than at first supposed. It is never necessary to heat even to redness, let alone fusion. The heat may be so low that the gold may be subjected to it for hours or for days, even, without any injury, and still be highly cohesive.

Electrically annealing gold saves time in many ways. The gold requires no attention, is ready for use at all times, and the heat not being high enough to take the temper from the plugger point, this instrument may be used to pick up the gold, thus saving the time of changing instruments. After six years' use, I am free to say that next in usefulness to the dental engine is the electric gold annealer.

The latest practical application of electric heat in dental practice is the electric oven for fusing porcelain. From the time of Allen and Hunter, or from the very beginning of porcelain work, the question of heat has been a serious one, and the principal reason that continuous gum has not been more popular is the difficulty and uncertainty in the production of heat. The heating principle of the oven is an electrically heated platino-iridium wire, or the gold annealer in the form of an oven. In using this new source of heat, I departed from the old muffled shaped oven to one more in keeping with this new agent. It consists of an upper and lower section, flask shaped, with an inner cavity amply large enough to contain a set of teeth, and of such form and arrangement of the wires that all parts receive the same degree of heat. Upon the whole inner surface is embedded the electric conductor, just deep enough to be supported while so highly heated, and yet to radiate its heat directly into the oven cavity. The upper half is hinged to the lower, which automatically makes the electric connection upon being closed. There are two openings through which the fusing process may be watched. These are placed at such positions that rays of light entering one will be reflected out by the plate through the other. This overcomes the intense glare of the heat, and at the same time brings the plate clearly into view, making it possible for an inexperienced operator to accurately determine the degree of fusion.

There are many other advantages offered by the electric oven.

The source of heat being a noble metal electrically heated, it will be readily seen that a heat is obtained that is unlike any heretofore used for this purpose; and since it gives rise to no products of combustion, it is an impossibility to produce what is known as "gassing," and porcelain fused by this method not only possesses unusual clearness, but appears to be more dense.

We can control electricity, and the opportunity is now open for any number of automatic appliances to regulate the heat according to the porcelain treated. I have, up to this time, devised a clock attachment to the rheostat whereby the current is gradually raised and cut off at a set time. Second, a fusible button of porcelain placed in the oven at the time of fusing, which rings a bell when the porcelain fuses. Third, an electric thermometer, whereby the temperature of the oven is quite accurately told by the rise of mercury in the tube. And fourth, an ammeter, the swing of whose arm is in proportion to the heat of the oven.

The cost of operating is very small indeed. The oven, as now made, consumes six amperes, which would be about two cents per fuse of thirty minutes.

In case a wire should burn out by accident, this break in the current automatically cuts the current off, so that no further damage is done, and it requires but a few minutes to repair the break in a way that is as good as new.

While the electric oven operates best when used on the Edison current, it is still very satisfactory on the 52 volt alternating, the 220 or the 500 volt currents.

In the practical operation of the oven the procedure is very simple. The case is placed on the tray in the lower section, and the upper is then closed down. The lever of the rheostat is placed on the first button, and heat for thoroughly drying out the case is quickly obtained. When the operator is satisfied that there is no more moisture present, he begins raising the heat by pushing the lever to the right. If he allows two minutes to each button, it will require from twenty to twenty-five minutes to reach the fusing point. If it is a crown or bridge, less time may be consumed in raising the heat without danger to the case, and it may be fused in from ten to fifteen minutes by throwing the lever over more rapidly. In practice I do not even measure off the time to each button, but fuse while I am operating. From time to time, as it occurs to me, I throw on two or three buttons at a time, according as the interval has been, until I have reached the third from the last button, on which it is allowed to remain until I have three minutes in which to give it my undivided attention. The porcelain is just ready to drop into a fuse, and upon throwing on the last button the successive stages and degrees of fusion are clearly made out.

In the first stage the porcelain is still in the powder form, and appears like snow; presently it begins to drop into a fuse, and the snow-like appearance changes into a dead, indistinguishable mass; the particles are now beginning to coalesce; gradually the surface, with all its inequalities, comes clearly into view, and presents a glistening appearance; continuing the heat a moment longer, the porcelain becomes more liquid, and the inequalities of the surface assume a more even appearance. Since the eye can be brought so close to the plate with the electric oven, and since the plate is brought clearly to view by the arrangement of the two sight openings, the operator is not guessing by the quantity of heat or the general appearance of the plate, but he is actually observing the different particles of the porcelain itself; and for that reason the fineness of his fusing is always assured, and under his perfect control. When the desired heat has been obtained, the lever of the rheostat si thrown back, which cuts the current off. At that very instant the heat begins to go down; so that there is neither overfusing nor loss of brilliancy in the gum color. If it is the first or second baking of the case, the stoppers need not be inserted, and the case can be taken out in a short time; but if it is the last fusing, after a few moments' time has elapsed and the case has become a dull red, the stoppers should be inserted, and the case allowed to gradually cool.

It would seem that electricity has given us all that we could ask for, and yet I am forced to say that the properties and applications of electricity are just unfolding, and the demands of dental practice of the future will keep pace with, if not in the lead of, electric progress. It is not a dream when I say the time is coming when electricity will have its place on the dental curriculum as much so as materia medica or metallurgy has now. No profession, science, or art has such varied demands in its practice as dentistry, and no single agent more nearly meets these than electricity.

A Convenient Homemade Barometer.

In the Weather and Crops, published by the Illinois State Weather Service, we find a short description of a simple instrument that serves the purpose of showing approximately the changes that may be going on in the pressure of the air. The description reads as follows:

"If a large-mouthed glass jar—fruit or pickle jar will do—be filled about two-thirds full of water, and in it be placed, inverted, a smaller long-necked flask, with mouth entering the water, the increasing or decreasing pressure of the outer atmosphere will cause the water to rise or fall within the flask. Clear, fine weather will be foretold by the water rising in the flask; stormy, wet, or bad weather by the water falling."

The device thus explained will, undoubtedly, show variations in atmospheric pressure, and all the more correctly in proportion as the temperature of the air within the flask remains stationary. If we wish to be at all accurate, or if we wish not to be misled by the effects of changes of temperature, we must either keep the temperature constant or else make a numerical allowance for the effect of its variations. If the temperature within the flask rises 1 degree Fahrenheit, its confined air will expand by $\frac{1}{492}$ of its volume, and the water in the neck of the flask will be pushed down to a corresponding amount. On the other hand, if the atmospheric pressure should diminish by 0·06 of an inch below a normal pressure of 30 inches, the air within the flask being slightly relieved of its pressure would expand by the $\frac{1}{492}$ part of its volume, and the water in the neck pushed down as before. In so far as we cannot rely upon the constant temperature of the air within the flask, we must therefore make an allowance of 0 06 for each degree of change. As this apparatus is so sensitive to temperature, it may therefore be considered as a thermometer when the atmospheric pressure is constant. In fact, this is known as the first form of air thermometer which was used by the physician Sanctorius, who learned it from Galileo in 1596, and it was the study of the fluctuations of this apparatus that contributed greatly toward the discovery of the pressure of the air and the invention of mercurial barometers and the ordinary spirit thermometer. If one wishes to use this apparatus as a barometer, and needs, therefore, to know its temperature correctly to within a degree, he will find it best to fasten the smaller flask and its long neck, or, still better, a long glass tube, permanently within the outer glass jar and fill the latter with water so that the whole flask is covered. A thermometer whose bulb is under the water will give the temperature of the water and the air within it, and, if the water be well stirred, all will have the same temperature.

An early modification of this simple barometer was for a long time manufactured by expert glass blowers in Florence, and was called the Florentine experiment. In this arrangement the inverted flask was made quite small, and weighted so that it floated freely like a small balloon in a jar of water; when the temperature of the water rose, or when the atmospheric pressure diminished, the air within the flask expanded and the density of the balloon diminished, so that it rose to the surface. If, however, the glass flasks are hermetically sealed so that the air within them cannot expand and change their density to any extent, then, if the water in the jar becomes warmer, the flasks will descend, because their own density will then be greater than that of the water. If, again, the open mouth of the jar be hermetically sealed, inclosing air above the water, we have a new condition, viz., the external atmospheric pressure has no longer any influence, while the changes of temperature have a twofold influence: by expanding the water its density is diminished, but by expanding the air above the water the quasi-atmospheric pressure within the jar is increased. These four combinations, namely, closed or open flasks floating in closed or open jars of water, formed what are known as the Florentine and the Stuttgart experiments with the Cartesian divers, and the phenomena that they exhibited were widely discussed by Europeans in the seventeenth century.—Monthly Weather Review.

Our Needs for Coast Defense.

Gen. D. W. Flagler, Chief of Ordnance, has appeared before the Committee on Coast Defenses and has stated that about $59,000,000 would be required to furnish the guns, mortars, and all that is required by the Ordnance Bureau to complete the defenses of the twenty-eight ports for which projects have been approved, including the fortifications on Puget Sound.