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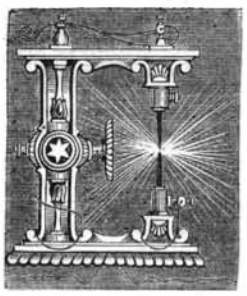
TELEGRAPHIC SCIENCE.



EVERY science in its history and progress may be compared to the flowing of a noble river. At its fountain head it may be seen as a slender rill trickling down the hill side; then, as it pursues its devious course through meadow and valley, stream after stream mingles with its waters and augments its volume, until it becomes the majestic river floating great navies, and forming fertile deltas by its alluvial deposits; then—like the Nile—it finally discharges into the ocean through several channels. This comparison is particularly applicable to electric science. Its fountain is the little rill witnessed by the Greeks, 600 years before the Christian Era, in the electron or amber, which when excited attracted feathers and straw. For 2,600 years this little rill of electric science flowed on without receiving a single tributary; but in the 16th century, the important discovery was made that, by friction, a vast number of bodies besides amber possessed like properties. In the next century, the first electric machine was invented by Otto Guericke, and from it the first sparks were obtained. In 1727 it was discovered that wire could conduct electricity to a considerable distance; and soon after this, the fluid was condensed in the famous Leyden jar. Twenty-five years subsequently, Dr. Watson found that both the earth and water could be used as conductors, and (in 1752) Franklin proved the identity of electricity with the lightning of the thunder-cloud. In this way electrical knowledge flowed along through a long course of years, gradually augmenting in volume until it became an important science, and was taught in colleges as a branch of natural philosophy.

Up to the beginning of the present century, the whole science was based upon tension electricity obtained by friction, and its application to what are called "the useful arts" was unknown, At this time, the Voltaic pile was discovered and electricity was obtained by chemical decomposition, instead of mechanical friction. The science afterwards assumed the proportions of a great river, by the application of the galvanic current to several of the arts, and it now flows on in several distinct branches each forming a separate practical science in itself. This is especially the case with the electric telegraph, as is fully evinced by quite a large number of works published on the subject, among which, the latest and most copious is the volume of Tal. P. Shaffner, our countryman, who is now on an exploring expedition on the northern seas for the purpose of laying out a new course to connect America and Europe by a series of short submarine cables.

Prior to 1837 fifteen telegraphs had been invented, most of which were impracticable for common purposes. In that year Professor Morse exhibited his telegraph and operated it through a circuit of 10 miles; and in 1843 Congress appropriated $30,000 to construct a line between Washington and Baltimore. It was first attempted to make it subterranean, by laying two copper wires covered with resin and placed in a leaden tube in the ground. Nine miles of this were laid and proved a perfect failure; not a mile of it could be worked, because a short earth circuit was formed. Professor Morse after consultation with some friends, lifted these wires and elevated them on poles in the same manner as all our American lines are now formed, and completed the whole distance between the two cities in May, 1844. It was a great success from the very first, and although the apparatus, then used was large and clumsy in comparison with the neat recording instruments now made, nevertheless, the principle of operation was the same. The principle of this telegraph is the employment of the attractive power of electro-magnetism to make marks or records—it is a long pen by which the operator in New York can write his letter in Washington.

The public we believe is not aware of the fact, that most of the telegraphing in our country is now performed neither with the Morse, House, Bain, nor any of the visual recording telegraphs, but simply by sound. Ten years ago each line had a most complete set of apparatus. The receiving register was made with the greatest care, so that the clock-work would move with the greatest perfection, and the various appliances had to be arranged in a particular form. The operator put the machinery in motion and he read from a paper the dispatch as it was slowly received. As he read aloud, a copyist near by wrote it down with a pencil, and when finished, it was handed to the copying-clerk, who wrote it out, put it in an envelop and dispatched it by a messenger. Expert telegraphists at length dispensed with the copyingclerks, and soon after the recording instruments were laid aside. The first operator who practically received messages by sound was Mr. Edward F. Barnes, of this city. This is now the daily practice of all the leading telegraph stations in America, only the local or interior stations have in use recording apparatus. Mr. Shaffner states in his work that, some years ago, as president of a telegraph line, he made a rule forbidding the receiving of messages by sound, but since then it has been reversed, and no operator can get employment in a first-class station unless he can receive by sound. At the Cincinnati stations there is not a single recording instrument; the mysterious agent speaks through the wires; the pen has given place to the tongue of the lightning, and an expert operator can receive 2,000 words per hour. Such is the perfection and such the present daily practice in American electric-telegraphing; and the 40 miles of wire between Washington and Baltimore in 1844, have grown into about 40,000 miles in 15 years—an almost miraculous achievement.

THE GREAT BALLOON.

We give elsewhere a description (from the *New York Daily Times*, and on its own authority) of a mammoth balloon that is being built in the neighborhood of this city for the express purpose of crossing the Atlantic ocean; in size it as much exceeds all former balloons as the *Great Eastern* steamship surpasses all other vessels. All the recent balloon ascensions seem to confirm the supposition that there is a current of air at the hight of about 10,000 feet, blowing from the west to the east; if this current should be found to be constant, and to extend across the ocean, it is very likely that the great feat may be accomplished. In regard to the Ericsson engine, unless it has sufficient power to raise itself by its fans, without being attached to any balloon, the most efficient way to raise the balloon by it would be to regard it as a part of the ballast and throw it overboard, rather than to use it in turning a propeller, while the fire to drive it would cause more danger than all the other perils of the enterprise combined. M. Rozier, one of the two men who made the first balloon ascension in 1783, lost his life two years afterwards by his balloon taking fire; and Madame Blanchard, widow of the famous aeronaut, was also killed by a similar accident. She carried up some fireworks, one of which set her balloon on fire, and she fell into one of the streets of Paris and was dashed to pieces. A lime stove was carried up by Messrs. Holland, Mason and Green, in their famous ascent from London, in 1836.

If the current of air should not be rapid enough to take the aeronauts across the Atlantic in a sufficiently short period of time, the air of the atmosphere would mingle with the carbureted hydrogen in the balloon, from the tendency which gases have to mix together, and thus the buoyancy of the balloon would be destroyed and the navigators dropped into the sea. If the speed should prove to be one or two miles a minute, there will probably be no difficulty from this cause; but it would be prudent to carry only three or four living persons, in order to have as large an amount as possible of dead ballast which may be thrown overboard.

THE ILLINOIS STATE FAIR.

[Special Correspondence of the Scientific American.]

MESSRS. EDITORS:—Being present at the last day of the Illinois State Fair, and knowing that you are interested in things of that nature, I propose to give you a brief account of the most prominent mechanical novelties there. The "Mechanics' Hall," on the north-west side of the grounds, was a large shed fitted with a line of shafting, which was driven by a handsomely-finished horizontal engine (made by P. W. Gates & Co., of Chicago), by which the stationary machines were operated.

It will be remembered that the Illinois Central Railroad Company (or the Illinois Central Railroad Land Company) offered a premium for the best ditching-machine; and, in consequence, there were many devices for such work on the ground. The most of these were intended to work by means of rotary scrapers and cutters; a number of others by means of plows and elevators; others were simply plows of peculiar shape, used by being passed several times through the same furrow. The most unique of these machines was Leonard Harrington's excavator, consisting of an upright shell of boiler-iron; the vertical section of the lower end being the cross section of the ditch cut. This shell contained, on the inside, an archimidean screw, and had spiral openings in its sides, provided with projecting cutters, which were rotated through peculiar mechanism, to throw the earth out of the ditch wherever desired. To commence work, it is only necessary to dig a hole large enough to let the shell and cutters in. This looks like a very good machine for heavy work. As usual, it was very difficult to ascertain the names of the machines and their inventors. There was a long row of reapers and mowers, each possessing some special advantage. The most noticeable novelties there were two "binders," one binding with wire, requiring one man to rake and one to attend the apparatus; the other binding with hemp cord and a cast-iron fastener. The wire-binder made a very loose bundle; the other was better, but the cord and fastening must be expensive. The latter machine was very ingenious and tolerably simple, the cut grain being carried off the platform by means of an endless apron, and delivered to a set of covered fingers, when it was compressed while being bound. The general opinion among the farmers seemed to be that binders were a great thing, but not yet brought to perfection.

Beside his machine, in an antique stove-pipe hat and a rusty coat, stood that veteran inventor, Pells Manny, who, with his son, John (now gone from earth), have introduced and invented more valuable improvements, probably, in reapers and mowers than any other two men in America.

Passing by the reapers, the ground allotted to the "steam plows" is in sight; and those, of course, claim a large share of attention. Only two were on the ground, the one announced from Seneca Falls not making its appearance. These two were "Van Doren & Glover's Rotary Plow, Reaper and Mower," and the widely-known "Fawkes' Plow." Van Doren & Glover's plow is an invention possessing some novelty, and the necessary features of cheapness and lightness seemed to be regarded. The engine was only four-horse power, horizontal, with link motion, and the piston-rod running through both ends of the cylinder. The outer end was fitted for attaching a cross-cut saw; the connecting-rod was of wood and double; the piston-rod was continued through a wooden guide-block, thus obviating the use of slides and cross-head. The boiler was an upright tubular, with a very small fire-box. The "plows," five in number, were simply cutters placed on each end of a strong iron bar, bent in such shape as to allow them to "lap" as they rotated, and this bar hung at its center on an iron shaft. This plow is not intended for "breaking;" it is for old land. A four-horse machine, the inventors state, will plow five acres in a day of 10 hours, reducing the ground to a fine tilth, and it can be built for $125 per horse-power, thus making a four-horse power cost $600 only. This machine weighs only 3,300 pounds. It was wretchedly built, the frame and much of the engine-work, levers, &c., being of wood; and it could not have run a week and held together. It further had the misfortune to have had its boiler burned the day before, causing it to leak so badly into the fire-box that only five pounds of steam could be maintained, which ruined the whole machine for all purposes of exhibition, and obliged its inventors (who were also its exhibitors) to take it off the grounds.