## ELECTRICAL NEWS.

THE TELEGRAPHONE. — A problem heretofore only partially and unsatisfactorily solved is the registration of telephonic messages so that they can be received at pleasure. Most of the efforts in the direction of its solution have been towards using the induced currents from the Blake transmitter in producing a record on the phonograph at the other end of the line. An amplifying trumpet has been used, and the vibrations of the diaphragm of the receiving instrument have been recorded on the cylinder of the phonograph. It has thus far been necessary that an operator should be at both ends of the line, and any slight electrical disturbances that would interfere with the delicate induced currents naturally have blurred the phonographic record. An instrument has lately been patented and brought out that will no doubt be of actual use and commercial value. It is called the "telegraphone," and is the invention of Mr. Malone Wheless of Washington, D.C. Mr. Wheless does not depend upon the transmitter currents for his impressions: the speaker's voice is registered on the cylinder mechanically, the record being of the nature of dots and dashes on a strip of paper. A stylus connected with a light primary battery moves along these impressions, producing current interruptions of a make-and-break character, almost similar to the Morse code, and reproducing the impressions on the registering cylinder at the other end of the line. In practice, if A desires to send a telephonic message to B, who is not at home, he calls him up in the usual way. Receiving no answer, he turns a switch which throws in the battery power and sets the cylinder at the other end in operation. He then talks into his transmitter. The vibrations are transferred to the cylinder, and the stylus sets up a series of waves, reproducing the impressions at the other end, and registering the message. A then reverses his switch, and the message is repeated back to him. Should any part of the message be inaudible, he simply fills in the blurred words or sentences, and the record at the other end is then satisfactory and complete. Upon B's arrival home, he finds the message waiting for him, corrections and all; and if its importance demands it, he can have it repeated to himself as many times as he chooses. The inventor claims that the apparatus can be manufactured and sold outright at a very low figure, and it is difficult to foretell whether its usefulness or novelty will be the most interesting feature.

ELECTRICAL EXECUTIONS. — This subject will enjoy popular interest as long as the law now supposed to be in force remains upon the statute books of the State of New York. It seems to have been adopted for the reason that those having the matter in hand knew less about death from electricity than from any other cause, and also because the expert advice at hand seems to have been discolored with the tainted aniline of business jealousy. The subject, from a scientific standpoint, is of itself sufficiently interesting and baffling; but when the people realize, as they now must, that the enactment of the law was due largely to the influence of a party whose object was not so much to furnish a quick and painless death as to enrich himself, it causes a cold shiver of horror to pass over the community. Exactly how many volts of electrical pressure will kill is as uncertain as would be the number and force of the strokes from a club that would produce death. A number of persons, among whom may be mentioned Mr. T. Carpenter Smith, the well-known electrical engineer, have been accidentally subjected to the action of the very type of machine intended to be used by the authorities, and have lived. Other persons have died instantly from a much lighter shock. Only a few days ago expert Henry of this city was instantly killed by 1,000 volts. Since that time a Buffalo lineman lived in agony for forty minutes after suffering the enormous pressure of 2,000 volts. Will electricity kill? Certainly it will kill, but exactly how applied, and how many volts?

ENCROACHMENT OF ELECTRICITY UPON GAS IN HOUSE-LIGHTING. — Gas, which is now almost universally employed, has not come into use in a moment. The difficulties attending its distribution at great distances from the source of supply have never called for more than mechanical skill and ingenuity. But with electrical distribution the problem to be solved is not how to cover a certain territory with the mains and feeders of an electric-light system, but how to do it with a fair profit on the investment. Among the methods making rapid strides is that of the distribution of electricity by means of the alternating current. The very type of machine which the authorities consider so dangerous to life will no doubt be that which will eventually solve the problem of universal electric house-lighting. The current in the outside mains is of a high pressure, — 1,000 volts or more, as the case may be. This current is transformed by means of the converter to a lower potential, and carried into houses at the safe and low pressure of only 50 or 100 volts. More and more private residences are being wired for and lighted by electricity every day, and this is the case more especially in small and growing towns than it is in large cities. Little towns like Marshall, Tex., Vicksburg, Miss., and the small towns of the Far West, are falling into line, and availing themselves of every fresh improvement that will increase the returns from investment and enhance the worth and reliability of the light itself. In the New England States this condition of things to-day obtains to such an extent that nearly every week finds some gas company absorbing the local electric-light company out of pure self-defence, and continuing the work.

AMERICAN ELECTRICAL ENTERPRISE IN LONDON. — The increased and increasing investment of English capital in American institutions has caused much comment. American capital is not doing precisely the same thing in England, but the establishment of a Westinghouse Electric Manufacturing Company in London is a fact that must excite comment and admiration as well. The Westinghouse Electric Company of London has been organized with a capital of $3,000,000. The factory is to be located on York Road, adjoining the Westinghouse Air Brake Works. Other electric companies are extending themselves abroad, but this is one of the most striking and recent examples of such extension.

ELECTRIC TANNING. — It is now claimed that an electrical process for tanning hides has been devised which reduces the time of the operation from six months or a year to twenty-four hours, turning out leather of equal quality. The cost is said to be reduced more than one-half. It is usually the case with quick processes that the material so turned out is in many respects inferior to that manufactured in the usual way by skilled workmen who have taken advantage of the experience of others, and perfected their process after years of work and study. The new system alluded to does not partake in any way of the nature of an "electric sugar" concern, as each step has been made public and carefully described. When it is proved that the leather thus turned out is equal in all respects to that now manufactured, the process will possess more interest than its shadowy entity now elicits.

ELECTRIC SIGNALLING FROM SHIPS. — If there is any thing in our naval service that is inefficient and undeveloped, it is the system known as "wigwag" signalling. A flag with a short staff is waved to the right and left a given number of times for each letter of the alphabet according to the code, and the speed attained is remarkable for its slowness. Lack of speed can also be attributed to insufficient practice of those using the code, although the exercises enforced on board most vessels have given rise to a number of bright, quick signalmen among the apprentice boys who do the service proud in this respect. But with the most expert signalmen the speed attained is so unsatisfactory that a quicker method will no doubt before long come into use. Where vessels are fitted up with electric lights, a system of signals is sometimes employed, extending the use of the "wigwag" code to two incandescent lamps suspended somewhere in the rigging for night work. In such cases a double key is used, the illumination of one lamp being read "one," and of both lamps at the same instant, "two;" the letters of the alphabet being represented by combinations of "one and two." Although these flashes can be made much faster than the motions of the flag in daylight, still it is so easy to exceed the possible speed of the reader on the other vessel or on shore, that little increase of efficiency is attained. It takes but two or three months to become tolerably proficient in the use of the ordinary key and sounder, reading from fifteen to twenty words per minute at least. The same device that now flashes out the clumsy naval code could be employed in connection with the Morse alphabet with a great saving of time. Practice in taking from a telegraph instrument makes the ear or eye practically drink in the words spelled

out, without a conscious analysis of individual letters. Messages can be flashed from the rigging of ships with almost the rapidity of telegraph messages over ordinary wires. Take, for example, the message "The uniform of the day will be clean blue." This sentence of only nine words, if sent at the rate of nine words per minute according to the regular navy code, could be read by about one officer out of ten. Few officers can read that fast. The average speed of signalling, then, by the "wigwag" system is probably less than nine words per minute. It ought to be more. Mr. Edison has suggested an adaptation of his train telegraph system to the use of ships at sea. If a sufficient area of insulated metallic surface could be exposed somewhere, either on deck or aloft, it might be possible to telegraph from ship to ship by electrical induction without the use of connecting wires, just as Edison in a moving train takes messages from the wires along the track. We know of no experiments in this direction as yet, but the field is certainly an interesting and promising one.

AN ELECTRIC LOCOMOTIVE. — Will trains eventually be run by electricity? The electrician is met by this question almost daily, and his only reply is that they will if the problem of their commercial success be finally solved. Of course, running machinery of any kind from primary batteries is commercially out of the question. Every one with even the most rudimentary knowledge of the science realizes that it takes a certain consumption of zinc or other metal to liberate a certain amount of energy, and that this method is altogether too expensive to be practicable. However, there is now being constructed at the locomotive works, Rome, N.Y., an electric locomotive which is the first engine, we believe, attempted to be run on regular railroad-tracks from storage-batteries. The ordinary rotary type of electric motor will not be employed. Suction-magnets are to be located on either side of the piston, and the current supplied from storage-batteries in the fire-box. The locomotive is smaller than the usual type, and has driving-wheels of less diameter. In a few days the trial trip will be made, and *Science* will give its readers the result. The question will be asked, "How is it possible to utilize the energy of storage-batteries at such a great loss from the original energy of coal, and still be as economical as the steam locomotive?" That is the fact that remains to be proved. It should be remembered, however, that it may be possible to generate electricity by means of large economical compound condensing engines with a final loss at the motor not much greater than that which is found in that great wasteful gormandizer of coal, the steam locomotive.

## NOTES AND NEWS.

THE Rev. Mr. Frizelle of Bushmills, England, narrates, in *Science Gossip*, that he witnessed a trial of a rook by his comrades for the act of stealing sticks from other nests. The other rooks assembled round the culprit, and cawed for a considerable time, when the unfortunate bird was condemned to suffer the penalty, and he was then and there set upon and pecked to death. Two magpies were present, who appeared seemingly as witnesses.

— The University of Jena is going to hold autumn courses for teachers in the various sciences. The course, commencing Sept. 23, is to last a fortnight, and comprises the following subjects: psychological principles of education, instruction in chemical experiments, the same in physical science, botanical observations and morpho-physiological experiments, animal biology, school hygiene, physical geography, and colonization.

— Any one who takes a walk abroad in the rural parts of France, when farming operations are going on, says J. W. Slater in *Science Gossip*, will often see small children following the plough armed with small pitchers, into which they put all the white, fat grubs of the cockchafer which are turned up. In England the rooks do this work, without young children being withdrawn from school or from play. But the French sportsman has nearly extirpated these useful birds. A recent iniquity, according to a contemporary, is the systematic destruction of the swallows on their return from Africa. Emissaries of the Paris *modistes* fix up on the shore, about the points where the birds usually land, long wires connected with powerful electric machines. The wearied swallows perch on the wires, and are struck dead by scores. Their bodies are then sent off to Paris to ornament women who are a disgrace to humanity. The saddest feature is that our contingent of martins and swallows arrive by way of France, and will doubtless be cruelly decimated.

— Professor Beal finds that the peculiar markings in bird's-eye maple do not occur in young trees up to about three inches in diameter, nor very high up in trees which are very much pitted at the base. A specimen taken fifty feet above the ground, *Garden and Forest* states, showed no trace of bird's-eye, while another from near the base of the same tree was very strongly marked. If the cause of these formations could be discovered and used to produce the marks, it would add greatly to the market value of the timber, for the wood of this maple and of other trees somewhat similarly marked is comparatively scarce and in great demand for veneers.

— F. W. Galton, the famous writer on the subject of inherited qualities, proposed to the Congress of Psychological Physiology to issue in the form of a document a series of questions intended to draw from scientific observers the world over the results of their experience touching the inheritance of acquired habits, mental, scientific, or social. He laid before the congress a first-rate conundrum. He told of an aquarium divided into two parts by a plate of glass perfectly transparent, and therefore invisible to the fish. In one division there was a pike, in the other a gudgeon. Every time the pike saw the gudgeon, he rushed to seize him, but every time he was stopped by the plate of glass. He did not learn soon, but for several months made this rush, and bruised his nose against the glass. Finally he came to understand that for some reason inscrutable to his intelligence he could not seize the gudgeon, and then he gave it up. He now swam about, seeing the gudgeon constantly, but paying no attention to it. Then the plate of glass was removed. This made no difference, the pike did not attempt to take the gudgeon. He had acquired the habit of leaving the gudgeon alone. The conundrum was, would his descendants inherit that habit, or possess the original impulse of their kind? Illustrations of this kind, or showing the operation of the principle of acquired inheritance, are what Mr. Galton wants.

— The great chart of France, showing the geological formations of the country on a scale of 1:500,000, has at length been completed, and a copy deposited with the Academy of Sciences at Paris. It is over fifty years since MM. Dufrenoy and Elie de Beaumont published a geological map of France on the same scale, and since that period the rocks of the different provinces have been more intimately studied. In 1882 the new general map was begun under the superintendence of the Commandant Prudent, and published by the depot of fortifications. It has just been finished, and, according to the *Scottish Geographical Magazine*, is an example of the most accurate cartography. Local geologists have contributed to the work as well as the government surveyors, and the scale of 1:500,000 has been adopted in deference to the wish expressed at the geological congress of Bologna in 1881, so that different countries can more easily compare the map with their own. The scale of colors recommended at that congress has also been followed,— that is to say, the sedimentary series is represented by the colors of the spectrum in their regular order. Thus the trias is colored violet, the Jurassic blue, the cretaceous green, and the tertiary yellow. Each of these general colors is subdivided into shades, which are deeper according as the rocks are more ancient. This is the first time the method has been employed on a large work, and it has given every satisfaction, since it allows the systems of rocks and their different gradations to be readily recognized. The eruptive rocks have been colored in different shades of red, and the crystalline schists in carmine. As for the primary rocks, on which the congress came to no decision, the authors of the map have been guided by the same principles in choosing their tints. The Silurian has therefore been colored a flesh pink, and the Devonian a red brown. The carboniferous, according to old habit, has been colored black and deep gray, while the Permian is represented by a yellowish gray. No fewer than fifty shades are employed; but all are easy to distinguish.