

FIXING IN HARNESS.

RECENT INDUSTRIAL APPLICATIONS OF ELECTRICAL SCIENCE.

A False Prophet—Novelties of Electric Lighting—New Things in Telegraphy. Electricity as a Motive Power—Many Other Surprising Inventions.

It cannot be interesting to all to know something of the more important steps that have recently been taken in applying the science of electricity as an industrial art. The force is one that is easily convertible into either light, heat, power or chemical action. But a few years since scientific men generally affirmed that it could not be profitably employed in either form. Now they are in hot competition demonstrating its economic value in each. And every new achievement reveals further and greater possibilities attainable beyond in each of the several lines of application, until it almost seems that this science is in itself the knowledge of the infinite.

So little while ago that it seems but yesterday the writer of this article heard a professor in a college near New York aver in a public lecture that incandescent electric lighting was an illusion, a humbug, an impossibility. At the time Edison's experimental lamps were glowing brightly at Menlo Park, but the professor saw fit to ignore the fact, and, exhibiting a dull, glowing bit of platinum wire, said triumphantly: "There, gentlemen, is all you will ever see of the incandescent electric light." The arguement could not be denied, for everybody knew that the Jablockhoff candles were nightly glowing in the Avenue de l'Opera in Paris.

SEVEN YEARS LATER.
Today, hardly seven years since that professor did his bad prophet act, there are, it is estimated, at least 3,000,000 incandescent electric lights in the United States alone. They are used not only for indoor illumination, but for decorative purposes—have been ingeniously applied to use as jewelry, for the adornment of ladies' hair, for pretty surprises in bouquets and—most surprising of all—for lighting up people's interiors so that a doctor could look right down into the stomachs and see what repairs were necessary to such a delicate organ as the stomach thus made visible. The apparatus for this latter achievement consists of a slender tube, with a glass bead on one end containing a minute carbon filament, which is connected, by fine wires running through the tube, with a little battery. There is also a small movable mirror at the inner or stomach end of the tube, and when the battery is put in operation the operator can see plainly in that mirror just how dilapidated are the coats of the stomach into which the tube has been thrust.

Are lighting is quite a different matter from incandescent illumination, in that its limitations, requirements and uses are more closely defined. For the lighting up of vast spaces it has a field of its own, but, according to information given at the recent annual session of the Electric Institute in this city, that field is already being narrowed. The arc light is no longer the feature of street illumination in Paris that it was a few years ago, having been replaced by groupings of powerful gaslights on the Avenue de l'Opera, the principal place of its display there. New York is now the most extensively arc lighted city in the world, but if the appalling perils that seem to be involved in the employment of the tremendous current necessitated by these lights are not prevented by such safeguards as the burial of the wires and their more perfect insulation, it is doubtful if they will long be tolerated here. There is hardly a conceivable limit to the power to which the arc light may be developed, but the greatest one yet known is that in the light house at Sydney, Australia, which equals 186,000 candles, and can be fifty miles. Mr. S. S. Wheeler, as standards of comparison to enable comprehension of what that light amounts to, suggests that an ordinary gas burner is of 16 candle power; the bright electric lights in the streets are 1,300 to 1,500 candle power, and the Statue of Liberty light is 48,000 candle power.

THE TELEGRAPH SERVICE.
Of equal importance, at least with its use for illumination, is the application of electricity for telegraphic and telephonic services, and it is really wonderful that with all the study and toil of brainy men during so many years as it has been since the telegraph was put in operation, for the perfecting of the science of telegraphy, there should still be so many new and important things found out in it every year. One of the novel and probably valuable recent discoveries is how to send by telegraph an exact fac-simile of a message, and to do so rapidly. A method has been known a long time by which a fac-simile was made up of an infinite number of minute dots successively placed on a piece of paper spread upon a cylinder in synchronous movement with another cylinder bearing the message. A point, pressed upon the message cylinder as it revolved, caused the breaking of the current each time that it touched a written line—the ink employed being metallic—and made a mark by the receiving instrument corresponding to just so much of the line as had been touched. But that was a very slow process. In the new way an upright lever, so pivoted that it moves freely in all directions, carries in its top a little cup. Into that cup the sender of a message pokes his pencil, and forms, one after another, the letters composing his dispatch. It will probably rattle him a little at first to go on making shapes of letters right in the same spot, one over another, as if he were piling up phantom symbols, and to see none of them materialize under his pencil, but he will soon get used to that. Each movement of the lever's lower end increases or diminishes the strength of currents that, acting upon the receiving machinery, move the writing pen in such curved modifications of the right angled applications of the forces as to conform to the motions of the transmitting lever.

This must not be confounded with the writing system now so extensively employed in transatlantic telegraphy to take the place of the old, uncertain and slow light spot method of receiving cable messages. A strong battery cannot be used on ocean cables, but only a small one, hardly stronger than that employed to ring a bell in a private house. To receive the signals sent by so weak a battery very delicate apparatus must be provided. A siphon shaped glass tube, thin and so slender that a human hair will hardly pass through it, is suspended with one end in a trough of very fluid ink and the other almost touching a moving telegraphic tape. It is connected by a thread with a coil of fine wire, which is so hung near to a stationary magnet that it will twist slightly when attracted toward the magnet, and these slight movements of the coil control the siphon, causing it to trace a faint wavy line in response to the vibrations of the signal current received by the coil and impelling it toward the magnet. Each wave of the line means a letter, and the expert operator reads the thread of faint color as plainly and correctly as anybody reads those printed words.

A SURPRISING TRICK.
It was at the time looked upon as a surprising thing when the practicability of sending

two messages at the same time in opposite directions over the same wire was demonstrated, but that achievement was quickly forgotten when the wonders of the quadruplex sending four messages at once, and of multiplex sending many telegraphs were made known. Now it is claimed that such improvement has been made by a United States army officer, who is an expert electrician, that one wire will suffice for the simultaneous sending and receiving of a hundred messages between fifty branch offices, without any of the messages getting mixed, going to the wrong addresses, or being understood at any other points than their individual ones of transmission and reception. For this, the infinitely rapid substitution of alternate currents—positive and negative—by means of a disc, in which alternate segments are so charged, and from which the currents are taken off by brushes, constitute the means employed. Another important recent improvement in telegraphy is the invention of a method for maintaining telegraphic communication between a railroad train in rapid motion and offices along the line of road upon which it is traveling. In doing this the message leaps through the air between the metallic roof of the moving car in which the flying office is established and the wire stretched along the side of the road.

In the application of electricity to the movement of railroad trains and cars, the inventions are numerous. In a general way they may be classified under two heads, those in which the propelling current is supplied from storage batteries aboard the cars, and those in which it is transmitted through the track or an intermediate third rail from a generating station and taken up by wire brushes to the motor on the car. The former is the Julien system, already mentioned, and hardly seems capable at present of application to heavier service than the propulsion of single cars, or at most very short trains, on street railways; to the second class belongs the Draft system, under which railroads are now very successfully operated in Baltimore and other cities, as also the electric locomotives which it is contemplated shall be employed on the elevated roads of New York. St. Paul has a new electric railway of novel construction. Its cars are suspended in mid air from a T shaped trestle construction, upon a single track, which carries the electrical current to the motor with which each car is supplied. The motors are placed directly on the shafts of the driving wheels over the rails. It is represented that on the recent trials of the system the cars, heavily laden, started off easily up a 10 per cent grade, turned sharp curves, were stopped and started again promptly and with ease. Electric railroads have been in operation in Europe for several years, and in this one particular branch of applied electrical science we are rather behind the times, which is not America's usual position.

MANY OTHER INVENTIONS.
Electric motors of all sizes, from one cat up to fifteen horse power, have now come into general use, are rapidly pushing small steam engines out of favor, and are, in fact, so much in demand that the manufacturers of the preferable ones are unable to supply them as rapidly as they are called for. In S. Y., an electrical furnace for smelting refractory metals has been in operation now nearly a year, extracting aluminum mainly by the use of an electrical current.

Another use for heat developed by electricity is the warming of apartments by means of radiating surfaces, in which a high temperature has been induced by electric currents, but, though this has been successfully accomplished, it has not been done as yet at such a cost as to popularize its use. At least three of the later utilizations of electric science for the service of surgery are worthy of mention. The "induction balance," invented by Hughes and Bell—first publicly applied for the exact location of the bullet in President Garfield's back—is a most ingenious contrivance, the use of which is indicated by its employment upon that occasion. The electrical cautery and the use of a platinum wire heated to incandescence by an electrical current for amputations are the other notable surgical uses of this powerful and versatile agent.

Somebody has got up an electrical lock for a safe. The only connection between the inside and outside of the safe is a little copper wire. There is no way of getting at the lock by knocking off the handle, no way of feeling the tumblers and by delicate manipulation finding out the combination, no hole or crack to poke powder in and blow the thing open. Electrical burglar alarms are so common now from the private plants in residences up to the big combinations with watchmen, lanterns and clubs, such as are used to guard the jewelry district of New York, that it is hardly worth while to speak of them, except to mention that progress has been made here, too, in making them cheaper and more effective than they used to be.

So much has been said lately about Edison's new and improved photograph that it hardly seems worth while to more than revert to it here. Edison's separator for extracting metals from ores that are difficult of treatment by ordinary methods has been brought to practical demonstration of its merits. He simply exposes the finely pulverized ores to the influence of a powerful magnet, that takes out the metallic particles thoroughly and rapidly.

Another novel application of electricity is for the bleaching of sugar, a French invention, in which a number of New York capitalists are interested. Keeping pace with the progress of electrical science itself are the multitude of inventions and contrivances of a secondary class to aid that progress, tools, machinery, chemicals and what not. An application of electricity that a good many people are looking forward to with curious interest—and some perhaps with a little apprehension—is its employment for the execution of felons condemned to death.—New York Sun.

ALPINE FUNERALS.

CEREMONIAL VISIT TO THE BED OF THE DYING.

Funeral Meats and Drinks—Respects Paid to the Dead in Carinthia—Native Society of the Alps—Scenes and Features After the Burial.

In the remote country districts it may also be said that the funeral begins before the death. As soon as any man or woman is supposed to be in the last agony not only all neighbors and friends, but perfect strangers, are informed of the fact and expected to pay a ceremonial visit. The guests simply enter the sick room, take a long look at the dying man and go their ways. No prayer is said, hardly a word is spoken; yet even the chance wayfarer who declines to enter the house of death on such occasions is considered strangely heartless.

After death the stream of visitors ceases, but only for a short time. As soon as the body has been prepared for burial a long table is spread in the room where it lies and covered with wine, spirits and cold viands of every description, and here open house is held day and night till the funeral starts for the churchyard. Whoever comes, known or unknown, rich or poor, is not only allowed, but urged, to eat and drink as much as he can. Beside the coffin at least two huge wax candles, which have been fetched from the church, burn dimly, and near them two old women sit or kneel. They are paid for their services, and supposed to pass their time in prayer. From time to time they are relieved by others, and they then usually make a somewhat lengthened pause at the table before going home. After the return of the funeral the chief mourner invites every one who has attended it to a hot meal, which is as sumptuous as he can afford, and which usually ends in hard drinking.

FUNERAL IN CARINTHIA.
Customs of this kind are not prevalent in Carinthia or Upper Carniola, funerals are there conducted with perfect quiet and decency. Yet in some observances one may find either the germ or the relic of much that shocks us in other districts. On the whole, the arrangements seem to be adjusted to the present religious beliefs and requirements of the community, and it is easy to see how they might degenerate into such excesses as have been mentioned. A simple account of a funeral in Carinthia will show this better than any amount of abstract argument.

As soon as the body has been placed in the coffin and the room put in order, the latter is thrown open to the visitors. In a Roman Catholic country it is natural that rich and poor should alike wish to say a few prayers for the soul of one who has been their friend, their companion or their benefactor. Among the educated classes certain hours are appointed for the purpose, among the poorer it is usual to keep the house open day and night. During the greater part of the time the mourners pray silently, but at certain hours one of them repeats aloud the prayers, in which the others join. On leaving the room each of the visitors is offered a piece of bread and a glass of wine or spirits, and the poor are apt to be offended if the offer is refused. Among a hospitable population this custom cannot be considered strange, but it must be confessed that, though the refreshments are usually consumed in perfect silence, it is open to abuse. Beggars will come six or seven times in the day for the sake of the dram with which their devotions are rewarded, and as it often happens that no member of the family is present, and no one would like at such a season to be guilty of an ungracious act, it is very difficult to keep a proper check on such persons.

THE NATIVE SOCIETY.
The native society of the Alps is somewhat peculiar in its character. The better class of the officials have, for the most part, been educated in the same schools, and many of them have there formed lasting friendships with each other. In later years they rarely meet, except at the annual meetings of the societies of which they may happen to be members; but the old affection still remains unimpaired. When the news of the death of an old foster or priest spreads from valley to valley it therefore awakens many kind memories of old times, and on the day of the funeral old companions will often come some thirty or forty miles, even when a railway cannot be used, to pay the last tribute of respect to the dead. In the towns these visitors put up at different inns, only those who are very intimate with the family think of entering the house of mourning.

At the appointed hour they gather outside the door, accompany the funeral to the churchyard, and on its return speak a few words of sympathy to the family. As a rule, no refreshment is offered them. Only the bearers of the coffin, who are usually intimate friends or colleagues of the deceased, are invited to a cold repast, which does not last long. In a society at once so closely united and so widely scattered it cannot but happen that many old friends who have long been separated should meet on such occasions, and that, after the ceremony is over, they should gather in groups in the various inns. The very thought of the companion they have lost recalls memories of a less somber character. Old hunting pranks are remembered and old boyish adventures retold, the wine flows freely, and, though the occasion of their meeting is not forgotten, its mournful character no longer casts a gloom over the whole of the conversation. In fact, when a respected citizen of any small town has been buried, a stranger who entered any of the chief houses of entertainment in the afternoon would fancy that a festival was being celebrated.—London Saturday Review

A Peculiarity of Genius.
I believe in genius, and Shakespeare and Lincoln certainly possessed it. It is just as sensible to believe in gifts on a large scale as in a little sense, and every primary teacher knows which of her pupils will probably make their way, and which are positively dull and likely to remain so. No two human beings are created with the same natural ability, and genius is simply the inborn qualities of mind, which, in a healthy body, carries with them a fitness and strength superior to those elements in others. A peculiarity of genius is that it is not always in the line of the "What, dear?" "Why, pickled pigs' feet." He blushed and drew 'em up.—Detroit Free Press.

Ambitious and Enterprising.
The southern California resorts are ambitious and enterprising. After establishing a reputation as winter resorts, they now enter the field as summer resorts.

The Petit Journal recently appealed to Bismarck to restore Alsace and Lorraine to France, to kiss and make up, and then both have a go in at England.

Googins—How is this wine C-I-I-q-u-o-t pronounced? Wine Dealer—It is pronounced good, sir.

WE MAKE OUR OWN PENS.

Rapid Growth of the Steel Pen Industry. Interesting Statistics.

"Every year the citizens of the United States wear out 130,000,000 steel pens," said a prominent manufacturer to a reporter. "Twenty years ago most of the steel pens used in this country were imported. Now comparatively few are imported, and there are several factories in this country in which they are made in large quantities. At present the importation of foreign pens is mainly confined to the high priced articles. It was first doubted that steel pens could be made in this country, but it was soon learned that the requisite skilled labor could be obtained for high wages, and the success of the pioneers led one manufacturer after another into the business, until now the field is pretty well occupied.

"Most of the work on these little instruments is done with the aid of very fine machinery worked by women and girls. The steel used is imported, because it is believed that the quality is more uniform than the American steel. This uniformity of quality is necessary, because of the very delicate tempering required in the manufacture of the pens. That mysterious quality of steel which gives different colors is a quality that requires expert manipulation on the part of the workman who does the tempering. He must know the nature of the material with which he works, and with that knowledge he must exercise a cool and skill that is not to be learned by any one who has not spent upon the proper instant to fasten the steel at a heat which insures the requisite quality. "First, the steel is rolled into large sheets. These are cut into strips about three inches wide. These strips are annealed, that is, they are heated to a red heat and permitted to cool gradually, so that the brittleness is all removed, and the steel is soft enough to be easily worked. Then the strips are again rolled to the required thickness. It is the quick eye for color and the quick hand that fastens it that constitute the skill to determine the temper of the steel. When the steel is heated for tempering it is bright. The first color that appears is straw color. This changes rapidly to a blue. The elasticity of the metal varies with the color, and is arrested at any point by instant plunging in cold water. The processes of splitting, polishing, pointing and finishing the pens are operations requiring dexterity, but by long practice the workmen and workwomen become very expert. There have been few changes of late years, and the process of manufacture is much the same as it was twenty years ago, and the prices are rather uniform, ranging from twenty-five cents to one dollar per gross, according to the quality of finish. The boxes sold generally contain a gross. The best now in the market are of American make. Writers who buy foreign pens at fancy prices find them far inferior in durability to the American article. Persons who write continuously will wear out a good steel pen in two days."—New York Mail and Express.

Moderation in Athletic Training.
The means to be adopted for the attainment of robust health are cleanliness, regularity of habits, moderation in diet, exercise, preferably in the open air, in accordance with the capacity of the individual and nature of the contest, and abstinence from strong drinks and tobacco. If a man trains simply to improve his health he does so more or less moderately; if for a contest, more or less strictly in accordance with the importance of the event. A man can do either without a trainer if he has an ordinary amount of common sense and will power. The man who simply desires to live in a sound, healthy condition should follow these rules, modifying them slightly, according to age or physique.

Get up not later than 7 a. m., sponge and rub yourself with cold water until the skin is red. Do not stop if perspiring, but keep on till tired. It is good exercise. Then dress and take a fairly long walk before and after breakfast. Walk to your place of business. Attend to work in the usual way, resisting every inclination you may have to give way to idleness. Walk home. Never mind the weather; a little rain will not hurt you, and summer heat will not affect you when you have done it long enough to do you good. Then have dinner, avoiding, as at your lunch and breakfast, greasy, sweet, highly flavored or seasoned food. Water is the best thing to drink, and that is better drunk after finishing your meal. Take your time over dinner in particular and other meals in general. If you have not time to get a meal leisurely go without it, as it will not injure you a quarter as much as it will to eat it in a hurry. Amuse yourself in the evening according to your taste, which, as you get healthier, will incline to active rather than effeminate amusements. Repeat the sponging and rubbing, and go to bed before 11 p. m.—A. Austin in Cleveland Leader.

Fishermen Sailing from Port.
As a rule a vessel goes on a fishing expedition with some particular sort of prey in view. A cod "rig" will also serve for halibut, but for halibut stronger tackle and bigger hooks are needed, while mackerel and herring must be taken in nets. Thus it is that boats usually sail from port, equipped suitably for capturing a single kind of fish, to the netting or hooking of which each craft devotes its exclusive attention. For halibut, halibut and the toothsome cod the winks, hundreds of miles out to sea, are sought by the vessels of from ninety to twice that many tons burden, which spend there as many months as are necessary to secure a load of "fare," as it is technically called. The system of angling pursued by these "pot hunters" would scarcely obtain the approval of lovers of sport. Lines a mile or so in length, with hooks attached at six foot intervals are anchored in the shoals over the banks with buoys of wood or cork to mark them. These "trawls"—for so they are designated—are set at night and in the morning, every hook freshly baited with a scrap of fish, and twice in twenty-four hours they are hauled up hand over hand by men in dories, who detach such victims as are caught and render the froe lunch offered to the scaly rounders of the ocean.—Boston Cor. New Orleans Picayune.

Work of the Night Owls.
Very much more of the work of a city like New York than is imagined by the unthinkers of thousands who lead conventional lives is done at hours which compel a faithful and useful minority to sleep by day. Editors, printers, compositors, pressmen, electrotypers, telegraph operators, bakers, policemen, road employes and hundreds of other occupations must bring rest to their tired eyes and weary limbs when most of the world is asleep and busy—thoughtless, too, with the quality of the money pursuit and what may all those who are not as they. It is true that a majority of the night owls come before 2, 3 or 4 o'clock in the morning, but they are tired and nervous, not sleepy. Who would be sleepy immediately leaving his work? How would a bank clerk feel about resting at 5 o'clock in the morning? They settle down in a conscientious effort to take the sleep that is as necessary as medicine to a sick man, and after an hour or two of tossing drowse off.—New York Press, "Every Day Talk."

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