TELEGRAPHING WITHOUT WIRES.

Among the recent patents is one by Thomas A. Edison, of Menlo Park, N. J.—means for transmitting signals electrically, without the interposition of connecting wires. In his specification he says:

"I have discovered that if sufficient elevation be obtained to overcome the curvature of the earth's surface and to reduce to the minimum the earth's absorption, electric telegraphing or signaling between distant points can be carried on by induction without the use of wires connecting such distant points. This discovery is especially applicable to telegraphing across bodies of water, thus avoiding the use of submarine cables, or for communicating between vessels at sea or between vessels at sea and points on land; but it is also applicable to electric communication between distant points on land, it being necessary, however, on land (with the exception of communication over open prairie) to increase the elevation in order to reduce to the minimum the induction-absorbing effect of houses, trees, and elevations in the land itself. At sea, from an elevation of 100 feet, I can communicate electrically a great distance, and since this elevation, or one sufficiently high, can be had by utilizing the masts of ships, signals can be sent and received between ships separated a considerable distance, and by repeating the signals from ship to ship communication can be established between points any distance apart or across the largest seas, and even oceans. The collision of ships in fogs can be prevented by this character of signaling, by the use of which, also, the safety of a ship in approaching a dangerous coast in foggy weather can be assured. In communicating between points on land, poles of great height can be used, or captive balloons. At these elevated points, whether upon the masts of ships, upon poles or balloons, condensing surfaces of metal or other conductor of electricity are located. Each condensing surface is connected with earth by an electrical conducting wire.

On land this earth connection would be one of usual character in telegraphy. At sea the wire would run to one or more metal plates on the bottom of the vessel, where the earth connection would be made with the water. The high resistance secondary circuit of an induction coil is located in circuit between the condensing surface and the ground. The primary circuit of the induction coil includes a battery and a device for transmitting signals, which may be a revolving circuit breaker operated continually by a motor of any suitable kind, either electrical or mechanical, and a key normally short-circuiting the circuit breaker or secondary coil. For receiving signals I locate in said circuit between the condensing surface and the ground a diaphragm sounder, which is preferably one of my electromotograph telephone receivers.

The key normally short-circuiting the revolving circuit breaker, no impulses are produced in the induction coil until the key is depressed, when a large number of impluses are produced in primary, and by means of the secondary corresponding impulses or variations in tension are produced at the elevated condensing surface, producing thereat electrostatic impulses. These electrostatic impulses are transmitted inductively to the elevated condensing surface at the distant point and are made audible by the electromotograph connected in the ground circuit with such distant condensing surface. The intervening body of air forms the dielectric of the condenser, the condensing surfaces of which are connected by the earth. The effect is a circuit in which is interposed a condenser formed of distantly separated and elevated condensing surfaces with the intervening air as a dielectric.

In the accompanying drawings, forming a part hereof, Fig. 1 is a view showing two vessels placed in communication by my discovery; Fig. 2, a view showing signaling stations on opposite banks of a river; Fig. 3, a separate view, principally in diagram, of the apparatus; Fig. 4, a diagram of a portion of the earth's surface, showing communication by captive balloons; Fig. 5, a view of a single captive balloon constructed for use in signaling.

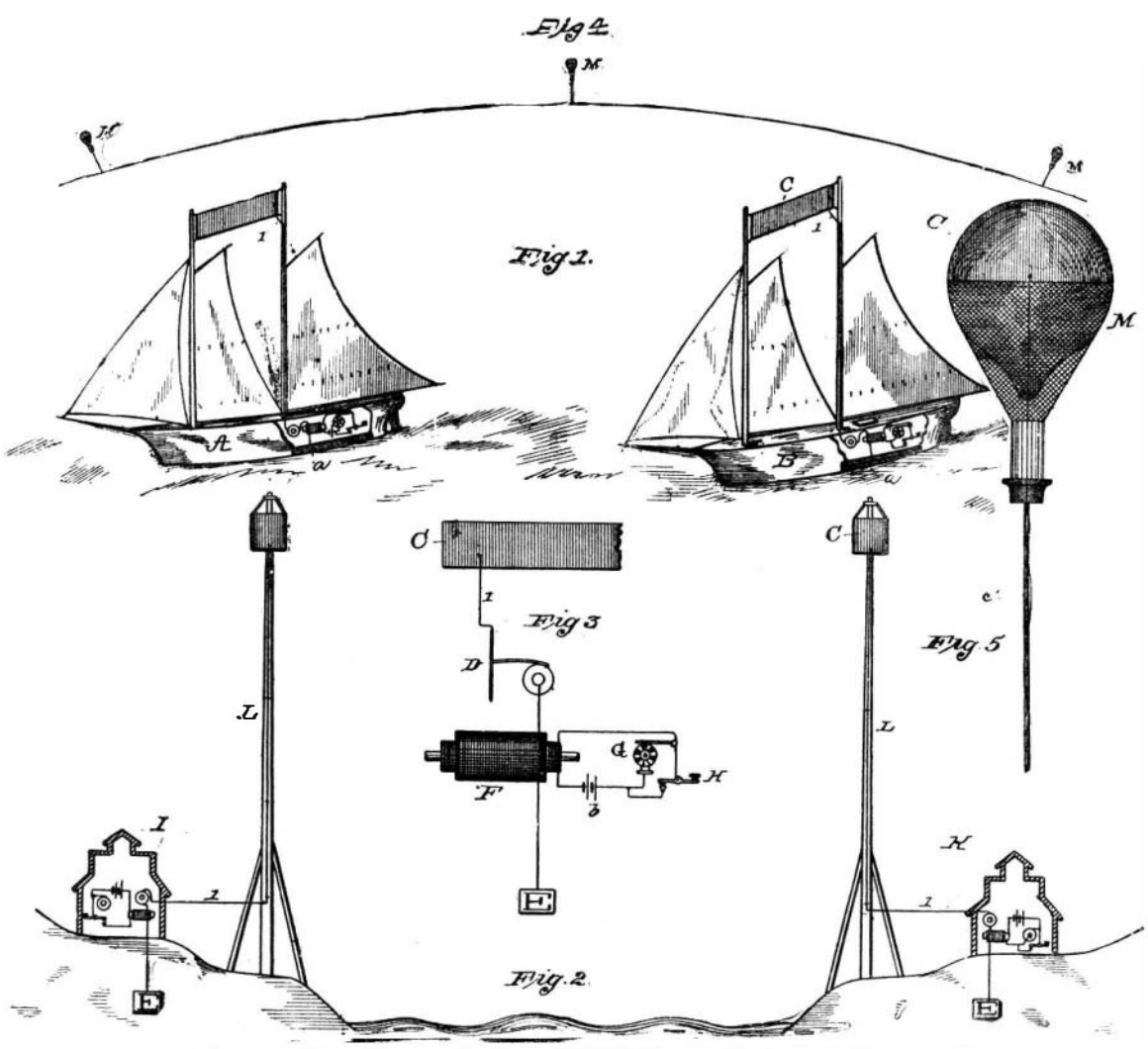
A and B are two vessels, each having a metallic condensing surface, C, supported at the heads of the masts. This condensing surface may be of canvas covered with flexible sheet metal or metallic foil secured thereto in any suitable way. From the condensing surface C a wire 1 extends to the hull of each vessel and through the signal receiving and transmitting apparatus to a metallic plate *a* on the vessel's bottom. This wire extends through an electromotograph telephone receiver, D, or other suitable receiver, and also includes the secondary circuit of an induction coil, F. In the primary of this induction coil is a battery, *b*, and a revolving circuit breaker, G. This circuit breaker is revolved rapidly by a motor (not shown), electrical or mechanical. It is short-circuited normally by a back point key, H, by depressing which the short circuit is broken and the circuit breaker breaks and makes the primary circuit of the induction coil with great rapidity. This apparatus is more particularly shown in Fig. 3.

In Fig. 2, I K are stations on land, having poles, L, supporting condensing surfaces, C, which may be light cylinders or frames of wood covered with sheet metal. These drums are adapted to be raised and lowered by block and tackle, and are connected by wires with earth plates through signal receiving and transmitting apparatus, such as has already been described.

In Fig. 5, M is a captive balloon having condensing surfaces C of metallic foil. The ground wire 1 is carried down the rope *c*, by which the balloon is held captive. In Fig. 4 three of these captive balloons are represented in position to communicate from one to the other and to repeat to the third, the curvature of the earth's surface being represented."

Several claims are made, but the principal one is the following:

"I claim as my discovery means for signaling between stations separated from each other, consisting of an elevated condensing surface or body at each station, a transmitter operatively connected to one of said condensing surfaces for varying its electrical tension in conformity to the signal to be transmitted, and thereby correspondingly varying the tension of the other condensing surface, and a signal receiver operatively connected to said other condensing surface, substantially as described."



EDISON'S NEW METHOD OF TELEGRAPHING WITHOUT WIRES.

New Discovery of Clymenia.

John M. Clarke describes in the *American Journal* for January the fossil *Clymenia* discovered in the fauna of the intumescens zone (Naples beds) of Western New York. The ammonoid genus *Clymenia* Munster has not heretofore been found in North America. As early, however, as 1843, Professor Hall doubtfully referred to this genus, a fossil from the Portage shales, the *Clymenia* (?) *complanata*, and in 1862 redescribed the species without the mark of doubt, at the same time adding a new specific name, *C. Erato*, for a fossil from the same fauna. Subsequently these fossils were proved to be of the same species, and though the name *Clymenia* was still retained as late as 1876, it was finally and quite properly abandoned in 1879.

The present discovery of a true *Clymenia* in a lower Upper Devonian fauna containing *Goniatites intumescens* and various other primordial goniatites was unexpected and is of considerable geological importance.

AN OVERSHOE ATTACHING DEVICE.

An improvement designed to facilitate the securing of rubber or other overshoes in a rapid, convenient, and firm manner on the boots or shoes of men, women or children is represented in the accompanying illustration, and forms the subject of a patent issued to Mr. Joseph H. Morison, of Centralia, Kan. It is an attachment consisting of a pair of pivoted opposite lateral clamps, adapted to hug the upper heel-end portion of the overshoe, and jointed together at their inner ends by a vertical hinge pin passing through an intermediate or center plate firmly secured to the overshoe. The center plate has a backwardly protruding lug, through which and two side arms of a clamping lever passes a fulcrum pin. The side arms of this lever are practically cams, and as the lever is pressed downward against the heel of the shoe the arms press the clamping wings inward, making the heel-end portion of the overshoe bind on or grip the under boot or shoe, to prevent the accidental withdrawal of the overshoe or its slipping off in muddy or sticky roads. To put on or take off the overshoe the central member of the lever is turned up, releasing the pressure upon the clamping wings, but, in putting on the overshoe, a single motion of the clamping lever, made by either the hand or foot, locks the overshoe on the under boot or shoe.

MORISON'S OVERSHOE ATTACHMENT.

A Proposed Ship Canal around the Falls of Niagara.

A bill has been introduced in Congress by Senator Davis, of Minnesota, for the construction of a ship canal around Niagara Falls which provides that the canal shall be built "along and upon one of the routes for a ship canal heretofore surveyed by the United States, if either of such routes shall be deemed feasible."

The report says: "Were this route open into Lake Ontario, vast numbers of lake steamers could and would descend to the Atlantic Ocean and there engage in the carrying trade in the winter months. That experiment has been repeatedly demonstrated beyond all doubt, and that, too, by vessels of less than six hundred tons burden. Ocean steamers as well as sail vessels could be constructed on the lakes cheaper than elsewhere, because all materials for construction as well as provisions are cheaper there than on the seaboard. This would at once solve the problem so long and anxiously sought after by statesmen as well as commercial men, to wit, revive commerce and cheapen transportation from the interior, so that our agricultural products could be carried to Europe at a profit, and there would no longer be a complaint of a languishing commerce."

THE "Physicians' Visiting List" for 1892, published by P. Blakiston, Son & Co., Philadelphia, besides the daily memorandum pages, contains much information useful to medical people.

The New Gas Works, Memphis, Tenn.

The *Appeal-Avalanche* says:

"I propose to throw in the first shovelful of coal," said Col. N. M. Jones.

"I think I deserve that honor," interposed Captain D. F. Jett.

A bystander was appealed to, who tendered the very just decision as between the friendly rivals that both should throw in a shovelful at once, and neither would have the advantage.

This pleasant episode marked a new era in the gas-making industry in Memphis.

President N. M. Jones, Secretary D. F. Jett, and Superintendent and Secretary J. T. Lynn, of the Memphis Gas Light Co., stood, on Monday, Nov. 30, 1991, in front of the great brick "bench," a technical term that refers to what appears to one unacquainted with the business to be a brick wall studded with doors like the openings to furnaces in a boiler room. These doors are the entrances to the retorts, which at the time and place referred to were clean and new, but white with a heat communicated from the furnaces below.

The Memphis Gas Light Company had just finished the work of putting in a new plant, and the interesting point of firing the first retort was reached.

The firing of the first retort of a gas works is the most interesting episode in the history of such an establishment. It is like turning the first dirt on a railroad destined at some day to carry on the commerce of a continent, or like touching the button which, by electrical communication, starts in operation the machinery of some great exposition of the world's products. It is an honor to be the individual favored with the task of throwing in the first coal.

It was for this honor that the president and secretary of the Memphis Gas Light Company contested, in a friendly way, in the words set forth at the beginning of this story; and a bystander, being a man of resource, settled the dispute between the others in the satisfactory manner hereinbefore set forth.

Messrs. Jones and Jett fired the first retort at 3:30 o'clock on Monday afternoon, and thus the new plant was launched upon its useful career of furnishing the finest quality of gas ever known in these parts.

The Memphis Gas Light Company has been lighting streets and houses, heating rooms and cooking meals of Memphis people for forty years, and each year has brought improvements and enlargements to meet the demands and satisfy the desires of its patrons; but this last great change has been the greatest since the first construction of the plant, embracing, as it does, a complete new machinery, from the coal chute, where the material for the manufacture of gas is first taken in, to the immense holders, where the perfect gas is confined before it is pressed into the mains to go out for the illumination of the city. The history of this company has been the history of the city. Forty years ago it started with a capital stock of $100,000; to-day its capital stock is $750,000. In 1851 it had 10 miles of mains; in 1891 it had over 40 miles. The plant was at first only large enough to accommodate its comparatively small patronage, but to-day it is the largest and most complete in the South, covering an entire block of ground, between Main and Chickasaw, Mill and Greenlaw Streets.

The improvements that have just been completed were begun last June, and have cost the handsome sum of $150,000. Up to last June the company had been supplying coal gas. It was then found necessary, owing to the dilapidated condition of the benches in which the retorts were situated, to make thorough repairs, and it was decided to remodel the plant throughout, securing the best and latest improved machinery in order to supply the finest quality of gas and to be ready to make extensions of the service whenever necessary. To this end it was necessary to go into the manufacture of water gas temporarily, pending the completion of the new system, and, since June, the water gas has been supplied to patrons of the Memphis company, a very good gas in its way, but not to be compared to the article which will be produced by the new system, which will be a combination of three parts of coal and one part water gas, which has been found better than any other by actual experiment, and is in use in the principal cities of the North, including New York, Chicago, St. Louis, Detroit, Pittsburg, Buffalo, Cleveland, and other leading cities. The water gas manufacture necessitated the use of two cupolas, which were put in, and which will still be used for the water portion of the new combination.

On July 15 the company began the task of repiping the entire city, and so rapidly has the work been pushed that already over 40 miles of new mains have been laid, including 20 miles of 16 and 12 miles of 8 inch and 6 inch pipe.

At the plant on Mill Street, entire new machinery has been put in, including a coke house, where three different qualities of coke can be put in; a $400 automatic pressure valve, by which the pressure can be regulated so that the same pressure will be given at the extreme limit of the mains as right at the gas works; a $6,000 meter, through which all the gas runs, and is measured; an $8,000 standard washer scrubber for ammoniacal liquor; a tar extractor under cover. In fact, the new machinery includes everything that goes to make a perfect and complete gas works, and the arrangements are not only for the present, but contemplate extension of the service whenever it is necessary.

A trip to the Memphis Gas Light Company's plant is a pleasant and instructive experience. It is not as disagreeable a place as people are inclined to imagine who pass by on the outside and get a whiff of the escaping liquid. Inside the inclosure everything is kept as clean and neat as a lawn, and th smell of escaping gas is not perceptible. Every gas manager takes a pride in the cleanliness and neatness of the establishment over which he presides, and when a reporter for the *Appeal-Avalanche* dropped unexpectedly into the area formed by the numerous large buildings belonging to the Memphis Gas Light Company yesterday afternoon, he was much surprised at the pleasing aspect of the place. Not a leaf or a stone is permitted to lie upon the ground outside the buildings, and inside the machinery and apparatus are kept clean and bright, with that scrupulous regard for the attractive that guides the locomotive engineer in the burnishing of the machinery under his care.

"You want to see how gas is made?" said Superintendent Lynn, who was found at his post of duty, watching the finishing touches being put on some of the new apparatus.

"Then come with me. First you ought to know how we get our coal, for the getting of the coal is the *sine qua non* of this business, as the catching of your turkey is the great desideratum to an orthodox Thanksgiving dinner. Our coaling arrangements are beyond improvement. You see the bayou runs alongside the yard, and barges loaded at Pittsburg are floated right up to our coal sheds, and the cargoes are lifted out by means of a derrick."

The genial superintendent showed how the coal was conveyed from the sheds to the retorts on trucks which were wheeled into the main building and lifted with their loads by means of a hydraulic elevator to the platform upon which the retorts open.

The retort is where the gas is first separated from its natural abode, the coal, and possesses, therefore, great interest to the student of gas making. The retorts at the Memphis Gas Company's plant are tunnels 22 feet 6 inches long and 17 inches by 30 inches in size, constructed of fire clay. There are twelve such retorts. They open at both ends and run through an immense brick framework termed a bench. Beneath the retorts are the furnaces, and around them are open spaces. The retorts are so high above the floor that a platform has been erected, so that the furnaces are on the first floor, the retorts on the second. The furnaces are fired with coke until the fire clay composing the retorts is at a white heat. The heating process is facilitated by gaseous fires in the open spaces surrounding the retorts. When the retorts are at proper heat the making of gas really begins by throwing coal into the retorts from both ends until they are completely filled. The doors are closed tightly then, and the terrific heat acting upon the coal produces the gas in its crude state. Every four hours the supply of coal in the retorts is replenished, the coke that has been formed being taken out. About 25 per cent of the coke is consumed again in the furnaces, and the remainder is run out on a chute and is put on the market for sale.

But this crude gas that is formed in the retorts is the interesting substance. It is impregnated strongly with tar and ammonia, all of which pass upward with the gas through what are termed "ascension pipes," large flues which run upward to the top of the bench, where they empty into a long, tightly covered trough known as the hydraulic main, where some of the ammonia and tar is deposited. This main is sealed with water, which serves the double purpose of preventing the gas from returning to the retorts when they are cold and to some extent cleansing the gas. From the hydraulic main the gas enters the "foul main," a pipe over 175 feet long and 20 inches in diameter. This pipe runs nearly the entire length of the immense building, and it requires an agile and sharp-eyed individual to follow it in all its course. Sometimes it is overhead, again it is under the floor, and further on it is climbing down the fire escape on the outside, but at last, after traveling a distance of 175 feet, it enters the "exhauster," a box-like machine in appearance, which draws the gas from the retorts, through the purifying process and into the holder. The "holder" is the technical term for that structure so familiar to every one who has seen a gas plant from the outside, that looks like a water tank with a roller coaster on top. After passing through the exhauster the tar and ammonia are separated from the compound substance in a machine known as the "scrubber," which is an iron cube-shaped machine with a capacity of 1,000,000 feet. Inside are brush and stones to which much of the tar and ammonia adhere. The gas passes thence into the condenser, which is another immense cube divided into six sections. Through each section run sixty 4 inch tubes, which are surrounded by cold water. The gas passing through this cold water is condensed. The tar leaves it at this point. But as a further precaution against tar deposits in the ammoniacal liquor there is a "tar breaker," a square iron machine fitted with screws, which breaks the volume of gas into small pieces and removes the tar.

The gas passes on to the standard washer scrubber, which is 7 feet in diameter and 16 feet long, with a capacity for washing 1,000,000 feet of gas per day. Its duty is to wash the gas. It is fitted with a large shaft running through the center and passing through numerous disks, in which are small perforations. These disks are always moving, pushing the gas through a body of water so as to percolate through the perforations, and thus separating the ammonia entirely. Thereafter the gas is free from ammonia. Then the gas goes to the purifiers, to be purged of carbonic acid and sulphureted hydrogen. This process is conducted in large iron boxes, 18 feet by 22 feet by 3½ feet in dimensions, in which are placed two tiers of trays. On each tray is placed about 12 inches of slaked lime, and in passing through this lime the gas is cleansed of the elements which it was desired to remove. It requires a great deal of lime for this purpose, and all of it is worthless ever after, except as a fertilizer. The gas company is glad to get rid of it by giving it away, but those who have land to be fertilized do not know of its valuable properties, or else are unaware that it can be had for the taking.

From its lime bath, the gas has one more journey before it is ready for marketing. It must pass to the station meter to be measured. This meter is like a large barrel lying on its side. It is 14 feet long and 12 feet in diameter, with a capacity of 2,000,000 feet in 24 hours. After the measuring has been accomplished, the gas passes into the holders, where it is stored, to be turned into the street in desired quantities, through the street governors.

That is the gas that burns on the street corners, in the parlors, and in the cooking and heating stoves.

It has gone through many processes, involving machinery that covers an entire block of ground, but when it is finished it is a first-class article. It is too valuable to be turned out to the public without measurement, and in the company's office are numerous machines for recording the quality, quantity, and pressure of the output. The pressure register only needs to be glanced at to be read. There is also an automatic register which, with a pencil, outlines on a paper the pressure during the day and night, and these charts are carefully preserved, so that it is possible to ascertain exactly the pressure that was on at any moment 10 or 12 years ago. There is also a jet photometer, which is to test the candle power of the gas.

The Memphis Gas Light Company has two holders, the new one, built by the Stacey Manufacturing Company, of Cincinnati, having a capacity of 425,000 feet, and the other, a relief holder for use with the water gas system, having a capacity of 100,000 feet.

The water gas system, which will be retained in addition to the coal gas system, is supplied with two Springer cupolas, 10 feet by 40 feet, with the capacity of 350,000 feet per 24 hours. It will be used as auxiliary to the coal gas system.

The main building of the plant is 164 feet by 62 feet, and 35 feet high, fronting on Chickasaw Street. It is of brick, with iron truss and slate roof. The purifying house is an extension of this main building on Mill Street. A lime shed is now in course of construction adjoining the purifying house.

Gas men will recognize in the above the description of a thoroughly complete plant for the manufacture of gas. The Memphis Gas Light Company is confident of being able to please its customers. The appliances for the regulating of pressure are perfect, and the repiping of the streets makes it possible to give good service in all parts of the city. The mains on Poplar, Washington, Adams, Jefferson, Court, Madison, and other residence streets have all been replaced with larger mains, and it is now possible to extend the service into the suburbs, if it were desired, without detriment to the present service. The gas is of a superior quality. The *Appeal-Avalanche* uses it in the furnaces of its linotypes. It will improve gradually until the new machinery gets in perfect working order, and then it will be of a quality unsurpassed.

The Lacquer Tree.

The juice of the lacquer tree (*Rhus vernicifera*) is the natural varnish upon which depends the famous lacquer work of the Japanese. Specimens of the tree were brought from Japan 16 years ago and planted in the Botanical Garden from rankfort, where they have flourished and have yielded seeds from which thrifty young trees have sprung. This place now has thirty-four healthy trees, 30 feet high and 2 feet in circumference near the ground. To determine whether the juice is affected by its changed conditions, Prof. Rein has sent samples to Japanese artists for trial, and is having comparative analyses made by eminent chemists. If the reports are favorable, it is expected that the lacquer tree will be quite extensively planted in Germany, and that Europeans will be instructed in the art of lacquering wood by some skilled worker from Japan.