THE SIGN LANGUAGE OF THE AMERICAN INDIANS.

The language of signs is the only universal language, and it is the oldest language, says *The Illustrated Christian Weekly*, to which we are indebted for the accompanying engraving and article. It is by signs that the brutes converse. Monkeys talk with their hands and legs, and even insects talk with their antennæ. The child speaks at first by gesture, though the gesture language is discouraged, and the limbs are put aside for the tongue. But just as we have to converse with a little child by signs, so we have to talk to the insane, who often have no knowledge of words. And signs are still used by the sane. When we pray we use our clasped hands as a sign of appeal, or bow the head in sign of reverence or adoration; and when we welcome a friend we clasp hands in token of welcome. In fact, try as we will, we cannot yet dispense with the gesture language.

At Washington, on March 6, 1880, seven Ute Indians who were proficient in the sign language were introduced to seven deaf mutes, and conversed with them. The experiment was entirely successful. They told each other stories, and the stories were written down and examined, and found to agree in every particular.

The Indians are the best sign talkers in the world. The multiplicity of their dialects rendered some general means of communication inevitable among them, and though legend assigns the invention of the sign language of the plains to the Kaioways, we shall not be far wrong in assuming that it is much older than the division of the Indian race into its minor tribes. This language, to which we propose to devote some attention, is curiously complete. By it one Indian can converse with another from Alaska to Panama. It has its general signs, its conversational signs, and its tribal signs. Let us take the general signs first.

The blanket is often used for signaling. When the Omahas discover buffalo, the blanket is held out at length, with the hands as far apart as can be. When it is intended to camp, the blanket is raised aloft on a pole. When a signal is made to approach, the lower edge of the robe or blanket is waved inward to the legs. The signal of the discovery of enemies, game, or anything else is to ride round and round in a circle, passing and repassing each other if there is danger.

If at any time it becomes necessary to communicate with friends at a distance, smoke signals or dust signals are used, so many pillars at different intervals apart signifying certain warnings or encouragements. At night a most remarkable system of signaling by means of arrows of fire is in use. The arrows are wrapped with tow round their heads, the tow is dipped in some resinous matter and lighted, and the blazing messenger is then shot aloft, to be visible over a wide extent of country, and by many to be mistaken for a meteor.

But it is with the conversational signs that most interest lies. Over and over again furs have been sold, leases granted, and treaties made in the far West without a word being spoken between the parties. The Indian interpreters employed by the United States government are all proficient in this wonderful universal language; and, though it varies in different districts, yet its meaning is always unmistakable. Some of the gestures used are strangely eloquent.

Take bad, for instance. The general sign for this is to scatter the right-hand fingers outward, as if spurting away water from them. But among the Arapahoes the fingers of the right hand are half closed, the thumb is hooked over the fore and middle fingers, the hand is moved back upward a foot or so toward the object referred to, and then the fingers are scattered, so as to show that the object is only worth throwing away.

Brave is shown among the Shoshones by clenching the right fist, and placing it on the breast. But among the Sioux the two fists are pushed forward about a foot at the height of the breast, with the palms inward, the right being about two inches behind the left. Among the Comanches and Kaioways the sign is that given in the illustration.

Dead is shown by throwing the forefinger from the perpendicular into a horizontal position toward the earth, with the back downward, or else by crossing the arms on the chest and then letting them drop at the same time on the head. The Bannack sign is that we give, which is also in use among the Shoshones.

For dying we give the sign common to the Apaches, Comanches, and Kaioways. For "nearly dying, but recovered," the Kaioways have a most significant gesture. The hand is moved slowly downward, and then upward again.

Grow has another eloquent sign, the hand being held as in the illustration, and moved upward in an interrupted manner. Much the same sort of sign is used for smoke, but in that the hand is thrown upward several times from the same place instead of continuing the whole motion upward.

For None, Nothing, or I Have None, a very expressive sign is used among the Sioux. The palm of the flat right hand is passed over the left from the wrist toward and off the tips of the fingers. With a little modification this sign is used among the Kaioways, Comanches and Apaches.

For Friend, we give the Dakota sign. It is worthy of note that an Indian rarely shakes hands with Indians; that is a ceremony he reserves for his pale-face friend.

For Killed, the Cheyenne sign is given.

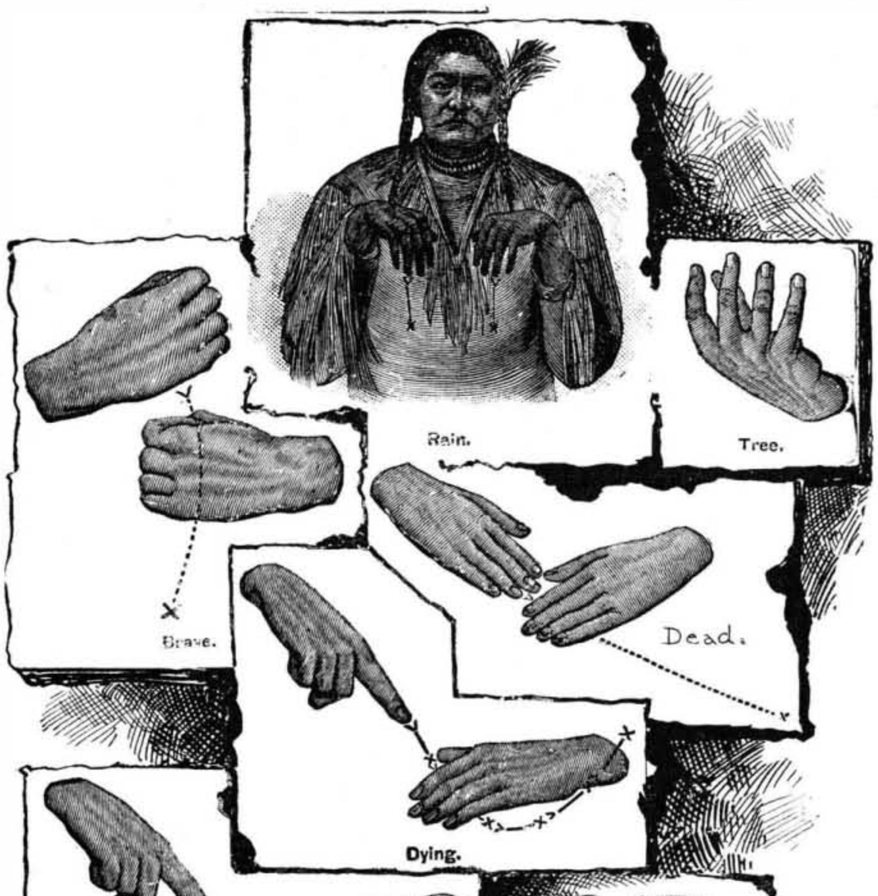
Rain is denoted by the Shoshones and Apaches by apparently dripping fingers.

We give the ordinary Sun and the Cheyenne Sun. Both mean the same, the completeness of the disk being shown in each case.

Tree is given according to the Dakotas, the right hand being held before the body, as shown, and pushed slightly upward, to give the idea of growth.

Untrue. The Arikara emblem of a falsehood is significant, the first and second fingers being moved in the direction of the dotted line.

The American Indians are the most stolid of races. We hear of them times and again sitting for hours without moving a muscle, and yet among them the language of pantomime flourishes at its fullest. It is much the same with them as it is with the Italians. As a nation of gesticulators, we should class the Italians far below the French, but owing to their peculiar divisions it has been found indispensable to have one general language, and to keep it at a fair average of cultivation. A most striking example of the perfection to which sign language can be brought forced itself into history in 1282. In that year the Sicilian Vespers rebellion was arranged throughout the island, and even the day and hour fixed, without a word being spoken or written. Every detail of the conspiracy was commanded by gesture.



SIGN LANGUAGE OF THE AMERICAN INDIANS.

Wooden Water Pipes.

The *Olympia Capital* describes the method of manufacture as follows:

A large pile of bright yellow wooden pipe was in one place, near by another pile of similar pipe, but with narrow steel bands coiled around them, like spiral springs, and another pile covered, consisting of pipe covered with asphaltum. These were in the different stages of manufacture. Inside the factory the green logs, as brought from the forest, are drawn up from the Sound and cut into lengths of eight feet. These are rolled to the boring machine. This consists of a hollow auger eight feet long. The log is securely fastened on a carriage, and the machinery set in motion. The rapidly revolving auger bores into the heart of the log, and in time appears at the other end. It has fairly eaten a hole clear through it. The core of the log is in the hollow of the auger, and when removed is in turn bored and made into pipe of a smaller size. When taken from this machine the inside of the pipe is complete, but the exterior, covered with knots and bark, is the same as when taken from the forest. The next process is to remove this bark. For this purpose a great turning lathe is used. The log is made to revolve at a rapid rate, and a chisel securely fastened to a carriage slowly moves along, bearing away the bark and fiber. Backward and forward the chisel moves, and at each trip more fiber is torn away and the pipe grows thinner. When all but one inch of the wood is removed, it begins to show what it is intended for. The next process is to chisel the ends for an iron collar that serves to join the pipes when used. After the ends are cut down to the proper size, the pipes are placed in a dry kiln and seasoned. The next process is the wrapping. A pipe is placed in a machine similar to the turning lathe. A steel strap about two inches wide is fastened to one end, then the pipe slowly revolves, and the strap is wound around in a spiral form the entire length and fastened at the other end. After that a coat of asphaltum is applied, and the pipe is ready for market.

The first of these wooden pipes were made so one would fit into another. Now a steel collar is used, and when the pipes are fitted into it there is but half an inch between them, and the collar fits so tight that no water can escape.

The capital stock of the company is $50,000 and the profits of the factory for this year will be more than the capital stock. Over 500 miles of this pipe are now in use, in sizes from 1 to 12 inches, by water works companies, in mines, and for all kinds of conduits throughout the Northwest. Last year 200 miles of this pipe were made. If the company decides to remain in Olympia, the capacity will be increased to four times the present output, and new buildings will be erected. The company is now simply awaiting the action of the railroads coming to this city.

THE pitting of small-pox has been entirely prevented by Dr. Lewintaner, of Constantinople (*Wien. Klin. Woch.*) by antiseptic treatment as follows: The entire head and face, except eyes, and the neck are covered with plaster consisting of 3 parts carbolic acid and 50 parts each of olive oil and starch. The body is covered over with a mixture of 3 parts salicylic acid, 30 parts starch, and 70 parts olive oil. The internal treatment consists in giving quinine in acid solution.

New Sugar Items.

France.—Recent observations on the action of lime upon raffinose have brought to light some interesting facts; the combination that occurs without heat appears to be the only one existing; 100 parts raffinose absorb 10 parts lime. A solution of raffinose at 15° C. will absorb a quantity of lime depending upon the degree of concentration of the saccharine solution. This amount is about one-half of that absorbed by a saccharose solution of same concentration. The lime raffinosate is precipitated by alcohol, but is less soluble than saccharate of lime. Certain sugar compounds may be made to take up raffinose. If molasses (containing saccharose and raffinose) be saturated with lime and then a small quantity of alcohol be added, the calcic precipitate will be richer in raffinose than was the molasses. In this may consist a method of extracting raffinose from this refuse. As the precipitation is repeated the percentage of raffinose decreases.

With the idea of improving existing agricultural methods of beet alcohol rectification, prizes are to be offered during 1891. The product should be of an irreproachable quality, and chemical or mechanical means may be employed.

Efforts are being made to have a heavy custom duty placed on molasses. As matters now exist, this product very seriously competes with the agricultural interest of the country. If its importation diminishes, there would follow an increased area devoted to grain, etc., which would be subsequently used in distilleries. Molasses distillation gives as residuary products, potassic and sodic salts. On the other hand, grain or root utilization furnishes scum cake for the soil as a fertilizer and excellent food for cattle. The labor question is also important. It appears that a molasses distillery requires very few hands for its working, as compared with a beet distillery.

Statistical data relating to the use of sugar in wine and cider manufacture are interesting, as showing the importance of these industries. The total quantity of sugar used for such purpose during 1889 was 20,500,000 kilos., and the resulting product was 1,788,000 hectoliters wine and 65,600 hectoliters cider. The grape crop having been a partial failure that year, such methods of strengthening were, as usual, resorted to.

The proposed changes in the fiscal system are not proving satisfactory. The law of 1884 gave a stimulus to the beet sugar industry, and should be left as it now stands. As the selling price of refined sugar has decreased, the purchasing price of beets has increased. The number of factories working in France diminished from the time that sugar was taxed. During 1889–90 there were produced 680,000,000 kilos. sugar, 305,000,000 kilos. molasses, and 2,500,000,000 kilos. pulp. The latter was sold for $2,000,000. The total value of sugar, molasses, and pulp was $70,000,000, or $144 per acre of beets cultivated.

From the sugar manufactured, the government collected in taxes $33,000,000—taxes on alcohol, value of beet leaves, refuse from filter presses, carriage by rail, etc., are estimated at $8,000,000. The total $113,000,000 is the amount representing the yearly national fortune from the beet industry, or $200 for every acre of land cultivated in these special roots, of which about $80 is taken from the air and does not represent a loss to the soil, etc., but may continue indefinitely; the remaining $120 represents labor, commercial transactions, fertilizers, etc.

A new beet slicer gives cossettes in T-shape; the cutting blades have an irregular, zigzag shape. The advantage claimed is that the small beet slices will not adhere to each other, and thus prevent the osmotic action of the circulating liquid in the diffusers, a trouble now most frequently occurring.

A very important new sugar process has been recently discovered by MM. Vivien and Lefranc. It is called "Fluation." Most of the existing methods for heating saccharine juices depend upon lime, baryta, etc., for defecation. The calcic-carbonic acid process eliminates about 40 per cent of the organic substances a juice may contain. The mineral elements are but slightly affected. A juice having a saline coefficient of 26 and purity coefficient of 85 when treated by existing processes will have a S. C. of 30 and P. C. of 90. On the other hand, by the *fluation* method the P. C. becomes 95 to 96 (?) In this process a fluo-silicate of lead at 34° B. is used. The quantitiy must be calculated to correspond to the requirement of each special case. The lead solution in excess may be eliminated by the addition of a small quantity of lime. Mechanical filtration follows and the purification is then finished.

The last trace of lead may be eliminated in various ways. Juices direct from diffusion battery, when treated by this method, subsequently gave *masse cuite* of an excessive purity, and in vacuum pan a heavy yield of sugar. Attention is called to the economy of *fluation;* the purification being done when juices are cold, there is considerable saving in caloric, which saving is estimated at 15 per cent of total fuel required by customary methods. In the residuary products may be found phosphorus, potassa, etc., from which, also, may be regenerated the fluo-silicate originally used. It is said that this process cost nothing; on the contrary, it may be a source of revenue of about 20 cents per ton of beets worked.

An "ebullioscope" recently invented gives by simple reading on a graduated scale the percentage of alcohol contained in a solution.

In sugar analysis by polariscope it is admitted that a deviation of 100° of the *Laurent* apparatus corresponds to 16·19 grains of sugar in the solution under observation. Chemists of different countries assert that 16·26 grains, 16·30 grains, etc., are the correct figures to be used. All the recent determinations are higher than the original figure, as given by *Girard* and *Lynnes* fifteen years ago. The explanation appears to be that since these reports great improvements have been made in polariscopes, and their working leads to much more accurate results than formerly. A well known authority points out that 16·30 is as far from the truth as the original figure was. Flasks are now used of 100 c.c. capacity and are marked by weighing 100 grains of water in the air at 15° C.; and it is impossible to obtain the division 100 with this weight. As a result, both the manufacturers and the government have been the losers.

A simple calculation shows what a discrepancy of this kind means; *e. g.*, during a recent campaign there were worked 4,216,850,000 kilos. beets, from which were made 414,860,576 kilos. refined sugar, as determined by the coefficient 16·19. If 16·30 coefficient had been used as the calculation of this total, refined sugar would have been 417,688,000 kilos. The difference, 2,818,000 kilos., means less money in the manufacturer's pocket, owing to a surplus drawback he would otherwise have received. It is seriously suggested that the matter be scientifically investigated.

It is said that the average yield of sugar during past campaign was 10·25 kilos. beets worked. It is thought that the total refined sugar production for the year will be 690,000,000 kilos., the drawback amounting to about $15,000,000 on 190,000,000 kilos. sugar.

The total production of alcohol during 1889 was 224,596,300 liters. There are 2,876 places where alcohol is made; 331 of these establishments used molasses or beets. The industry is mainly in the hands of 46 distillers, who produce 63 per cent of all the product.

In the department of *Aisne* last year, there were destroyed nearly 600,000 kilos. of beetles. If we admit 1,200 beetles per kilo. and 20 eggs per beetle, this destruction represents 13,900,000,000 white worms. In many other parts of the country active measures in this same direction are being taken. Special trials have demonstrated beyond cavil that excellent results may be obtained by using benzine. This method, however, while efficacious, is too expensive for general use. Sulphide of carbon, when distributed on the surface of the soil, will saturate the same with its vapors, so that the white worm perishes in the strata below.

For some unknown reason, the residuary product from molasses distillation has undergone great changes in its composition. Five years ago 30 per cent of it was potassic carbonate, but now nearly 40 per cent; potassic chloride was then 18 per cent, and now 8 per cent; sodic carbonate in 1884 averaged 17 per cent, and in 1889 only 12 per cent. Chemists offer no explanation for these changes.

Refined sugars consumed in Tunis are imported from France and Austria-Hungary. Raw sugars have a very limited sale.—*The Sugar Beet.*

Prof. Ewing's Model of Magnetized Molecules.

Ever since the time of Ampere, physicists have been familiar with the idea that a magnetic substance consists of an assemblage of minute magnets. Prof. Ewing accepts and starts from Weber's theory that the molecules of iron and cognate substances are always magnets, and that the process of magnetizing consists in turning them from their many directions into one direction.

"Every one knows," says Dr. Oliver Lodge, "that when a substance is subjected to magnetizing processes, some of the magnetization excited is only temporary, while some continues permanently after the magnetizing forces are withdrawn—a fact which may be expressed by saying that the molecules are strained out of their old positions into new ones, and when released they spring back part way toward their old positions, but do not completely recover unless the strain has been very small or the iron excessively soft."

Prof. Ewing has built up a molecular model of the simplest kind, in order to show what really happens to the molecules in the successive stages of magnetization. The model consists of a large number of short steel bar magnets strongly magnetized, each pivoted upon a sharp vertical center, and balanced to swing horizontally. The bars swing with but little friction, and their pole strengths are sufficient to make the mutual forces quite mask the earth's directive force when they are set moderately near one another. The group is arranged on a board which slips into a large frame. The frame is wound around the top, bottom, and two sides with a coil, through which an adjustable current may be passed to expose the group to a nearly homogeneous external magnetic force. Little magnets furnished with air vanes illustrate capitally what has been called magnetic viscosity. When the imposed force reaches a critical value, some molecule swings round; the next neighbors finding their stability weakened follow suit, and the disturbance spreads through the group in a way eminently suggestive of the phenomena of time lag.

The scene when the current is passed into the molecular field is almost startling. The molecules do not arrange themselves with uniform polarity all in parallel lines or in closed chains. They fall into groups, each group forming a stable configuration in itself. Lines predominate, two or more of the molecular magnets linking themselves in one straight line, and others in lines parallel or not. Three magnets, for instance, give two in one straight line, the third in a line parallel to this. In a group of seven, three will be at right angles to the other four; in fact, in many groups this right-angled relationship is a condition of stability. Square patterns have a special interest, because iron and nickel crystallize into the cubic system.

The many experiments made with the model repeat on a visible scale the cycle of events which take place when the invisible molecules are magnetized in an ordinary mass of iron or steel, the process being traceable from the effects of even the smallest force up to that which produces saturation, and thence through the return series. All the known phenomena of hysteresis or retardation of effects behind the causes that produce them can be imitated by the model, as well as many others less obvious and familiar.—*Extract from "Science Notes," in the Leisure Hour.*

Mistakes of Architects.

In the search for the beautiful, the demand for impressive facades, the taste for complicated ornament, and a most singular appreciation of the odd, the grotesque, and the ugly, there is little attention paid to matters which seem self-evident and are of really vital importance. Windows are arranged to suit a symmetrical facade, whether they are just what are needed for the rooms or not, and even where it is possible, little attention is given to the direction of the sunlight in order that the living rooms may receive the full benefit of the natural warmth, nor are those rooms where it is not needed, or minor offices, relegated to the exposed side. The most important external feature, the door, is seldom adjusted to the climate.

Even in large office buildings, hotels, and churches, where there should be ample space for every structural convenience, the door is frequently of cramped dimensions, and instead of being preceded by a porch, which would be an integral part of the architecture, and which is absolutely essential in our long, cold, damp winters, is boarded up with "storm doors," that are not only hideous in design but an actual obstruction. With the rapid increase in the value of land which has taken place in all our large cities in late years, a wild fear lest any inch be wasted has resulted in a compactness of plan that is frequently painful. The housekeeper longs for the roomy closets and ample storerooms of the old buildings; the fine hall that once formed an imposing and appropriate entrance has given place to the narrow entry through which it is frequently impossible to carry the larger articles of furniture.

The same difficulty is experienced in the sharp, frequent turns which characterize so many stairways. Bedrooms are pushed into corners where they seldom have the benefit of pure, free air and the heat of the sun, for no other reason than that space is required for ample reception rooms and state apartments, which, though used comparatively seldom, are treated as the most important part of the house.—*The Telegram.*

The Width of Streets as Affecting Public Health.

According to an American contemporary, Dr. Anders has been making certain inquiries in Philadelphia as to the influence of the width of streets on the mortality from phthisis, and as the result of examining into the localization of 1,500 deaths he has arrived at the conclusion that the number of phthisis deaths is smaller in proportion to the population in wide streets than in narrow ones, and that in narrow streets the mortality is greatest where they are long or where they form culs-de-sac; in other words, complete movement of air about dwellings is a point of great importance in connection with the question of pulmonary phthisis. It is on this principle that all modern by-laws as to open space about houses are based, and it is as important to have wide open spaces behind houses as well as in the streets in front, so as to secure a proper through current of air. There is, as a rule, not much difficulty in getting a reasonable width of street in the case of newly laid out areas for building, but there is a constant tendency to put an undue limit on the needed area behind dwelling houses, although this is a matter of the first importance as regards the promotion of health and the prevention of a certain class of diseases. The observations from Philadelphia deserve the consideration of such sanitary authorities in this country as have not yet acquired proper control over the open spaces to be provided about new domestic buildings.—*Lancet.*

Good Draughtsmen.

Draughtsmen worthy of the name seem to be a very scarce commodity in the engineering market just now, if the frequent applications of employers to this office can be taken as an index to the trouble they have in finding men to suit them, says the *Engineering News*. One bridge engineer said recently that out of eighty-odd answers to an advertisement for a bridge draughtsman, he did not find one that was worth employing. Even a satisfactory "tracer" is not easy to discover, as we know from our own experience. The trouble seems to be that too many so-called draughtsmen think that the art begins and ends in handling a drawing pen and in inking-in a pencil plan practically made by some one else. They are exceedingly limited in their knowledge of mechanics, and know little or nothing of structural details; in other words, they are neither well trained nor thorough in their work, and cannot be left to their own resources for a moment.

There was a time when imported German labor of this class met all demands, and usually met it well; but for some reason that we cannot explain the supply has lately fallen off, and the more valuable men already here are secure in permanent employ. The German technical schools devote much time to the thorough teaching of drawing as an essential adjunct of mechanical and civil engineering, and, as a rule, devote nearer twelve than four years to the careful training of pupils fitting themselves for these professions. While we would not encourage young men to adopt the drudgery of draughting for a life occupation, it is, nevertheless, one of the best schools for the mechanical engineer that can be chosen, provided that he goes at this work well trained in the principles and fundamental laws of mechanics, and always works with the combined purpose of making a good machine as well as a good drawing. The same remark applies to bridge draughtsmen and to those engaged in the design of metallic structures of all kinds.

In the time now allotted to "scientific training" in the majority of our technical school, probably all the time devoted to draughting is such as can be safely spared from other work. But in too many of our schools a little less time devoted to pure mathematics, depending practically upon a retentive memory for any future usefulness, and more time devoted to fundamental laws and to the training of the eye, the hand and the mind combined, would result in a graduate more useful than is usually the case to himself and to his employers. The young man leaving his school must necessarily be an assistant until he has had time to gather that worldly wisdom and experience that will alone fit him to successfully enact the role of a creator or leader. But the better and more thorough the previous training of the graduate, the better assistant will he make and the more rapid will be his advancement. It pays the student, therefore, to devote more time to his training, and pays in a proportion that altogether exceeds that of the extra years involved in this training.

Notwithstanding certain prejudices against this occupation, a really good draughtsman in the office of a bridge works or a machine shop, one who thoroughly understands his business in all its details, commands a much better salary than the average engineer on a railroad. And if he is an exceptionally experienced and good man, with individual push well developed, more doors are probably open to his substantial advance than is the case with an equally good man on railroad work. In any event, at the present time there is an army of idle men who call themselves draughtsmen, and will work for $60 to $75 per month, while the really well paid higher positions go begging for the lack of some one to fill them.—*Tradesman.*

Pambutano, a Substitute for Quinine.

Dujardin-Beaumetz has, according to the *Medical Press and Circular*, recently called attention to the antiperiodic properties of an extract obtained from the root of a shrub called pambutano. The aqueous decoction of the root has been largely and successfully used in the treatment of malarial fevers, it has been beneficial in a number of cases in which the symptoms did not yield to quinine. The isolation of an alkaloid has not hitherto been effected, but the plant contains various fatty bodies and essential oils in addition to a special kind of tannin. All the active properties of the root are extracted by maceration in alcohol at 60°. The writer in the *Press and Circular* adds that, while the high value of quinine as a febrifuge and antiperiodic is incontestable, the faults and failures of the old favorite do declare themselves from time to time, and hence the discovery of other vegetable products which have similar powers is not without importance, since some of these may and do succeed when quinine has proved ineffectual.—*N. Y. Med. Jour.*

THAT acid phosphate quickly attacks the teeth is an observation recorded by Dr. Head, D.D.L., in *Int. Dental Journal.*

THE MAGNETIC MAGNIFYING GLASS AND THE BOX OF NUMBERS.

Should we want a new proof of the saying, *Nihil novi sub sole*, we might find it in the magnetic magnifying glass, of which we here reproduce two very distinct forms, one of them dating back at least a century, since we find a detailed description of it in a work published in 1786.

The magnetic magnifying glass is the first of the magnetic recreations described by the author, Mr. Guyot, of the Literary and Military Society of Besançon. To describe the old apparatus is also to describe the modern one, and we cannot do better than to pass our pen over to the writer of the last century.

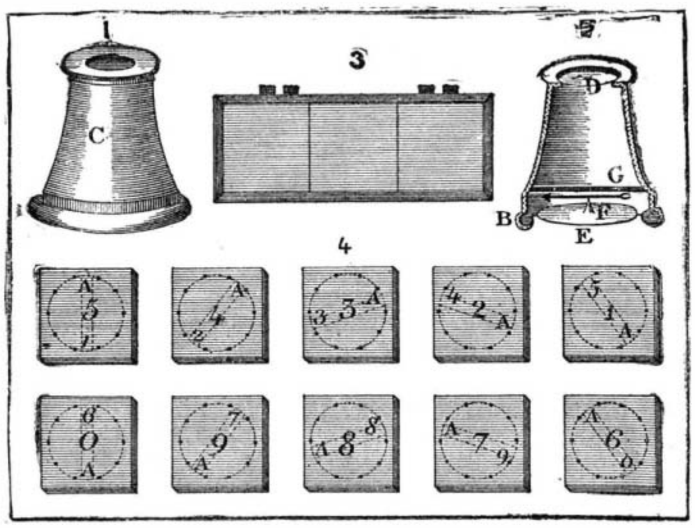


Fig. 1.—GUYOT'S MAGNETIC MAGNIFYING GLASS.

Nos. 1 and 2. The instrument. 3. Cover of the box. 4. Arrangement of the magnets.

"Have an ivory tube turned so thin that the light can pass into the interior of it. Give it a height of about two and one-half inches, and let it be nearly of the form shown in Fig. 1. Let the top, A, and the bottom, B, be screwed into this translucent tube, C. Let there be at the top of this tube a groove for the reception of a lens or ocular, D, whose focus is two inches. Let the ivory circle, B, be open in order that there may be placed therein a glass, E, that you will cover within with black paper and a small circle of cardboard. Put a pivot, F, in the center of this circle, and place thereon a very small magnetized needle, G, that is to say, a little smaller than the diameter of the circle. Cover the latter with a glass, so as to secure the needle and prevent it from leaving the top of its pivot. Finally, let this arrangement be a sort of compass placed at the bottom of an ivory tube translucent enough to allow the direction of its needle to be perceived, and the eye piece of which serves the better to distinguish the letters or figures that are to be drawn upon the cardboard disk at the bottom of this magnifying glass. Let it have, moreover, such a form as to give this compass the appearance of an ordinary magnifying glass, and make one imagine that he perceives by means of it the objects hidden and inclosed secretly in different boxes, as will be explained in the course of this work.

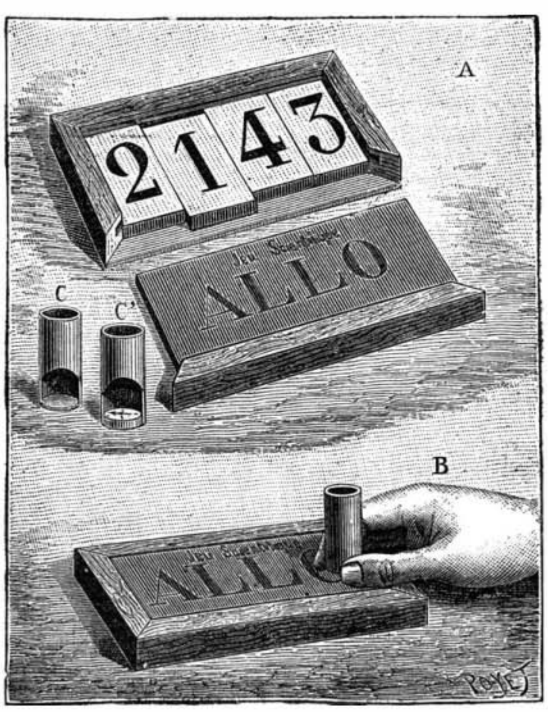


Fig. 2.—THE NEW FORM OF THE APPARATUS.

"When this magnifying glass is placed at a small distance above a magnetized bar or any box in which the piece that contains the bar is hidden, the magnetized needle contained therein will necessarily place itself in the same direction as this bar, and will, consequently, indicate which side is its north or its south. The north of the needle will indicate the south of the bar. . . . It is necessary to observe that the bar should not be too distant from the needle, particularly if it is very small, and that the pivot of the needle must be placed over the center of the bar, without which its indication might be erroneous, especially when in the pieces there are several bars that may act in unison upon the needle."

After thus describing the construction and effect of the magnetic magnifying glass, Mr. Guyot passes in review the different experiments that it permits of, beginning with the box of numbers represented in facsimile in Fig. 1. This box is capable of receiving three blocks selected from among a collection of ten, upon which are inscribed the first nine numbers and the zero, thus permitting of writing a great many numbers of three ciphers. In the interior of each of these wooden blocks there is concealed a small magnet, the position of which differs in each block, as shown in Fig. 1 (No. 4). After marking the corresponding numbers on the bottom of the compass once for all, it suffices to place the magnifying glass successively over the centers of the three squares which indicate the place of the three numbers concealed in the box (in which they have been previously arranged in secret), in order to know each of them and to rapidly read through the cover the number formed.

Fig. 2 represents the modern form given to Mr. Guyot's device. The experiment is made by means of four rectangular blocks, the place of the magnets that they contain being indicated by the four letters of the word ALLO printed upon the cover. In lieu of a magnifying glass, two small cardboard tubes are used, one of which, C (the only one offered to the novice) is a simple cylinder closed at one end, for which the experimenter always substitutes another tube, C', of identical appearance and containing the indicating magnetizing needle.

Mr. Guyot describes no less than forty-six scientific experiments that are made for the most part with the magnifying glass and magnets. Our perspicacious readers will have no trouble in increasing the number of them, by taking advantage of the well known properties of magnets and the laws of magnetic action.—*La Nature.*

Beef Extract.

We may, for convenience, divide the factory into three departments: First, pressing; second, bottling; and third, finishing. To the first of these, supplies of the choicest parts of the ox are brought in the morning of every working day straight from the shambles. It is at once cut up into succulent steaks, each of which get a slight sprinkling of table salt, is then inclosed in a new muslin bag and an outer canvas bag, and with dozens more is placed between the perforated metallic plate of an hydraulic press. When the company commenced work, they were content with a press which took a charge of about 100 steaks at a time, but they have had to meet a greater consumption than was anticipated, so that lately they have installed an exceedingly powerful press, which would do perfectly for making bales of cotton, and this is tested to give a pressure of 400 tons. When the pile of steaks is put on the receiver, the whole is surrounded with a jacket (iced in the summer), and the pressure applied. We need not follow the process too minutely; it is so simple. The juice as it is collected is mixed with an innocuous preservative, set aside for a month to clear, and then transferred to the bottling department. Here the liquor is filled into bottles by a siphon arrangement, so that the liquid comes into contact with as little air as possible; and the bottles when filled are transferred to a separate building, where they are corked, capsuled, labeled, and boxed. Our traveler observed that a girl examined each bottle before it was passed on to the capsuler, and any one which showed a speck of suspended matter, or was in the least cloudy, was set aside. It was explained that this is part of the principle of the manufacture; the liquor is the pure juice of beef, and in order that it may keep, the most rigid attention must be given to exclude foreign matter from it, and, as far as our representative could judge, the principle was adhered to throughout. And what becomes of the pressed steaks? Well, they are like cardboard when they come out of the press, and as dry as a stick.—*Chem. and Drug.*

Powerful Hopper Dredger for the Nicaragua Canal.

There was recently launched at Renfrew, complete, with steam up, a powerful screw propelling hopper dredger built and engined by Wm. Simons & Co., for the Nicaraguan Canal Construction Company under the direction of Chief Engineer A. G. Menocal.

This vessel has a capacity to carry 400 tons of dredgings, and will load itself with ordinary material in an hour. The bucket ladder, which works in a central well, is fitted with an endless chain of steel buckets and adapted to dredge banks and shoals to a depth of 35 feet under water level. The hull is constructed with the builders' patent raised forecastle, which permits the buckets to dredge in advance of the hull.