Carolina in coastal plain deposits; and those of Indiana in sandstone.

Continuously sucking wells are reported in Georgia and Nebraska, but in general the wells are of the breathing type, the movement being outward or inward according to barometric pressure.

Symbols for Representing Underground Water Data: Discussion by members of the society.

To secure uniformity it is considered advisable to adopt some simple set of symbols for use in reports. A circle for wells and a circle with a short irregular line leading off from it (suggesting a stream) for springs were favored. For successful wells the circle is to be made solid (dot), while for unsuccessful wells the circle alone is to be used. Mineral wells are indicated by a dot within the circle. A vertical bar for waters which rise in the wells, a cross (consisting of vertical and horizontal lines) for flows, and a horizontal bar for thermal properties in springs were suggested, each to be superimposed on the fixed symbol for common or mineral wells and springs.

M. L. Fuller,
Secretary.

Discussion and Correspondence.

A new world for the blind.

In *Harper's Magazine* for January, 1860, there is a story by J. D. Whelpley called, 'The Atoms of Chladni.' The tale itself has interest for the curious only, but it pivots upon a contrivance which, as described, is an illustration of the fact that the fancy of man has often anticipated the scientific discoveries of a succeeding time. 'The old discoveries of Chladni' are alluded to as the initial idea whence sprang the mechanism devised by 'Bonsall,' the Merlin and Mephisto of the tale. A broad plate of thin metal is described as suspended from the ceiling by threads of silk. This plate may be 'electrified by vibration.'

> The mirrors of your ceiling are each a vibrating plate. From the upper surface of these rise wire conductors of the electric power generated by the vibration. This is faint and feeble at first, but, by passing through metallic threads coiled a thousand times around small magnets each geometric division of the plate corresponding with a magnet and with a radical sound of the human voice—it has power to connect and disconnect the keys of the batteries. * * * Thus are pinned more or fewer points in this strip of paper, from which, by such wonderful means, has been read off and written every clearly articulated sound uttered in your apartments. There are ninety distinct entries of the record, said Bonsall, closing the book, and of these more than twenty are conversations between the same pair of affectionate lovers. All must have taken place in your room. Your villainous machine records words spoken in your room, above the mirror, as clearly as if they had been uttered below it, in my chamber.

Within the past year or two there have appeared in the magazines and newspapers of the world accounts of a remarkable invention. From one of these—*The Boston Evening Transcript,* October 14, 1905—I quote the following account:

> Conceive a piece of steel wire, generally known as 'piano wire,' stretched between two points, or a steel plate. Take an ordinary electromagnet and connect the coil of it in circuit with the secondary of an induction coil, the primary of which is in circuit with a microphone and battery. On speaking into the microphone induced currents of electricity produce continuous variations in the field strength of the electromagnet, and if we slide the electromagnet along the steel wire or over the plate the magnetic fluctuations of the electromagnet affect the steel wire or plate in the form of variable magnet intensities. There have been impressed on the steel surface undulations of magnetization, a kind of writing that is virtually permanent, and which faithfully records the articulations of the voice. If the coils of the electromagnet are connected with the telephone receiver, and the magnet is made to travel over the steel wire again, the telephone receiver repeats what was spoken into the microphone; or, in other words, acoustic vibrations analogous to the original vibrations of the microphone are produced in the telephone receiver. The records thus made will last for years. The steel wire or plate may be polished without disturbing it. Rust has no effect upon the record. The message remains there until a heavier magnet is drawn over the wire, when it is wiped off or demagnetized.
>
> In one form of the machine a steel plate is

used. In its manner or operation it resembles the ordinary gramophone. The disk is rotated in the same way. The records are not reproduced with the loudness of the gramophone; still, they are distinct and free from the scratching and hissing occasioned by the stylus as it passes over the wax surface. The steel disk which receives the message is about five inches in diameter. As the disk rotates, the magnet and coil, which are held in a carrier, are gradually moved toward the center of the disk by a micrometer screw. The speed of rotation is increased as the magnet approaches the center of the disk, so that the disk rotates beneath the magnet with a constant linear velocity of one half a meter per second. The record is easily erased by passing a bar magnet over the disk. In place of a pair of magnets the two coils, which characterize the earlier machines, a straight magnet is now employed. This magnet is a pointed needle which can be lifted out and renewed, the coil being imbedded in an insulating composition and held in a small ebonite cylinder.

In yet another form a steel piano wire is employed, wound off one wheel to another between two magnet poles by an electric motor contained in the base of the instrument. The speed is about 10.64 feet per second. Enough wire is carried on the reels to make a record three quarters of an hour in length. Should only a part of the record be used at a time, its position can be noted by an indicator finger which rotates at a speed equal to that of the reels. In this machine three pairs of magnets and coils are used, each pair consisting of two magnets and coils similar to the straight magnets previously described. The magnets are placed horizontally, one on either side of the wire. The sounds are recorded by the middle pair of magnets, the pairs on either side serving for demagnetization or erasure. As the wire winds off the magnet carrier travels back and forth, serving both to hold and guide the wire on and off.

As to the genuineness of this discovery, Lord Kelvin, Professor Silvanus Thompson, Mr. Alexander Graham Bell, Mr. Marconi and other scientists have borne abundant testimony. I understand that the invention is soon to be placed before the public, the instruments to be rented to subscribers precisely as the telephone is now supplied.

The sole object of the present writing is to call the attention of philanthropists, educators, social economists, and the medical profession, to an application of the invention which was probably not dreamed of by Mr. Poulson, the Danish engineer who made the discovery. I have spoken into the machine all sorts of messages in every tone and strength of voice, and at once have heard the same speeches returned to my ears with the same qualities of timbre, pitch and intensity, and without any mechanical additions or unpleasant effects.

All of this being true, of what use the now ludicrously cumbrous, expensive, slow and wearying embossed letters and libraries for the blind—the Braille, New York Point, Line Letter, Moon Type, etc.? How vastly may be increased the ease of methods of reading to the sick, the infirm, the aged, of instruction of teachers, of the young and others! A book can be read to the sightless or to the invalid by the machine, while the patient lies in bed. Lectures, concerts, recitations—what one wishes, may be had at will. Skilled readers, or expert elocution teachers could be employed to read into the wires entire libraries, and every taste would thus be easily supplied. Of course the invention could not help those who, in addition to being blind, are deaf.

Letters may be dictated or spoken upon the thin sheets of steel, and these, after being sent by mail to the distant friend, are placed in the machine and the voice is exactly reproduced as regards inflection, emphasis, timbre and pitch. The record does not wear out, and may be used again and again, as often and as long probably as one may wish.

The expense could not possibly be a tithe of that required in the use of the raised or embossed systems of book-making for the blind. The saving of the time of the reader or listener would, of course, be immense. I know nothing about the financial methods or plans of the company which is putting the telegraphone upon the market. I take it the owners of the patent are human and would respond to the double argument that a gift or a sale of the machines at the cost of manufacturing would undoubtedly in the end prove profitable. Even if it were not so philanthropy could be relied upon to furnish the deserving blind of civilized countries with the

machines. There are several hundred thousand blind persons in the civilized world, and benevolence has long vied with charity in lightening the burden of their afflictions, and mitigating the tragedy of their lives. One can not imagine a more speedy and effective means than this of stimulating their *esprit de corps,* arousing mental, educational and social progress, and of placing at their command the learning and science of the world. We are too slowly learning that there is no occupation, whether farming, mechanics, manufacturing, merchandising, or professional life, that may not be worthily, and that has not been successfully, carried on by those without sight. To place within the reach of these this most helpful and noble device would put them at a bound so in touch with one another, and with profitable employment, that other charities in their behalf would lessen in demand and in significance.

George M. Gould.

Philadelphia, Pa.

Color-associations with numerals, etc. (fourth note.) 1882–1906.

I have given in various places[1] some account of the associations of colors with numerals and letters at epochs in the years 1882, 1883, 1885, 1887, 1889, 1891 and 1895, in the case of my daughter Mildred. The note in *Nature* for July 9, 1891, is the most complete and gives a table which can be consulted by any one interested in this matter. I have recently (January 16, 1906) asked her to give me a list of the colors that she associates with (1) the days of the week; (2) the letters of the alphabet; (3) the numerals 1 ··· 10. Her answers are exactly the same as those given in *Nature* for June, 1891, except for the following very slight differences:

Friday, white with tiny dots; *E,* pink; *K,* grayish brown?; *P,* green, not very clear; *Q,* purplish blue, not very clear; *S,* cream, nearly yellow; *V,* white; *Y,* yellowish cream; 8, white; 9, blue; 10, black and cream (and both colors are seen); 0, cream.

[1] Science, Vol. VI., O. S., 1885, p. 242; *ibid.,* Vol. I., N. S., 1895, p. 576; *Nature,* Vol. 44, 1891, pp. 223–4.

The series of notes seems to be of value, as it records the results of experiments extending over a period of twenty-four years, made under exceptionally good conditions. To make the record complete it should be added that my daughter married some two years ago and is herself the mother of a daughter. It will be interesting to inquire if this child inherits color associations of the sort from one or both parents. I, myself, see no colors associated with numbers or letters.

Edward S. Holden.

U. S. Military Academy,
West Point,
January 18, 1906.

The yellow-fever mosquito.

To the Editor of Science: The communication of Professor Vernon L. Kellogg, printed in the number of Science of January 19, implies that yellow fever and the mosquito *Stegomyia fasciata* do not occur on the Pacific coast of America. Guayaquil, Ecuador, is a notorious hotbed of the disease and there have been numerous outbreaks at points along the Mexican and Central American coast—not to mention Panama. Caldera, the former Pacific coast port of Costa Rica, was abandoned on account of an epidemic, undoubtedly of yellow fever, which swept off a great part of the inhabitants. Upon a recent trip through Mexico and Central America, in the interest of Dr. L. O. Howard's forthcoming work on the Culicidæ, the writer found *Stegomyia fasciata* abundant in the following Pacific coast ports: Acapulco and Salina Cruz in Mexico, Champerico and San José in Guatemala, Corinto in Nicaragua and Puntarenas in Costa Rica. The only port visited which appeared to be free from this mosquito is Acajutla in Salvador, although the species was found at Sonsonate, about twenty-five miles inland. Perhaps on account of its very small size and the scattered disposal of the houses, Acajutla does not offer favorable conditions for this eminently domestic mosquito.

It would seem that at present the greatest danger of the introduction of yellow fever into Hawaii lies in the transportation route across the Isthmus of Tehuantepec, which will soon