

IMPROVEMENTS IN TELEPHONES.

Our engravings represent some new forms of telephonic instruments recently brought out by Mr. Eloy Noriega, of the city of Mexico, Mexico. In Fig. 1 is shown a combined telephone transmitter and receiver, in which the instruments are united in such a manner that while the transmitter is held to the mouth in position for receiving speech, the receiver will be pressed against the ear.

The receiver is provided with an iron diaphragm



NORIEGA'S COMBINED TELEPHONE RECEIVER AND TRANSMITTER.

which is acted upon by a U magnet concealed in the handle and provided with oblong pole pieces formed of short iron rods and surrounded by oblong bobbins. By means of this construction a powerful magnetic field is formed, which is sensitive to slight impulses, and therefore effective in reproducing sounds uttered in the transmitter.

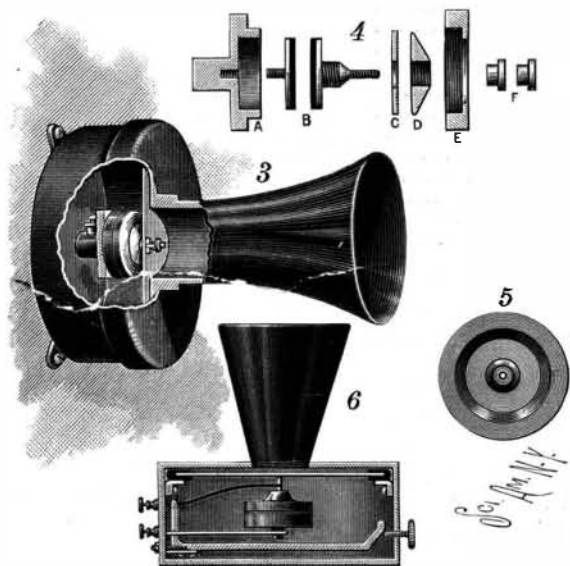
The transmitter used in this instrument is provided with a diaphragm of resonant wood, such as pine or spruce, with a covering of mica on opposite sides, and a binding of elastic rubber around the edge to protect the wood from moisture.

To the diaphragm are attached two perforated carbon bars, in which are loosely inserted the ends of two carbon rods. A cross bar inserted in the carbon bars between the carbon rods carries a brush of horsehairs or analogous material, which presses the carbon rods outward away from the diaphragm and into contact with the outer walls of the holes in the carbon bars, as shown in Fig. 2.

The carbon bars are connected up in the primary circuit of the local battery, and the receiver bobbins are connected with the secondary or line circuit.

The variations of resistance, due to the vibration of the carbon rods in the carbon bars carried by the diaphragm, causes pulsations which are reproduced in the receiver.

In Figs. 4 and 5 are shown two forms of transmitter employing a carbon button or granulated carbon placed between carbon or metallic disks, one of which is stationary, while the other is vibrated by the diaphragm when the instrument is in use. In Fig. 4 the



NORIEGA'S MICROPHONIC TRANSMITTER.

several parts of the button are shown in the order in which they are assembled, the carbon button or granulated carbon being placed between the disks, B. A side elevation of the complete button is shown in Fig. 5. In Fig. 6 the cell just described is supported by a spring attached to an adjustable lever secured to one side of the diaphragm cell and adjustable by a screw passing through the opposite wall of the cell.

The same lever carries a flexible spring, having at its free end a stud which rests upon the diaphragm and presses upon the center of the button. In each case

the disk adjoining the diaphragm is slightly movable, like a piston, in the cell in which it is placed.

The kind of carbon preferred by the inventor is that prepared by a peculiar coking process from anthracite coal. This instrument is designed for long distance work, and is constructed with a view to using heavy currents.

Removal of Shops.

General Manager Broughton, of the Chicago and Eastern Illinois Railway Company, has ordered the company's divisional shops at Brazil, Ind., torn down, preparatory to moving them to Momence, Ill. A committee of thirty business men called upon Mr. Broughton and requested that the shops be allowed to remain. He answered that he was simply carrying out the instructions of the company, the city and county authorities having refused the company protection. He bitterly censured the sheriff for appearing on the company's property when appealed to for protection wearing the strikers' white ribbon, and when deputies were asked for, swearing in strikers, who put oil cans filled with emery on the locomotives. He said that when non-union men appeared on the streets, they were assaulted and driven out of the city. He censured the mayor for fining a non-union man for carrying a revolver, when the man's life was threatened, and said the boarding houses and eating houses had refused to feed the men, and the company thought it best to remove the shops.

AN ADJUSTABLE ELECTRIC LAMP HOLDER.

The illustration shows a simple and inexpensive bracket device by means of which an electric lamp may be conveniently placed where desired, by simply being moved into position by the hand. It is made by the Faries Manufacturing Co., of Decatur, Ill. The smaller figure shows the simplest form of the device, another style having two arms and a bracket with eyes



AN ADJUSTABLE ELECTRIC LAMP HOLDER.

to slip over a three-quarter inch iron pipe, the curved section working in the outer end of a horizontally swinging arm. The combined length of all these sections is five feet, so that the lamp can be placed in any part of the space within a circle of ten feet. There are no screws to be manipulated in making any of the adjustments, except when moving the bracket up or down the post.

Corea's Ancient Ironclad.

Ensign George C. Foulke, U. S. N., who spent several years in Corea in charge of the American Legation at Seoul, in a report to the Navy Department in 1883, wrote regarding Corean strength at sea:

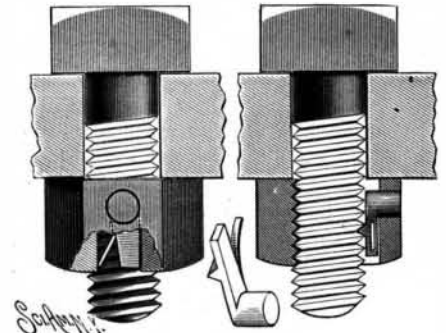
"The old navy consisted of junks, which were armed with grapnels, punching pikes, and small firearms. At present there are no vessels kept for war purposes at all. During the last war with the Japanese in 1619 an iron turtle-backed vessel was built by the Coreans and very successfully used against the Japanese wooden junks. From ports under the turtle-back grapnels were thrown on the Japanese junks, which were then capsized or sunk by having holes punched in them. This ironclad is still in existence at Yong Yong; it is one of the oldest, if not the oldest, ironclad in the world."

Army Bicycles.

The sum of 100,000 marks is included in the German army estimates for the present year for the supply of bicycles to the infantry. Two bicycles are assigned to each battalion. An instruction has been issued dealing with the bicycle service. Bicycles are to be used for communications between columns on the march and for communications between advanced guards. When troops are in quarters, bicyclists are to fulfill the functions of orderlies, especially where mounted orderlies are wanting. They will also relieve the cavalry from relay and intelligence duties. In great fortresses the whole of the duties now devolving upon cavalry as message bearers will be transferred to bicyclists.

AN IMPROVED NUT LOCK.

According to this improvement the nut may be turned freely to screw it up, but is prevented from unscrewing without stripping the threads from the screw bolt, making as strong a lock as the bolt will stand. It is a recently patented invention of Mr. Henry J. Van Nest, of Florence, Col. Two of the figures show different sectional views, while the small figure shows the key, which fits in a recess provided therefor within the nut. The key has a tongue-like piece running in the direction of the length of the bolt and having on one side a sectional portion of a screw thread fitting the screw thread on the bolt. The key is preferably made of steel, and is held in position, but so as to have a lateral swinging motion, by a lug entering a hole at right angles in the nut. Attached to and forming a

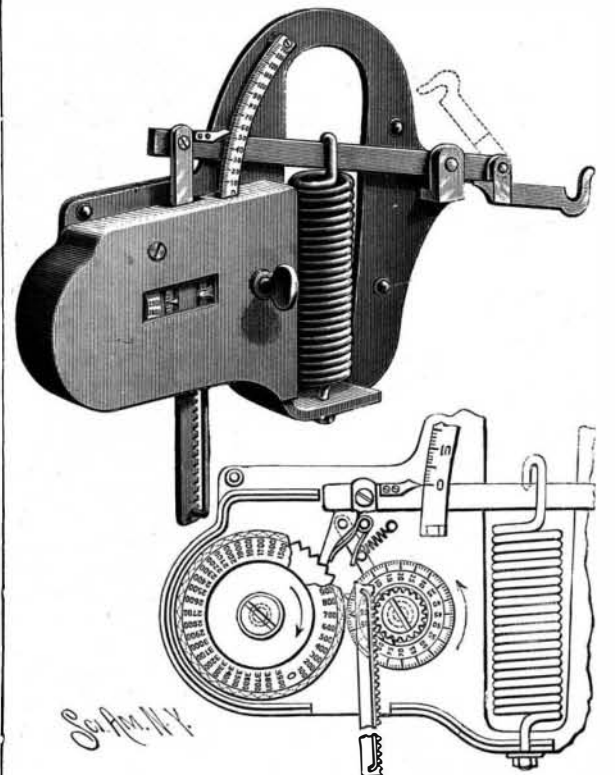


VAN NEST'S NUT LOCK.

side branch of the key is a spring, which causes the key to begin to act or start the friction of the key with the bolt.

RANEY'S SELF-REGISTER FOR WEIGHING SCALES.

The illustration represents an improved self-register, of simple and durable construction, which automatically registers the amounts weighed. It is shown as applied to a spring scale of any approved construction, although it may be readily adapted to lever and other scales, and one of the views represents an enlarged face view of the improvement with the casing cover removed. A patent for this invention has been granted to Mr. Oscar Raney, No. 101 Tyler Street, Topeka, Kansas. It is especially adapted for ice weighing and recording and all general weighing, at the same time not interfering with an account that is being kept, being readily attachable to one end of a refrigerator, or in some other convenient place about the premises. The end of the scale beam may be turned up out of the way, as indicated in dotted lines, and the beam is pressed on by a spring and has a pointer indicating on a scale the amount weighed. On the rear end of the beam is a downwardly extending rack, which engages a pinion turning loosely on the hub of an indicating wheel within the casing, the front face of this wheel being marked to indicate amounts weighed up to one hundred pounds, in such way that it may be seen through an opening in the casing. When it is desired not to register the loads weighed, the rack is thrown



RANEY'S SELF-REGISTER FOR WEIGHING SCALES.

out of mesh with the pinion by means of a key extending through the casing cover, whereby the registering mechanism may be at any time made inoperative, or again caused to register. In order to register more than one hundred pounds, the first registering wheel is connected with a second wheel, on which is a dial indicating hundreds and thousands, the pointer on the rack bar indicating on this dial as well as on the other, and so that the operator can at any time read the total amount registered from both dials through the opening in the cover casing.

The Photo-electric Action of Light.

The difficulties of working with ordinary polarized light in studying its photo-electric action disappear if the cathodes are formed of the alkaline metals, and advantage has recently been taken of this fact by Dr. J. Elster and H. Geitel. In the circuit of a voltaic battery of about 250 volts were placed a sensitive galvanometer, a commutator, and a sensitive cell of the liquid potassium-sodium alloy of the form described in Wiedemann's Annalen, vol. xlii., p. 564, so inserted that the negative pole wire leads to the surface of the alkali metal. The cell was coated with opaque varnish, with the exception of a small circle 15 mm. in diameter, which was turned toward the source of light. The rays entering this aperture centrally and parallel struck the center of the metal surface under an angle of 65°, and between the source of light and the sensitive cell a lens was introduced for making the light parallel, as well as a polarizing arrangement. It was found with this apparatus that if the polarizing device is turned, while at the same time the strength of the current is measured in the galvanometer, two maxima and two minima are seen in the course of a single rotation. The ratio of maxima to minima is about 10:1. Other observations were made, which we can scarcely refer to here; but it will be remembered that, according to the results of Tronton, Klemencic and Righi, it must be taken for granted that in Hertz's rays of electrical force the plane of polarization is at right angles to the direction of the electrical displacement. So if the motion in the light rays is regarded as analogous, the result of the experiments made by Elster and Geitel would be thus expressed: The luminous electrical current attains its maximum when the electrical displacement in the luminous ray takes place in the plane of incidence, its minimum when they are at right angles thereto. In the former case the electrical vibrations contain a component normal to the cathode, but not in the second. We might be tempted to seek in these changes of potential normal to the cathode, and induced by the electrical rays, the force which impels the negative electricity to leave the cathode. Whether this suggestion is correct can perhaps be ascertained by further experiments on the dependence of the luminous electrical action on the angle of incidence of the polarized light, and their connection with the quantities of light reflected from and retained by the cathode. Further details may be found in a paper communicated by Elster and Geitel to the Phil. Mag., July issue.

Canaigre.

Canaigre is a tanning agent. It is a species of sour dock, and the dried root contains about 33½ per cent of tannic acid, or a higher average than the very best oak bark. It grows wild on most of the New Mexican plains or "mesas," and in that state yields from one ton to four tons to the acre, and in rare instances five tons. Under very simple cultivation and scanty irrigation the yield is at least ten tons per acre, and it will average ten tons to twenty tons. The United States experiment station attached to the Agricultural College at La Cruces has two fields planted now, one irrigated, the other dry. The habits and evolution of this plant

from the wild to the cultivated state are being watched and recorded. At Deming, extracting works have been erected, and the product is being shipped to several tanneries in the United States and England.

A TRIUMPH in engineering is reported from the mountains of Peru, where a twin-screw steamer of 540 tons, 170 feet long and 30 feet wide, has been success-

THE LYONS UNIVERSAL EXPOSITION OF 1894.

The Lyons Universal Exposition opened its doors on the twenty-ninth of April, but it required several weeks longer to completely finish the work and get the exhibits in shape. Everything has been in readiness since the first of June, however, and the visitor can now admire the Exposition as a whole and in detail. The Exposition is organized in the magnificent Tete d'Or Park, which has an area of two hundred acres, and is certainly one of the most beautiful of its kind in France. There is nothing to be compared, as a panorama, with the beautiful lake of the park, with its islands and the large centenary trees that surround it. It is in the midst of greenswards and of clumps of trees of all species, whose leaves are green, purple or variegated, that the structures stand.

The principal palace of the Exposition is of a peculiar form and huge dimensions. When the visitor enters the dome of this structure, he is struck with wonder at the lightness and method of construction of the immense framework of metal, the external aspect of which is shown in Fig. 1.

The framework of this palace of iron and glass comprises two very distinct parts: the cupola and the annular part formed of two rows of pillars supporting balanced girders.

The central cupola covers a circular surface of 360 feet in diameter. It is not spherical, but has a parabolic form. It is composed of 16 half arches resting upon cast iron rollers 3¼ feet in diameter and assembled at their apex against a crown 16 feet in diameter and 6 feet in height. These arches have a pitch of 33 feet. They are formed of coffer from 4 to 6 feet in height, with solid frame pieces 2½ feet in width, and are connected at the sides by uprights and 3 inch U irons. The upper crown is 180 feet above the floor. The arches were calculated independently of one another and are, in reality, independent, each arch working for itself. They are not connected so as to form a rigid whole capable of supporting and distributing a given stress, and this is one of the curious points of this structure.

The arches are simply braced by iron purlins, the only object of which is to transmit to them the charge of the roof. It is to be remarked that they are charged only in the central part. The arches are calculated for supporting the weight of the iron in the purlins, rafters, etc., plus that of the covering (estimated at 30 pounds to the running foot) and the accidental supercharge.

The great dome of the Exposition covers a superficies of 491,800 square feet, and the diameter of its external framework is 760 feet. The main entrance of this magnificent structure is shown in Fig. 1. The Exposition as a whole is in a manner comprised within the immense hall of this palace, in which the show cases are so placed as to form circular galleries. There are many beautiful things to admire under the vast dome.

The exhibit of the Lyons silk mills is placed at the entrance, and offers to the eyes of the visitor the spectacle of the wonderful products of a great art. The general plan of the Exposition installed in Tete d'Or Park is represented in Fig. 2. The great dome



Fig. 1.—MAIN ENTRANCE OF THE LYONS EXPOSITION.

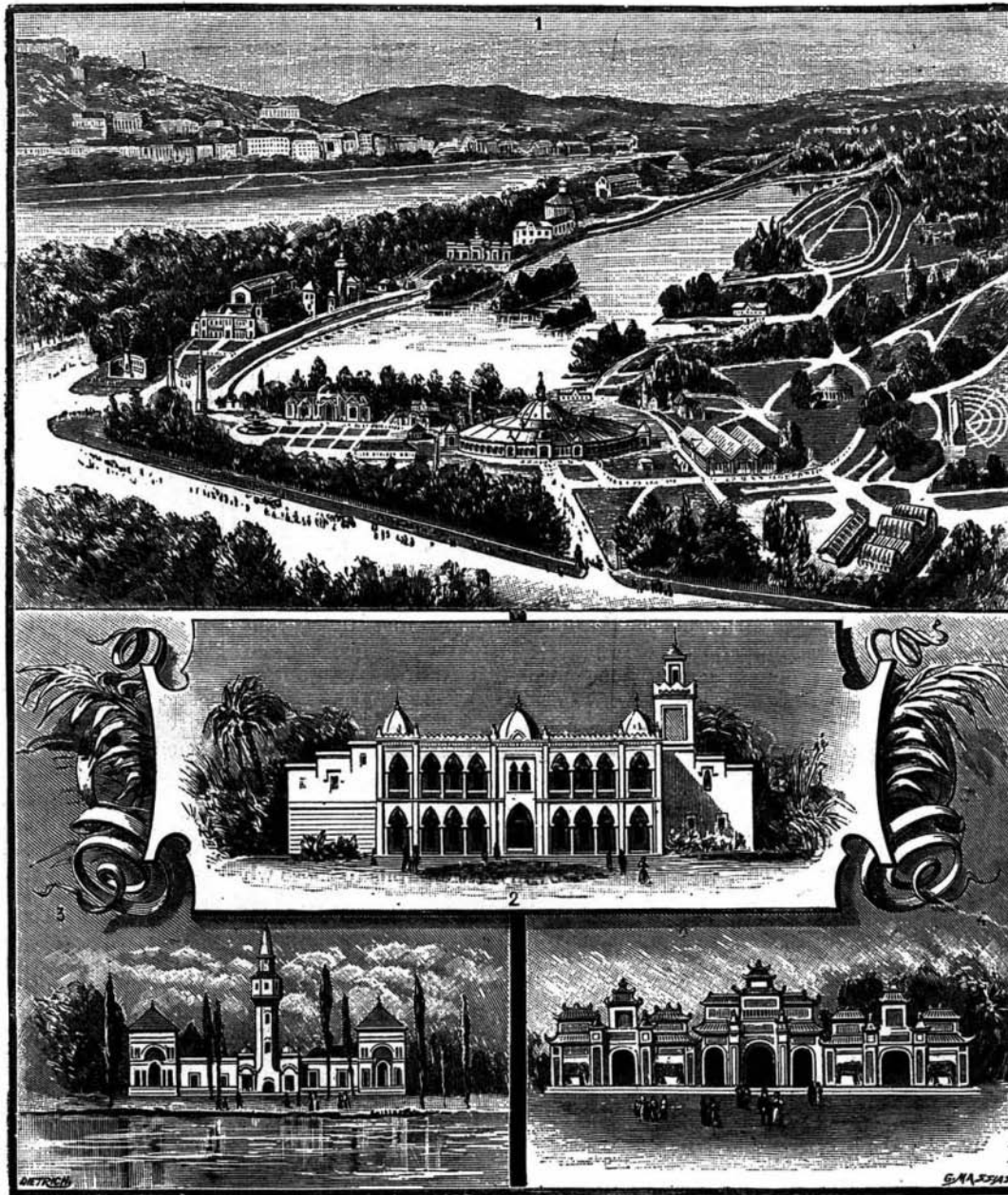


Fig. 3.—BIRD'S EYE VIEW OF THE LYONS EXPOSITION.

1. General View. 2. Palace of Algeria. 3. Palace of Tunis. 4. Palace of Indo-China.

fully launched on Lake Titicaca, the highest navigable waters in the world, more than 12,000 feet above the sea. This steamer, which belongs to the Peruvian government, is to be used for freight and passenger traffic, and was built on the Clyde, then taken apart in more than 1,000 pieces, and shipped to Mollendo by sea. It was then carried inland over the mountains to Puno by railway and put together on arrival at its destination by a Scotch engineer.