with black spotted net, that has little lace medallions appliqué. Jet trimming spans the figure back and front with a shell-like fall of black lace, and epaulettes with braces of jet over the shoulders. Black satin sleeves gathered in at the armholes terminate in pansy-purple velvet cuffs and lace, the same rich colour appearing in the velvet at the throat with its fan bow of lace.

An elegant substitute for the black sleeves would be chiné silk, made in one large puff to just below the elbow, and cream-white lace, instead of black, over a bodice of black satin.

A. LL. GRIFFITHS.

Cut paper patterns for making costumes from the designs on pages 872 and 874 illustrated in this article may be had, cut to the sender's measurements, for one shilling and sixpence. For the children's dresses on pages 873 and 874, patterns will be supplied for one shilling each. Application should be made to the Author of "Chit-Chat on Dress," care of the Editor of CASSELL'S MAGAZINE, *La Belle Sauvage, London, E.C.*

Correspondents are requested, when applying to the Editor for the names and addresses of the persons from whom further particulars respecting the articles in THE GATHERER may be obtained, to forward a stamped and addressed envelope for reply, and in the case of inventors submitting specimens for notice, to prepay the carriage. The Editor cannot in any case guarantee absolute certainty of information, nor can he pledge himself to notice every article or work submitted.

Soldering Glass.

ADVANTAGE has been taken of the fact that the metals aluminium, magnesium, and zinc, adhere to glass, and a process of covering glass with these metals and their alloys, as well as of soldering glass, has been introduced in France. To cover the glass for decorative purposes the metal, preferably aluminium, is fused and floated on the glass. To solder glass the following alloys may be used—(1) 95 parts of tin and 5 parts of zinc melted together at a temperature of 200° C., or (2) 90 parts of tin and 10 parts of aluminium, melting at 350° C. The solder can be used in the ordinary way with a soldering tool of iron or aluminium. Again, the surface of glass to be joined may be heated and rubbed with the solder, which is spread uniformly over the glass with a piece of aluminium, and then the two surfaces are pressed together and allowed to cool slowly. When a soldering bolt is used it can be warmed in a jet of petroleum flame. Care should be taken not to heat the bolt or solder above the fusing temperature and thus oxidise the alloy, as the oxides will not adhere to glass.

Bread and Bacteria.

Dr. Waldo has been investigating the heart of ordinary loaves, and finds that baking does not always kill the bacteria or micro-organisms in the dough. The temperature of ordinary ovens in which bread is baked varies, he finds, from 72·7 to 95 degrees Centigrade, whereas it should be at least 100 degrees in order to destroy the bacteria. It would be well if bakers would take the hint and elevate the temperature of their ovens by the few additional degrees required to sterilise their bread.

A Ventilating Lid.

A fly-proof ventilating lid for jugs, milk-pans, and other vessels is shown in the figure. The cover is made of wire-gauze or perforated metal, and in this case has a smaller lid in the centre for pouring in liquids, such as milk. As flies have been proved to convey infection, the lid will be useful, especially in the keeping of food and drink.

Photographs by Wire.

Another step forward in telegraphy has been taken by Mr. Amstutz, an American electrician,

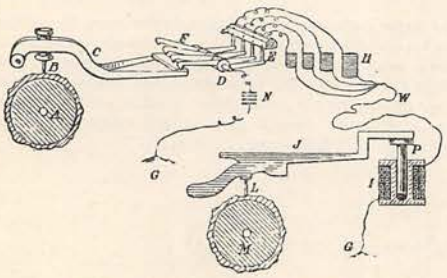


FIG. 1.—DIAGRAM OF CONNECTION.

who has invented an apparatus for transmitting photographic pictures to a distance by means of electricity. The system may be described as a combination of the photograph and telephone. The picture, an ordinary negative, is taken and impressed on a gelatine plate sensitised with bichromate of potash. The parts of the gelatine in light become insoluble, while the parts in shade can be washed away by water. In this way a relief or engraving of the picture is obtained on the gelatine, and a cross section through the plate would, if looked at edgeways, appear serrated up and down like a section of country, or the trace of the stylus in the record of a phonograph. The gelatine plate, thus carved by the action of light and water, is wrapped round a revolving drum or barrel, A (Fig. 1), and a spring stylus or point, B, is caused to pass over it as the barrel revolves, after the manner of a phonographic cylinder. In doing so, the stylus rises and falls over the projections in the plate, and works a lever, C, against a set of telegraph keys, F, which open electric contacts, E, and break the connections of an electric battery, N, which is joined between the keys and the earth, G. There are four keys, and when they are untouched, the current splits up through four by-paths, or bobbins of wire, H, before it enters the line wire, W, and passes to the distant station. When any of the keys are touched, however, the corresponding by-path or bobbin is cut out of circuit. The suppression of a by-path or channel for the current has the effect of adding to the "resistance" of the line, and, therefore, of diminishing the strength of the current. When all the keys are untouched, the resistance is least and the current strongest. On the other hand, when all the keys but the last are touched, the resistance is greatest and the current weakest. By this device it is easy to see that as the stylus or tracer sinks into a hollow of the gelatine or rises over a height the current in the line becomes stronger or weaker. At the distant station the current passes through a solenoid, or hollow coil of wire, I, connected to the earth, G, and magnetises it so as to pull the soft iron plug or "core," P, with greater or less force into its hollow interior. The up and down movement of the plug actuates a graving stylus or point, L, through a lever, J, and engraves a copy of the original gelatine tracing on the surface of a wax or gelatine plate overlying another barrel or drum, M, which revolves at a rate corresponding to that of the barrel at the transmitting station. In this way a facsimile of the gelatine picture is produced at the distant station, and an electrotype or *cliché* of it can be made for printing purposes. The method is, in fact, a species of electric line engraving; and Mr. Amstutz hopes to apply it to engraving on gold, silver, or any soft metal, not necessarily at a distance. The larger the number of keys the better the graduation of the current, and the finer the work. The actual transmitters and receivers of the "Artograph," as Mr. Amstutz calls his machine, are illustrated in Figs. 2 and 3, while Figs. 4 and 5 exhibit a specimen of the work; the former being a portrait of the inventor, and the latter a copy of it sent by wire in three minutes. As photographs and sketches are a feature of the daily press, Mr. Amstutz hopes that his apparatus will be useful in transmitting views far and wide. Moreover, it makes engravings on the spot as well as telegraphs them, and with it an artist can

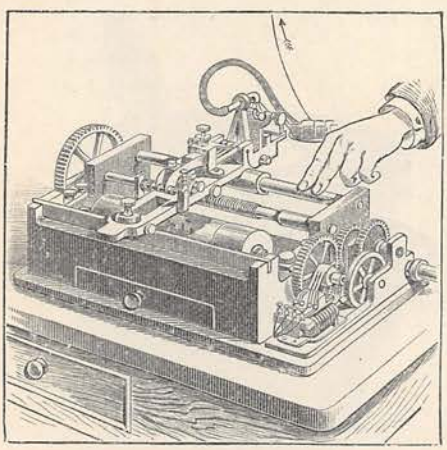


FIG. 2.—THE TRANSMITTER.

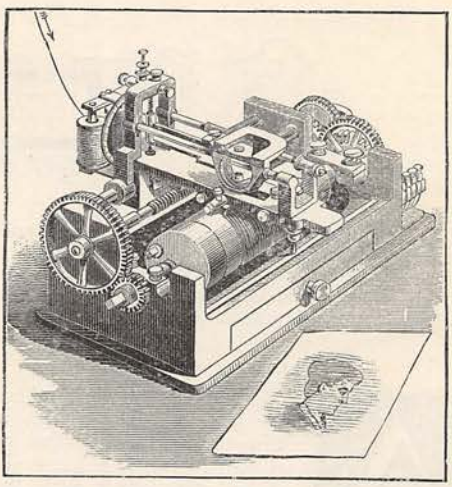


FIG. 3.—THE RECEIVER.

COPY BY WIRE.

THE ORIGINAL.

PHOTOGRAPHS BY WIRE.—PORTRAIT OF THE INVENTOR.

engrave his own sketch on gelatine and in a few minutes finish it, and thus overcome the drawback of having another person to interpret his work. We may also add that Mr. Amstutz has recently succeeded in engraving directly on metals for printing and stereotyping purposes.

The Age of Earth and Sun.

Lord Kelvin, P.R.S., was the first to overthrow the school of geologists and biologists called Uniformitarians, who believed that the operations of Nature on the earth had been going on the same as now for an infinitude of time, by attempting to calculate the age of the earth as a cooled and solid body. His estimate, based on data necessarily incomplete, was that the crusted earth fit for the support of vegetable or animal life, could not be less than ten or twenty million, or more than four hundred million years old. Since he published this result, which was discredited at the time, geologists have modified their conceptions, and even come to the conclusion that, after all, the time allowed is quite, if not amply, sufficient. Dr. Clarence King, one of the most eminent American geologists, has calculated from geological data that all the stratified rocks could very well have been produced by the action of water in twenty-four million years. Quite recently, however, Professor John Perry, F.R.S., has questioned Lord Kelvin's estimate, and assuming that his lordship did not allow enough for the greater conducting power of rocks for heat at high temperatures, has calculated that the age of the earth is one hundred and twenty times what Lord Kelvin made it, or a matter of thousands of millions of years. Lord Kelvin, thus challenged, has reverted to the subject and made experiments, only to discover that so far from rocks conducting better when heated, they appear to conduct worse, so that, if anything, the lower figures of his former estimate are probably more correct. This result also agrees with Dr. King's conclusions, and with the age of the sun as calculated by Helmholtz, Newcomb, and Kelvin, at fifteen or twenty million years, for in accordance with the nebular hypothesis of Laplace, the sun and planets originated in the same nebula.

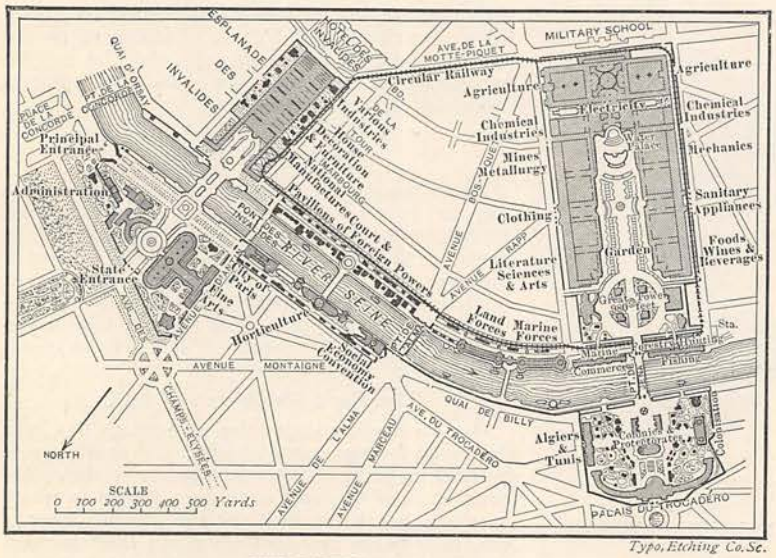
Projecting Globes.

The lamp globes, which we illustrate in such a way as to show their outer and inner appearance, have the property of shedding the light of the burner in the manner of lighthouse lenses. Most of the light is thrown downwards by the globe, so as to illuminate the space below. They are made in various sizes for every kind of lamp, indoor or out, and they have been adopted in some of the streets of Paris.

The Paris Exhibition of 1900.

Our illustration shows the plan which has been drawn up for the great international exhibition to be held in Paris in the year 1900 to celebrate the completion of the 19th century, a period in which so much has been done for the advancement of science. There can be little doubt that our century will stand out in history as the most remarkable, or at least one of the most remarkable, the world has ever seen. What with railways, telegraphs, telephones, gas and electric illumination, steam navigation, phonographs, and so on, the face of our planet has been rapidly changed during the comparatively short space of a hundred years, and the inner life of the nations, the very spirit of social life, has been changing with it. Of all places in the world, Paris is perhaps the most suitable for a celebration of the kind, and, to judge from the preparations which are being made, the forthcoming exhibition will be the greatest by far that has ever been organised. The centre of the Fair will be the river Seine, and not the Eiffel Tower, as in the exhibition of 1889, which was practically confined to the Champs de Mars and the Trocadero, on the right of our view. It will extend on both sides of the Seine from the old exhibition ground on the west to the Place de la Concorde and the Invalides

PROJECTING GLOBES.



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THE PARIS EXHIBITION, 1900.

on the east. The Entry of Honour (Entrée d'Honneur) will be situated in the Champs Elysées, near where the Palais de l'Industrie, in which the Salon or picture show is annually held, now stands. This building, which is celebrated for its exhibitions, including the first electrical exhibition of 1881, will be demolished entirely, little to the regret of Parisians, for it blocks one of the finest views in the city, and is, moreover, an ugly edifice for Paris. On one side of the Entrée d'Honneur will be erected the Palace of the Fine Arts, and on the other the offices of the administration and the Museum of Retrospective or Antique Arts. The main entrance for the public will be near the Place de la Concorde on the border of the river, over which a new bridge will be flung to give access to the other side of the exhibition, and especially to the Esplanade of the Invalides, which will be devoted to French manufactures, decorative arts, and miscellaneous industries. From here a circular railway will go round the exhibition on the left bank, passing the Palaces and Pavilions of the foreign nations, those of the French army and navy, and enclosing the Champs de Mars, which will be occupied by the principal building of the Fair, containing the exhibits in agriculture, chemistry, mining, engineering, weaving, hygiene, foods, scientific instruments, and so on. The Eiffel Tower will be allowed to remain, but its name has been altered and it will probably be modified and redecorated. The Trocadero opposite will be set apart for Algeria, Tunisia, and the French colonies and protectorates. In addition to all this, a balloon station will be installed at Vincennes, which, of course, is several miles away. It is estimated that the works will cost about four million sterling.

Asbestos Clothes.

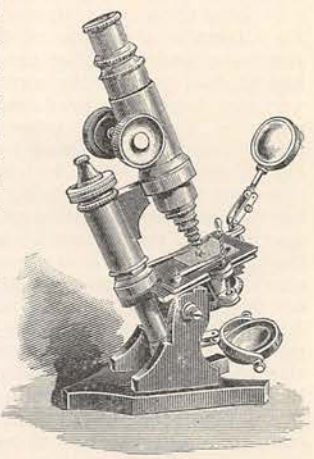
At a meeting of the National Association of Fire Engineers at Montreal, Canada, a fireman appeared in a suit of asbestos clothing, and entered a burning wooden house, where he stayed for several minutes and went through a performance in life-saving in order to show the advantages of his dress. His asbestos boots were soled with iron, and his helmet of the same material was glazed with mica. A respirator permitted him to breathe the stifling air with impunity, and his hands were protected by asbestos gloves.

The Micro-Photoscope.

Our engravings represent a microscope which, by a few simple adjustments of an optical character which we need not particularise, can be turned into a camera, so as to take a photograph of the microscopic view for future reference or projections on a screen by the magic lantern. Fig. 1 shows the instrument in position for observation, and Fig. 2 for photography. A "dark chamber" sufficient for the purpose must, of course, be added; but the light employed may either be diffused or proceed from an artificial source.

Gutta-percha from the Leaf.

The supply of gutta-percha, which has threatened to cease, owing to the practice of cutting down the trees to obtain the gum, is now in a fair way of being permanent, thanks to M. Hourant, who showed that gum superior in quality to that from the trunk could be extracted from the leaf of the tree. His plan has been tried with every success at Sarawak, and it is found that two pluckings of the leaf give as much gum as the destruction of the whole tree by the older method. The tree is none the worse for the plucking, and, moreover, the saplings at the roots of trees formerly cut down are also made to yield a harvest of gum.



THE MICRO-PHOTOSCOPE.—FIG. 1.

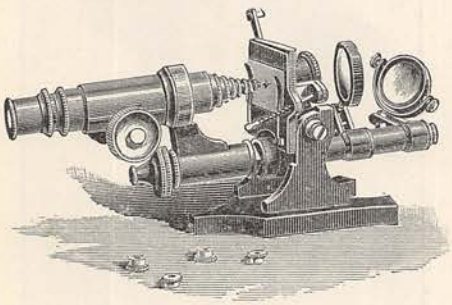
Health on Mountains.

The healthiness of mountain tops appears to be due in part to the absence of micro-organisms in the air. According to

Dr. A. C. Millar, the meteorological observers of Ben Nevis enjoy remarkably good health and freedom from colds or chest affections whilst they are on the summit of the mountain. After three months in the observatory, however, they are allowed a holiday, and on descending to the valleys are subject to a species of influenzal catarrh, believed to spring from germs in the lower atmosphere, which seldom or never attain to the summit.

The Highest Speed of Travel.

The Pennsylvania Railroad Company of the United States recently made some experiments with a locomotive drawing a single car containing passengers and baggage, and succeeded in attaining a speed of 88 miles an hour. The trip between Camden, near Philadelphia, and Atlantic City, a distance of over 58 miles, was covered in 45 minutes 45 seconds, at a mean rate of 76½ miles an hour. This result is understood to make the "record" as regards travelling on land or sea, but some balloons have drifted faster in high winds.



THE MICRO-PHOTOSCOPE.—FIG. 2.

"The Queen's London."

Under this appropriate title, Messrs. Cassell are now issuing, in monthly numbers, an album of views of London and its suburbs, which should prove of permanent interest to all who know the metropolis, either as residents or as visitors. There are thirty-two excellent views in each sixpenny number of this new work, which will include pictorial mementoes of every building and point of interest in and around the capital.

"British Birds."

Mr. W. H. Hudson is the author of a new book on "British Birds," which has just been published by Messrs. Longmans. The book is addressed to the great public which knows little or nothing of natural history, and by its simplicity and clear presentation of the salient facts concerning each of our feathered neighbours or visitors, must do a great work in spreading and widening knowledge. Eight coloured illustrations are supplied by Mr. A. Thorburn, and upwards of a hundred black and white pictures from sketches and photographs by Messrs. G. E. and R. B. Lodge. The book is one that should be in the hands of every dweller by, or lover of, the country side.

The Herschels.

To Messrs. Cassell's "Century Science Series," Miss Agnes M. Clerke contributes a most interesting study of "The Herschels" and the influence of their research upon the progress of modern Astronomy. Probably never did three members of a single family contribute so much to the advancement of a single science in popular esteem as did the subjects of this pleasant little volume, which should add alike to the value of the series and the public interest in its topic.

GARDENING IN OCTOBER.

IN this often beautiful month of russet browns, a sharp and provoking frost sometimes occurs, sufficiently severe to spoil the remnants of summer flowers and things in full glory, such as dahlias and tuberous begonias. How precious then are the Michaelmas daisies (perennial asters), the flowers like stars tossed about on slender, graceful shoots! And scarcely less valuable are the perennial sunflowers, that lift themselves again to the sun after a night's frost.

Amateurs often forget the autumn flowers, but there are many brilliant things to gild this month with colour. Amongst bulbous plants one may have the glorious blue of Crocus speciosus, or the bold, heavy, delicate-tinted blossoms of the colchicum.

When frost occurs lift dahlias, cannas, and tender roots. They may be stored away in a cool cellar. Tuberous begonias are better if kept in dry silver sand. Pot up geraniums, or hang them up by the roots in a dry, cool cellar; but, of course, the best results are got by giving them greenhouse treatment. Shading on plant houses is now no longer required, and less water will be needed, as, of course, the soil does not get so dry as in summer; besides plants are not so active in growth.

Pot up all bulbs now, and one cannot do better than have plenty of daffodils, hyacinths, tulips, snowdrops, crocuses, and chionodoxas (Glory of the Snow), especially C. Luciliæ for pots. They will all succeed uncommonly well, and may also, of course, be planted in the open with every prospect of success. Add to this list for the open the quaint winter aconite, star flower (Triteleia), and the Siberian scilla.

This is a good season for planting hardy flowers, but as early in the month as possible. Never forget how important it is to get everything planted before the frosts. Trees and shrubs may also be put in.

Chrysanthemums will require close attention. Damp is their great enemy, so that on all favourable occasions give abundance of air and little fire-heat. Pick off any blooms that show signs of decay. A few rotten petals soon spoil the finest flower.

Very soon now will be time for that important operation, turning the ground well up, so that it can be thoroughly exposed to rains and frosts. These purify the soil, sweetening and preparing it for all kinds of crops.