THE MARÉORAMA AT THE PARIS EXPOSITION.

The amusement section of the Paris Exposition has occupied the serious attention of some of the cleverest mechanics Europe has produced. At many places in the Champ de Mars and Trocadéro sections are panoramas and side shows of all kinds which vary greatly in merit. Some of them are highly interesting even from a scientific point of view. The Maréorama is one of the most attractive of the many panoramas, and is located on the Champ de Mars near the Quai. Here the spectator may enjoy a trip in the Mediterranean from Marseilles to Constantinople, touching Algiers, Sfax, Naples and Venice on the deck of a steamer worked by a contrivance which causes it to roll and pitch as at sea. Nothing is wanting to complete the deception. There are smoking funnels, steam whistles, etc., while varied scenes of sea and shore pass in review as the spectator steams along the coast. He experiences the zigzag lightning and the crashing thunder of the tempest; he views the sunrise, and later sees a night effect.

The Maréorama has required the exercise of peculiar mechanical talents of a high order. In its construction two problems had to be solved: first, that of effecting the unwinding of two canvases each 2,460 feet long and 42½ feet high, and also giving a double swinging motion to the platform carrying the spectator. The problem was at last finally solved in a very ingenious manner by M. Hugo d'Alesi, a painter who has made a specialty of painting well-colored and realistic landscapes for railway and steamship companies' advertisements. He is also well known as a poster artist. Many decorative and scene painters worked under his direction for eight months to transfer his sketches to the 215,000 square feet of canvas which is unwound for the spectator. The visitor to the Maréorama stands on the deck of a ship, which is made to pitch and roll mechanically. The wind whistles in the rigging as it grows to a tempest. As the voyage progresses, the rocking of the ship becomes more violent, there is the usual sound of the screw and of the steam siren. Even the smell of tar is detectable. To add to the illusion, deck hands are hurrying about the deck, ostensibly to help any who may suffer from *mal de mer*.

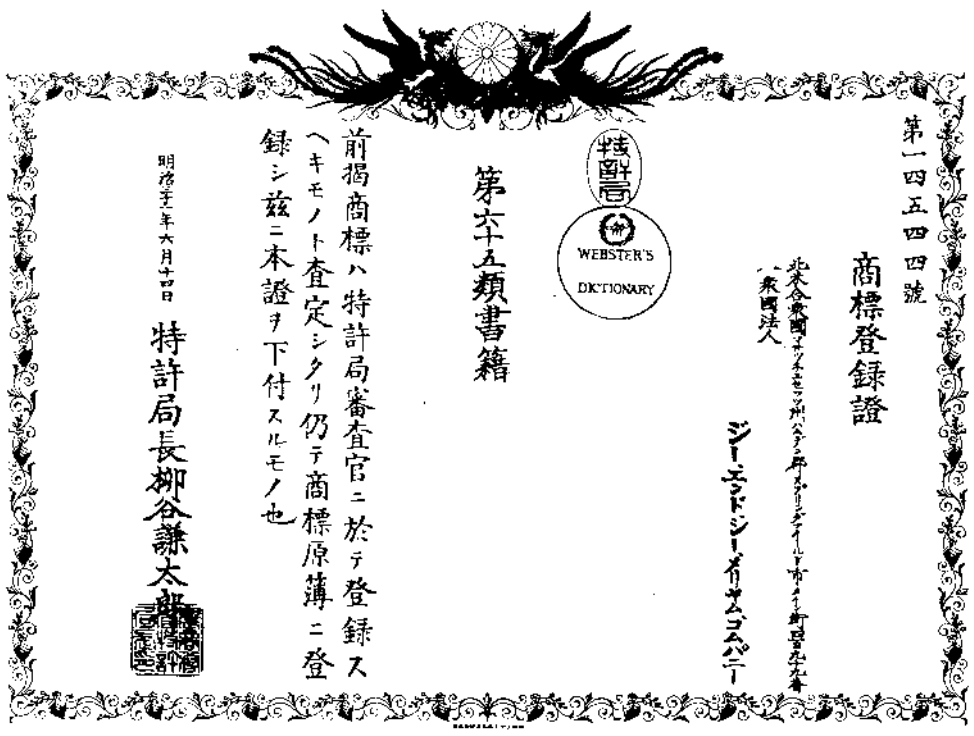
One of the canvases unwinds to the starboard and the other to the port side. Both are wound on cylinders at the ends of the vessel. The latter are concealed by curtains and decorative motives. The same system is used in both canvases. The problem which confronted the builders of the panorama was that the canvases, each of which comprises 107,500 square feet, must be made to pass from one cylinder to the other end of the vessel and be wound on another cylinder. The cylinders being vertical, it was, of course, necessary to sustain the great weight of canvas at various points, in order to prevent it from sagging. M. d'Alesi adopted a very ingenious arrangement for surmounting these difficulties. Each cylinder ends at the top in a truncated cone, of which the large base points upward, and upon the entire surface of which are arranged hooks according to a helicoidal curve.

The cylinders are supported by floats, which permit them to move in a vertical direction a distance equal to the height of the truncated cone. They are revolved by hydraulic motors situated at the very top of the construction. The upper edge of the canvas is reinforced with a thin band of steel, containing apertures at regular distances, which are adapted to engage hooks attached to short horizontal iron rods, secured to the lower extremity of small trolleys, which are connected with each other and which run upon a rail. The housings of the trolley wheels are connected at the top by rods, so that when the mechanism is started one trolley wheel follows the other on the rail at a foreordained distance, thus carrying the canvas with it. Yokes are attached to the superstructure which carries the rail, and at the bottom of the yokes are rollers which are adapted to press the canvas into contact with the hooks secured to the trolley. The result is that a positive motion is imparted to the canvas without any danger of the canvas slipping or sagging. At the beginning it is unwound for the entire length of the vessel, and the steel band at the top is engaged with the first hook at the small base of the cone of the winding cylinder. When the latter is set in motion by the hydraulic motor, the band detaches itself from the nearest trolley hook, and the apertures with which it is provided present themselves opposite the hooks of the cone, our small inset diagram showing the path of the canvas, the trolleys moving in a curve as they approach the cone. As the canvas winds by the ingenious mechanism, its weight causes the sinking of the float that carries the cylinder, and the hooks of the cone situated at different points present themselves in succession at the level of the point at which the steel band detaches itself from the hooks of the carriages of the trolleys. Naturally the adjustment of each of the hooks to the winding drum, or cone, was a delicate piece of work, because the exact point was dependent upon the weight of the canvas, and as the latter is not entirely homogeneous, its weight is not the same at all points. It varies likewise with the size of the painting. These differences were corrected by weighting the lower edge with small plates of lead placed in pockets. After the apparatus was once adjusted, there was no further difficulty.

The spectator stands upon a platform which represents the deck of a transatlantic steamer. In order to give the deck on which the visitor stands a rolling and pitching motion, the well-known Cardan suspension system is used.

The vessel proper is mounted centrally upon an iron frame which is 16 feet square, and which is journaled in such a manner as to allow a longitudinal or pitching motion to be imparted to the body of the vessel. The journal rests upon two trunnions, which, in turn, are mounted upon another frame which is journaled at the center in such a manner as to allow a lateral or rocking motion to be imparted to the body of the vessel. The trunnions carrying the lower frame are mounted upon masonry piers. At each end of the platform of the vessel are two pistons which operate in hydraulic cylinders which are connected by means of a conduit. A chain is attached to the extreme end of the main platform of the vessel. By means of this chain the pitching motion may be imparted to the body of the vessel by an electric motor.

By means of a Stephenson link-motion the amplitude of the movement can be varied. For the pitching, it is possible to proceed to a maximum of 20 inches on each side of the horizontal plane, say 40 inches of the total displacement for the extremities. For the rolling, it is possible to have 8 inches. An electric motor actuates the pumps designed for the hydraulic motors and elevators employed in the construction annexes. Two other and smaller electric motors actuate the sectors that effect the traction upon the chains for the displacement of the platform.



A JAPANESE TRADE MARK FOR WEBSTER'S DICTIONARY.

German Mask Industry.

Paper masks are made by doubling one sheet of a specially prepared paper, wetting it, and moulding it by hand over a face form; it is then dried by artificial heat and cut off of form. Openings are cut for eyes, nose, and mouth, and it is painted and decorated by hand as desired. The paper used by Sonneberg manufacturers is made in Oeslau and Schleusingen, and costs at present about 33 cents per 480 sheets. One sheet makes three of the common masks. The painting of cheap masks costs about 12 cents the gross; the moulding of face costs about 14 cents per gross. Packing is figured at about 3 per cent, as the masks are rolled in brown paper, the ends being folded in to save string. The expenses are estimated at about 15 per cent, leaving the net profit 20 to 22 per cent, as the complete article sells at present at about 42·8 cents per gross. The cash discount varies from 2 to 5 per cent, according to the size of order and reliability of purchaser. Last year the masks sold for about one-third of a cent each, says Consul O. J. D. Hughes, of Coburg, and next year's price is expected to be 43 cents per gross. The cost of raw paper next year, it is estimated, will be higher, and there will be an increase in the cost of painting. The hair used for mustaches, etc., cost last year 15·5 to 17 cents per pound. Manufacturers have no trouble in getting good prices, and are making handsome profits. These calculations are on the cheapest staple goods; on specialties the gain is considerably more.

Wire masks are made by stamping a piece of wire netting about one foot square over a face mould in a large machine, inclosing the rough wire edges in a narrow strip of lead, and painting. The latter is done by hand in oil colors. The prices of these masks have undergone little change during last year, but an increase of about 4·7 cents the dozen is looked for next season. The present selling price of the cheaper masks is 47·6 cents the dozen. The wire is at this date selling for $8.33 per 220 pounds, but this is an extraordinarily low price.

Gauze masks are made by moulding over a clay face form a doubled piece of cheap linen gauze that has previously been soaked in a starchy paste. The sticky linen is made to adhere to the form, and this is set on a stove and dried for about twenty minutes. The linen is then taken off and openings cut for the eyes, mouth, and nostrils. It is painted as desired, and makes one of the most practical masks known. The gauze mask is used considerably in the United States, but the larger portion of them are made therein by machines owned by two firms, one in New York and the other in Findlay, O.

A JAPANESE TRADE MARK.

Of all the patent documents published throughout the world, it is doubtful whether any possess for us a more curious interest than the specifications, copyrights and trade marks issued by the Japanese government. Some idea of the oddity of these papers, with their characteristic script extending after the Japanese fashion up and down the page and the artistic ornamentation not always found in legal documents, is conveyed by the accompanying fac-simile reproduction of a certificate of registration for a trade mark for Webster's Dictionary, obtained through our agency. Translated the paper reads:

CERTIFICATE OF REGISTRATION.

Registration No. 14,544. Class No. 65, Books. Proprietor, G. & C. Merriam Company, 499 Main Street, Springfield, Mass.

The trade mark represented in the fac-simile having been decided by the examiner of the Patent Bureau as permissible of registration, the same has been this day entered in the Register of Trade Marks, with the register number above written, and this certificate hereby issued.

KENTARO YANAGIYA, Director,
Imperial Japanese Patent Bureau.
Tokio, June 14, 1900.

Panama Hats.

The hat for summer wear which is termed "Panama" does not really come from Panama; Ecuador is its real home, but the industry extends to Peru and even to Yucatan. The hat is known all through Latin America as "jipijapa," in honor of the city where its manufacture was first started. It is only outside of the countries which produce it that the hat receives the name of "Panama." In its fabrication the leaf of a small plant is used which grows abundantly in the country. The leaves have the shape of a fan and the plant is known as the Carludovica palmata. In buying one of these hats it is necessary to find out two things: first, if the straw is whole, and second, if it is not stiffened. The weavers split the straw with such perfection that unless the purchaser is accustomed to such examination, it is very difficult to tell the difference between a hat made of whole straw and one made of split straw, although the former is worth several times one of the latter. Good torquilla is white and stiff enough not to need any gum, and only the ordinary hats are treated.

The finest hats ever made were by a native named Palma, and were exhibited at the Paris Exposition when Napoleon III. was Emperor. The best two were bought by a French gentleman for 1,000 francs ($193) and presented to the Emperor and Marshal MacMahon. Palma is now dead, but there are two or three others who possess equal skill.

Monotony in shape has been, perhaps, one of the chief causes why the hats have not been more popular, but if dealers would take up the matter the natives could easily make any style desired. Ladies' hats may be worn a number of successive seasons; cleaned and retrimmed, they appear perfectly new.

THE Astrakhan electric tramway, which has recently been opened, has a single track with a total length of 12½ miles. The boilers for the power house are constructed for naphtha fuel.

Science Notes.

A marble statue of Apollo, with the head in a fine state of preservation, has recently been unearthed near Athens. Its workmanship shows that it belongs to the fifth century B. C.

The city council of Denver is considering a bill for the destruction of germs in railroad cars passing through that city. It calls for the thorough fumigation and disinfection of all sleeping cars passing through Denver. It is thought that this will lessen the chances of contagion.

Captain Cagni, of the "Stella Polaris," the vessel used by the Duke of Abruzzi in his Arctic expedition, confirms the report that the Duke intends to organize a new expedition. He denies the existence of Peterman Land, and he also states there are no islands north of Franz Josef Land.

The determination of the recalescent point of nickel steel has been made by two Americans, Messrs. H. Souther and F. S. Flavel, for the Pope Manufacturing Company. It appears that the recalescent point of 0·25 carbon steel is a little over 1,600° Fah., while that of 0·50 carbon steel is between 1,350° and 1,400°, and that of 5 per cent nickel steel, with 0·25 carbon, is about 1.080° Fah. The recalescent point of pure nickel is 1,112° F. This furnishes an explanation of the supersensitiveness of nickel steel to heat treatment. The proper annealing temperature for the simple carbon steel is, according to Mr. Souther, a full red, while for nickel steel the heat should not be over a "cherry" red.

The meteorological department of the Japanese government, as described by a pamphlet issued by the Tokio Observatory, is a very complete and practically useful organization. It has about 1,000 stations. Electrical, earthquake, and other exceptional phenomena are regularly observed in addition to the usual meteorological observations. All vessels belonging either to the imperial or merchant service which are over 100 tons burden are compelled to make observations at regular intervals six times a day, and the logs are forwarded to the central observatory. There is a regular service of weather telegraphy and storm warnings. The average success of these forecasts is 82 per cent, and of the storm warnings 70 per cent. The present director is Prof. K. Nakamura, of Tokio University.

A new process for the refrigeration of meat has recently been patented by a German firm which is vastly superior to the principle of freezing the meat as is at present generally adopted. A few days ago a vessel arrived in the Mersey from the River Plate with a consignment of meat which had been preserved by this new system. The treatment of preservation is accomplished by sterilized air. At the port of shipment, some bullocks and sheep were placed in a special chamber, the air of which was subsequently freed from all impurities by means of a special process, and the temperature reduced to 20 degrees below freezing point. The chamber was then sealed, and when opened at Liverpool, after a voyage of thirty-four days, the carcasses were found to be in perfect condition. A piece of meat was cut from one animal and cooked, and when tasted was found to be as fresh and as savory as if it had only been killed a few hours. There was a complete absence of the peculiar taste which is such a prominent characteristic of the prevalent process of freezing meat. It is generally regarded in England that this process will revolutionize the freezing and preserving trade.

Mr. Hogarth, the director of the British School at Athens, has recently returned to England, and given an account of his excavations in the Sacred Cave of Zeus among the Cretan Mountains, about 2,000 feet above the level of the sea. This cave is sacred to Zeus, because he is supposed to have been hidden therein by his mother, Rhea, to save him from his father, who was addicted to cannibalism. For several years past discoveries of ancient relics have been made by the natives. Mr. Hogarth therefore determined to systematically explore the cave and for several months past he has been employed in this task making many remarkable discoveries. During the excavations one day, a laborer rested his candle in a little niche, with the immediate result that a scintillating brilliancy was emitted from some object behind it. Examination proved it to be an offering placed there over 3,000 years ago. In other niches of the stalactite pillars were unearthed weapons, needles, and many other similar curios, valuable relics of what had been offered to Zeus. To enable Mr. Hogarth to carry out his work with complete thoroughness, women were employed to explore the cave, since their eyes are sharper than those of the men. They withdrew the treasures from their secret hiding places by small tweezers, and were extremely zealous in the work, for the simple reason that Mr. Hogarth handsomely remunerated them for everything they discovered. So successful have been the researches, that Mr. Hogarth estimates that it will occupy him seven years to study and to classify the antiquities.

Engineering Notes.

The Lehigh Valley Railway is using a system of lettering on its locomotives which indicates the pulling capacity of each class.

Experiments carried on at the University of Illinois show that coal washing removes a considerable percentage of the slate and ash ingredients and 50 per cent of the sulphur, rendering the coal more fit for gas-making and coking.

The contract for the transportation of mail by the Third Avenue Electric Road from the Post Office to the Grand Central Depot will not be renewed. The service hardly pays and there is considerable danger of passengers being struck by the mail car.

An immense dockyard is to be constructed at Antwerp to cope with the exigencies of the rapidly increasing shipping trade of that port. When completed it will cover no less than sixty-seven acres. The scheme has received the financial support of several of the most prominent shipping owners in Germany.

The South Metropolitan Gas Company, of London, has made a trial of American coal, and has found it superior to English coal, as regards the quantity of gas yielded, and also in its illuminating power and the quantity of coke it produces. It is dearer than English coal, but its quality more than makes up for the difference in price. The company used 3,700 tons as a test.

A lamp-post has been introduced in England which combines a fire hydrant, tap and fire-alarm box. The hydrant can be used for fire purposes, filling water carts, and for street flushing, while the small tap can be used by an individual for domestic water supply. There is a water meter and siphon at the bottom, by which the water is shut off from the hydrant, thus preventing it from freezing.

All the English railway companies have now arranged to allow an extra weight of luggage accompanying passengers to be taken free of charge. The free weight of luggage will in future be: For each first-class passenger, 150 pounds; for each second-class passenger, 120 pounds; and for each third-class passenger, 100 pounds; instead of 120 pounds, 100 pounds and 60 pounds respectively.

A machine for hulling rice has been invented by a citizen of Cincinnati. The working part of the machine is a carborundum wheel or cylinder. There are corrugations on the surface, and these are deep and sharp to cut the hull without injuring the kernel. The rice will be fed upon the roll from the hopper above, and a stiff brush will hold the grain to the wheel while the hull is being taken off. A fan will then separate the husks from the grain.

The Atchison, Topeka & Santa Fé Railway is encouraging the sugar beet industry, and a hundred flat cars are now being remodeled to enable them to handle sugar beets economically. The cars will resemble ballast cars, in that six doors will be arranged on each side hinged to a top rail, for side-dumping the beets at the unloading shed at the sugar mills. In order to unload, it will only be necessary to turn the lever, and the doors will open upwardly, and the beets will roll down an inclined plane into the storage bin, says The Railway and Engineering Review.

The Queen of England's new steam yacht is at present undergoing the official steam trials. She has been through her forty-eight hours steaming tests, with complete satisfaction, and a long journey is contemplated, probably to New York and back, to test her sea-going qualities. With a mean indicated horse power of 11,298, which is 298 above the contracted power, the speed attained in her power trial was 20·53 knots, the mean air pressure being 6. Rough weather was encountered at times, but although the yacht rolled a little, she proved herself a good sea boat. The vessel is equipped with the Belleville water tube boilers, which in the trials have proved very successful and quite up to the standard anticipated by the Admiralty. The yacht is being rapidly completed for sea.

The municipal authorities of Leeds, England, have been so defrauded by their tram conductors that they are introducing a novel ticket machine, which will put an effectual stop to the nefarious practices of their employes. The machine registers each passenger and records the fare. It is only 5½ inches square by 1¾ inches deep, yet it performs a whole program of operations. When the passenger tenders his fare to the conductor, the latter takes the ticket from the machine. But as it issues therefrom, the date; the exact time of the day at which the ticket was issued; the stage to which the fare carries; the number of the machine from which it was issued; and an advertisement are printed simultaneously in an instant upon the ticket. The amount of the fare paid by the passenger is also recorded on a dial in front of the machine. The machine also records the total number of pence received during the whole journey and the number of passengers who have paid their fares. By means of this ingenious little contrivance, the dishonesty of the conductor is completely checked.

Electrical Notes.

The Niagara Falls Power Company makes a nominal charge for allowing visitors to see the installation. The receipts go to charity.

In Austria the use of electrical power distribution in mills and factories is becoming widespread and almost universal in the important textile industry. Recently a plant has been installed at Roverado, in the South Tyrol, in which 400 velvet-weaving looms are operated by polyphase electric motors from a central power station. Severe practical tests are said to have shown high efficiency and entirely satisfactory operation.

The omnibus companies whose vehicles traverse the same route followed by the Central Electric Railway, of London, have considerably felt the effects of their new rival. For the second week after its opening the receipts of the London Road Car Company decreased by $6,920, and those of the London General Omnibus Company by no less than $16,463. On the other hand, the receipts of the railway for the same period amounted to $25,210, an increase of $3,595 upon the traffic receipts of the first week, representing an average daily increase of 12,000 passengers.

Electric power transmission is giving a new impetus to industries in the south and east of Europe. At Sinaia, the summer residence of the King of Roumania, a fine water power on the river Prahova has been developed, and its energy will be transmitted forty-five kilometers (twenty-nine miles), and distributed to a number of industries in the lower valley of the river. In the extensive petroleum fields in the neighborhood a considerable demand for current has arisen. A high tension system of distribution is used, the pressure on the main transmission circuits being 11,000 volts.

The penny-in-the-slot system of distributing gas through the poorer and artisan districts of London has been so successful that attempts are now being made to supply the electric light in the same way. The vestry of Battersea have erected a large generation station which is nearly completed, and have laid the necessary cables down in the roads. The fixtures are installed in the house free of cost to the customer, who simply pays for the amount of electricity he consumes. The profit derived from this method of distribution is sufficient to enable the authorities to recoup themselves for the initial cost of the installation of fittings in the houses.

Mr. George Rumker, of the Hamburg Observatory, has been conducting some interesting experiments with a view to measuring the length of a flash of lightning. During a thunderstorm, a few weeks ago, he had set up his camera, and succeeded in recording upon his photographic plate a flash of lightning, which struck a tower about 550 yards distant from his camera. From the distance he was from the tower, and the focal distance of the camera objective, Mr. Rumker succeeded in calculating the breadth of the flash, which was one-fifth of an inch. On each side of the main flash of lightning are seen many ramifications, which Mr. Rumker attributes to the strong gale that was raging at the time, but they have imparted to the discharge the curious effect of a ribbon torn to shreds.

The starting of three-phase induction motors is the object of a recent invention of Herr V. Fischer-Hinnen, of Prague, Austria, says Engineering News. In series with the secondary winding is connected a large non-inductive resistance, which is shunted by a coil having low ohmic resistance, but high self-induction. All that is required to start the motor is to close the switch connecting the primary winding with the mains. The induced currents in the secondary are at the beginning of high frequency, and neither the impedance coil nor the ohmic resistance will allow a very large current to pass. But, as the motor speeds up, the frequency becomes lower and lower and the apparent resistance offered by the impedance coil falls correspondingly, until at full speed it was very small. The presence of the coil has only a slight influence on the normal running of the motor, there being a slight diminution of the power factor and a slight increase in the amount of slip.

The X-rays have been subjected to a novel purpose in Calcutta. A thief was supposed to have stolen a diamond worth 10,000 rupees and to have effectually secreted it on his person by swallowing it. Expert thieves in India temporarily secrete small valuables of this description in the throat. It is called "pouching," and the thieves undergo special training in order to render them proficient in the art. The plan is very simple. A small piece of lead is attached to a thread, and this the neophyte swallows, then by the action of his tongue he guides the lead to the orifice of the sac in the throat. The pupil is prevented from completely swallowing the lead by the piece of thread which the teacher holds. When the man has become skillful in this act of swallowing, the leaden pellet is coated with lime, which has the effect of enlarging the sac so that it becomes capable of retaining large articles. In the case of Calcutta the Roentgen rays revealed the presence of some obstacle in the throat, but its precise identity could not be gathered.

Electric Cooking at Paris Exposition.

One of the most extensive applications of electric cooking is that which has been made at the restaurant in the basement of the Spanish pavilion. The installation which has been made there demonstrates the great advantages of this method and shows that it is adapted to all the requirements of an establishment of this kind. As the Spanish pavilion contains a number of collections of great value, the government authorized the establishment of a restaurant in the basement only on condition that no coal, gas, or petroleum should be used, on account of danger from fire. The electric system was thus almost compulsory; it was, however, quite an undertaking to establish a plant of this kind, as over four hundred meals per day were served, with the complicated menu necessary for a high-class restaurant. The installation was made by Parvillé & Company, of Paris, and is now in successful operation. The outfit consists of a large range, two large broilers, two ovens, a hot water reservoir, a vegetable boiler, and a small heater. The principle of the apparatus consists in the use of a metallo-ceramic resistance, based on the fact that the conductibility of metallic powders is diminished by mixing them with powder of refractory material. On account of the great pressure and high temperature used in making resistance-pieces of this kind, they are very solid and easily handled, and may be raised to incandescence in free air without deterioration. The powder is pressed into different forms, such as pencils, bars, or plates, and any desired resistance may be obtained. The consumption of energy in proportion to the heat given off is within reasonable limits. The pieces are easily replaced without taking apart the apparatus. In the large range, which measures 3 × 6 feet, there are eight fireplaces, each consisting of a group of these resistance-bars, which are raised to a bright red by the current and will support a temperature of 1,200° C. without deteriorating. Four of the fireplaces consume 25 amperes at 100 to 110 volts, and the other four 20 amperes. The heat not utilized by direct radiation is used to heat a series of intermediate plates by which the cooking is finished. The temperature is adjusted to any desired degree by means of a regulator, and any one of the resistance-bars may be cut out when desired. The two broilers give a high temperature, and heat from above, avoiding the falling of fat and the consequent odor; these take a current of 25 to 35 amperes. Of the two ovens, one is arranged to be heated by the lower part and consumes 20 amperes; the second has several heaters placed in the upper part and connected to different circuits, so as to be used independently or together. It roasts every day at least 75 pounds of meat at one operation, taking about 30 amperes. The vegetable-boiler and hot water reservoir have each a capacity of about 60 gallons. For the coffee, tea, etc., a small heater of two fireplaces is used, besides a water bath. The different heaters are constructed of sheet iron, with solid iron corners and braces; they are made with double partition, the interior space being filled with asbestos. This installation has worked very regularly since the first of May, and demonstrates the practicability of electric cooking when applied on a large scale.

Weight of Elephants' Tusks.

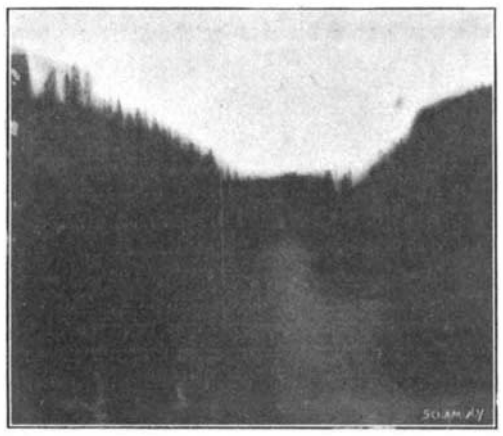
Sir Samuel Baker gives the weights of the largest African elephant tusks he ever saw as 172 and 188 pounds respectively. Tiffany & Company, of New York, have now a pair weighing respectively 224 and 239 pounds. Their corresponding sizes are: Length, 10 feet ¾ inch and 10 feet 3½ inches; circumference, 23 inches and 24½ inches. The tusks of the extinct Elephas ganesa were sometimes 12 feet 4 inches long and 2 feet 3 inches around. A mammoth tusk from Alaska is 12 feet 10 inches long and 22½ inches around, but the average tusks of this animal are 7 feet to 9 feet long and only 60 pounds to 80 pounds in weight. The tusks of the mastodon are thicker than those of the mammoth, a large one being 9 feet 4 inches long and 23 inches around.

H. de Vries records the occurrence, in a culture of Œnothera lamarckiana, of a single individual differing in several distinct points of structure from the parent form, and presenting all the characters of a distinct species. These specific characters were repeated for three generations without exhibiting any tendency to return to the parent form. M. de Vries names the new species Œnothera gigas.—Comptes Rendus.

PENETRATIVE QUALITY OF LIGHT AS TESTED BY PHOTOGRAPHY.

By J. W. Kime, M.D.

Ordinary sunshine falling upon the surface of the body penetrates the tissues to a considerable depth.



NEGATIVE MADE BY RAYS OF LIGHT PASSED THROUGH THE HUMAN BODY.

The condensed actinic rays of the sun pass entirely through the human body.

For the purpose of determining this question a series of experiments have been made by the writer, assisted by Photographer G. I. Hostetler, of Fort Dodge, Iowa, in which we were able to demonstrate that the actinic rays of the sun, when sufficiently concentrated, may be made to pass through the thorax of an adult, from front to back, with sufficient intensity to reproduce a picture upon an ordinary photographic dry plate. The method of procedure was as follows:

The person on whom the experiments were to be

PRINTS FROM NEGATIVE AND POSITIVE TAKEN BY RAYS PASSED THROUGH THE HAND.

made was taken into the photographer's dark room and the plates were applied with great care, that all rays of light save those that traversed the thorax might be excluded.

The direct rays of the sun falling upon the reflector through the skylight are focused upon the chest of the person upon whose back has been placed the sensitized plate on which the picture is to be taken. A transparency on glass of a valley in the Klondike was used as the original from which the picture was to be made. This was fastened to the sensitized plate and the two were placed on the back between the scapulæ of a man weighing 150 pounds, the transparency being placed next to the body with the new plate immediately behind it. Over these were placed black paper, black cotton wadding, several large black cloths, and over this his coat was drawn and all were securely fastened by means of long black bandages. He was then taken to the light room, and the reflector was turned upon the chest for fifteen minutes. After exposure he was again taken to the dark room and the plates were removed, and the illustration shown was developed on the photographic plate.

The upper engraving represents the scene in the Klondike valley.

In producing this picture all sources of error were carefully excluded, and the operation was repeated many times on various persons, and always with like results.

To further test the reliability of the procedure and to insure that the picture was not produced by contact of the transparency with the plate, aided by the body heat or by some undetermined influence other than the light transmitted through the body, plates were arranged in the same manner and for like periods of time, without attempting to pass the light through the body, and no picture developed on the plate.

The middle engraving represents a positive and negative picture of the Mason City and Fort Dodge depot, and, in the back-ground, the Fort Dodge High School building, taken through the hand of the writer, which is more than one inch in thickness.

The same care was here exercised to prevent the entrance of light as above described. Time of exposure, five minutes.

These photographs establish the fact that the actinic rays of the sun, when sufficiently concentrated, may be made to pass entirely through the body of a full grown man.

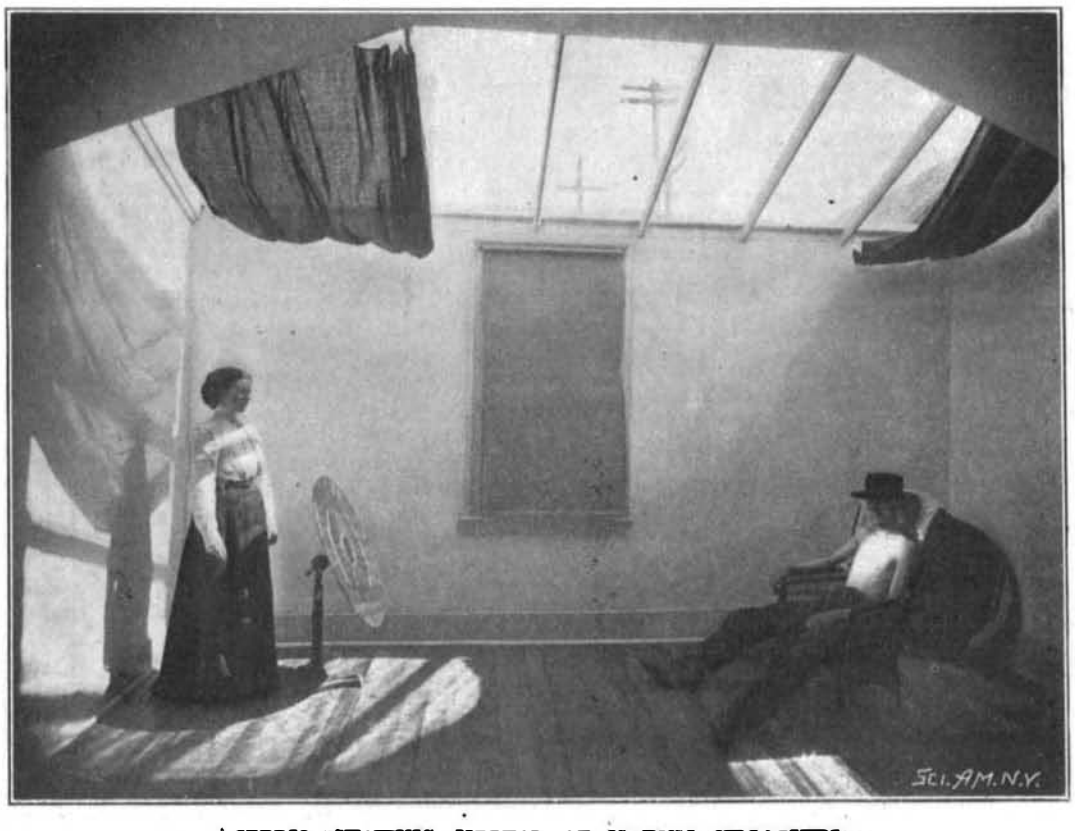
The rays of light pass through the integument with considerable difficulty, more readily through muscular tissue, and much more readily through bone. In producing a picture through the cheek the light passes through but a single thickness of the skin and the picture is reproduced almost instantly.

The reflector used in making these experiments is a compound circular mirror, 30 inches in diameter, and is overlaid with blue glass.

It is so constructed that all the light which falls upon it is focused upon a spot 6 inches in diameter at a distance of 8 feet in front of it. Thus a very powerful blue light is brought to bear upon the parts.

The heat rays of the solar spectrum are largely contained in the red band, while the actinic, or chemic, rays are much more abundant in the violet and ultra-violet bands; thus by utilizing the blue light we get a much greater percentage of actinic light in proportion to the heat rays than if ordinary white light be used.

Heretofore, light has been applied to the treatment of diseases of the skin only, no one supposing that it would penetrate to any distance into the body.



STUDIO, SHOWING METHOD OF MAKING NEGATIVES.

Moldavite.

A curious mineral called moldavite, or bouteillenstein, attracted considerable attention among the geologists in Austria and Bohemia. The mineral is in glassy ovals from an inch to an inch and a half long, and is characterized by various markings, which look somewhat like finger impressions, while others form a network of furrows, which seem in part a rough radial arrangement.

They have been regarded by some authors as relics of prehistoric glass manufacture, but this view does not appear to have been sustained. Dr. Suess, the Austrian geologist, finds resemblances between them and meteorites, and the general disposition of students seems to be to regard them as of extra-terrestrial origin. Resemblances have been pointed out between them and the obsidian volcanic bombs found in Australia. In Bohemia the moldavites occur in sandy deposits, which are assigned to the late tertiary or early diluvial period.

A correspondent from Boston states that the difficulty of forcing a button or shirt stud through a starched buttonhole may be entirely overcome by rubbing the back of the buttonhole with common paraffine wax.