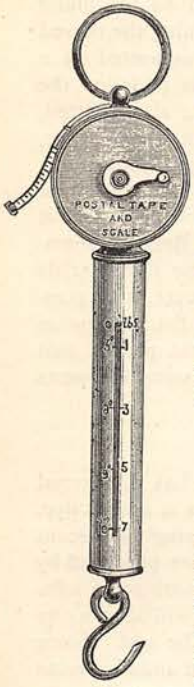
THE GATHERER.



A Parcels Post Balance.

A useful little apparatus has been devised for the use of persons sending parcels by post. It is simply a spring balance, graduated to weigh parcels up to the postal limit, 7 lbs., and showing the corresponding cost of postage. A tape measure is also attached to the scale, to enable the sender to measure his parcel. On the dial of the measuring tape full instructions are embossed for the sending of these parcels, and the whole machine will go into the pocket.

Helm Signal Lights.

Mr. Evelyn Liardet has devised a plan for enabling a ship's mast-head light to indicate the position of the helm. These lights are electrical, and consist of a red, a green, and a white electric light. When the helm is amidships only the white line is seen; when the helm is to port the red light is also visible beside the white; and when the helm is starboard the green light is visible beside the white, and the red light is out. This change of lights is effected by cutting off the electric current by means of contacts on the helm. In thick weather bells and gongs could be substituted for these lamps, the electric current working them in a similar way.

Manitoban Coal.

Extensive coal-fields have been discovered in Manitoba, the new north-west territory of Canada. They extend for several hundred miles along the Rocky Mountains on the eastern side, and as the prairie country is bare of wood, will be a valuable aid to civilisation in these parts. A specimen of the coal, cut from a seam five feet thick, on the Belly river, now exhibited at the Canadian Government offices, shows it to be a hard, dry, bituminous fuel, like Welsh anthracite, and producing little cinder or smoke. It is suitable for steam and domestic purposes, and bears transport and exposure well. This kind is as yet the best discovered in that region; but combustible lignites are also found in the mountains there.

A Novel Bridge.

A temporary bridge of a novel kind has been erected across the river Spey, at its widest part, near Garmouth, to accommodate the workmen engaged on a new railway on the Moray coast. The span is 500 feet, and the bridge consists of four steel cables, on which runs an iron carriage weighing 140 lbs. The carriage is lined and floored with strong diamond lattice wire offering little resistance to the wind. The four upper wheels have each a crank attached, by means of which the passengers, seated back to back, can propel the carriage up the short incline at the termination of each journey. For 460 feet the journey is accomplished by gravitation owing to the thickness of the rope; and the average length of the journey across is under a minute. The bridge has been designed for the Great North of Scotland Railway by Mr. Harper, C.E.

A Steam-Magnet.

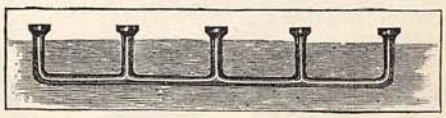
A German chemist has recently constructed an electro-magnet of a soft iron core surrounded by a helix of copper piping, through which steam was forced at a high pressure. This experiment is not quite novel, it having been made before by M. Tommasi, a French electrician; but it was eminently successful

A Sunlight Battery.

Herr Sauer, a German electrician, has devised a voltaic battery which only operates under the influence of sunlight, the power being furnished by the chemical rays of the light. It consists of a glass vessel containing a solution of fifteen parts of table salt, and seven parts of sulphate of copper, in 106 parts of water. In this is placed a porous cell containing mercury. One electrode is made of platinum and the other of sulphide of silver, and both are connected with a galvanometer. When in use the platinum electrode is immersed in the mercury, and the other in the salt solution. The battery is then placed in the sunlight, and the galvanometer needle is seen to be deflected, the direction of the current proving the sulphide of silver to be the negative pole. If the sun is clouded so as to lower the intensity of the light, the needle indicates the fact by a change in the strength of the current. We have here an interesting case of the conversion of luminous rays into electricity.

Soil-Heating.

The plan of forcing vegetation by heating the soil itself directly by means of hot-pipes, not indirectly by means of heated air, is likely to become general.



French vine-dressers are trying it with success after the system shown in the woodcut, which represents the pipes running under-ground, and at intervals rising

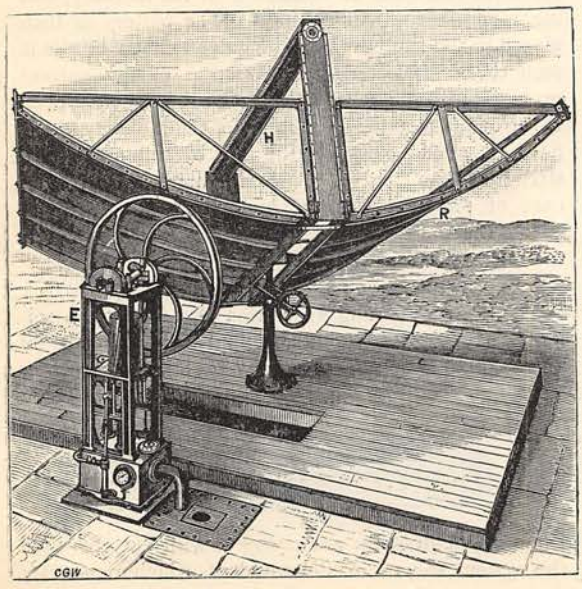
to the surface to heat the air. Steam or heated air can be used to warm the pipes in the ordinary way, but we also learn that Signor Cirio has utilised the hot-springs of Aqui by circulating their waters in earthenware pipes laid under the soil. The water is brought from the baths of the town after it has been used, and the gardens supplied are close to the bath establishment. Here are 10,000 asparagus, 4,000 chicory, and 4,000 lettuce plants being forced in this manner. We may add that the Japanese are about to utilise the hot-springs of Tokio in a similar way; and it is also proposed to utilise the hot gases of volcanic districts for this purpose.

Universal Buoys.

The Corporation of Trinity House are bringing into use a new system of buoyage which, it is hoped, will be adopted universally. Formerly, colour was the distinguishing mark of buoys, but the introduction of metal buoys has led to a more enduring distinction, namely, that of form. In future flat-headed or can buoys are to mark the left or port side of a channel, and conical buoys the right or starboard side. This accords with many existing systems abroad, and is an important step towards a uniform system everywhere. While upon the subject, we may mention that the Trinity House are also about to make a series of practical tests of the best means of light-house illumination. The experiments will be carried out at the South Foreland Light-house, and the relative advantages of oil, gas, and electricity will be tried.

The Sun-Motor.

Our illustration gives a general view of the machine constructed by Captain J. Ericsson, at New York, for utilising the sun's heat in producing mechanical power. It consists of a curved reflector R, lined with polished plates which reflect the sun's heat on a cylindrical heater H, mounted over the reflector. This heater contains air or steam, which is heated, and transfers the energy of the sunshine to work the engine E, shown beside the reflector. The reflecting surface consists of window-glass panes silvered on the under sides, and fastened to wooden staves lining the curved iron framework. The reflector is supported on a central pivot, round which it revolves to follow the sun, a change in its inclination being also effected, by means of a horizontal axle not seen in the figure, to suit the path of the sun. The engine shown is a steam-engine, which in turn works a force-pump. The steam is brought to it from the heater, where it is generated by the sun's rays, in a flexible steam-pipe. The average speed of the engine during trials last summer was 120 turns per minute, the pressure on the working piston being 35 lbs. per square inch. The success of the experiment proves that the sun-motor may be very useful in some hot parts of the globe.



ERICSSON'S SUN-MOTOR.

Dyeing Cut Flowers.

Mr. Nesbit, a well-known botanist, has discovered that by soaking the stems of cut flowers in a weak dye, their colour can be altered without altering their scent or freshness. Most beautiful effects are produced by prepared baths. Flowers refuse to absorb some solutions, and if placed in mixed solutions, will absorb one or more of the ingredients, and leave the rest. Some lilies, treated with purple dyes, show red and blue veins quite distinctly. The tints have been separated by the process of absorption.

Reducing Metals by Gases.

An interesting series of experiments has been made by Dr. G. Gore, F.R.S., in order to test the effect of various gases and liquids in reducing metals from their solutions. The method consists in slowly passing a stream of dry pure gas, or mixture of gases, through various solutions, or maintaining the liquids in contact with an atmosphere of the gas. Thus a mixture of dry and pure carbonic oxide and carbonic anhydride passed through a solution of bichloride of palladium reduced the metal rapidly to a black powder. Again, an atmosphere of coal-gas was kept in contact with dilute tetrachloride of gold, and beautiful films of the metal, bright and very thin, were found on the surface of the liquid. Platinum was also separated from platinic chloride solution by American rock-oil, benzole, and such liquids kept in contact with the solution. Dr. Gore is of opinion that this method might be useful in physical experiments, and suggests that it may have played a part in reducing metals from their ores in the bowels of the earth.

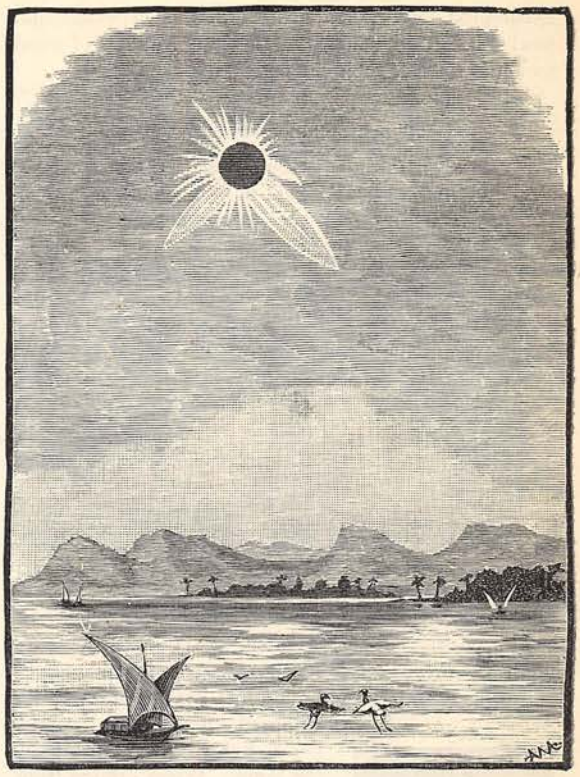
Speed of Tidal Waves.

The last great outburst of the Krakatoa volcano took place at twelve minutes to noon on August 27

last, and a tidal wave was formed in the Straits of Sunda. At 1.30 p.m. the same day a wave was felt at Point de Galle, some 850 miles distant; and at Mauritius, about 3,400 miles distant, a wave was felt at 2.15 p.m. Calculating from these observations, M. de la Croix finds the speed of the molecular wave through the sea to be about 1,250 miles per hour, or 600 yards per second—that is, nearly twice as fast as sound in air.

The Solar Corona.

Our engraving represents that wonderful object the solar corona, as seen by M. Trouvelot during the eclipse of last May. According to M. Janssen, the celebrated astronomer, the spectrum shows that the corona is due in part at least to reflected sunlight; and M. Tacchini also found in the spectrum of the great coronal plume, seen on the right, the peculiar bands found in the spectra of comets.



THE SOLAR CORONA.

A Paper Insulator.

Paper-pulp impregnated with liquid silica has been introduced in America as an insulator for covering electric light wires. We may also mention that paper-pulp is now made by macerating straw or wood in dilute milk of lime, and after twelve hours, digesting it with sulphurous acid under a pressure of four or five atmospheres. In two hours the material is loosened, and after being washed in water and again treated under pressure with three per cent. of chloride of calcium, and a half per cent. of aluminum sulphate, dissolved in a little water, the stuff obtained resembles cotton, and serves for the manufacture of fine cotton.

Frozen Nitrogen.

Liquid oxygen, when the pressure is removed, enters into an ebullient state, and its temperature is then very low—according to recent experiments by M. Wroblewski, 186° below zero Centigrade—that is, below the freezing point of water. At this temperature compressed nitrogen solidifies and falls in snow and crystals on the bottom of the vessel holding it.

Composite Pavement.

A piece of new pavement of the composite kind, invented by Mr. H. F. Williams, of San Francisco, is now being tried in Cannon Street, London, opposite the Mansion House station of the Metropolitan District Railway. The pavement is laid on a concrete foundation faced with cement, which is set hard and dry before the superstructure is built. This consists of wooden blocks about 8 inches long by 4 inches deep by 1½ inches wide, which are set on the foundation like bricks on edge, and with the end of the grain—that is, the 1½-inch side—uppermost. Previous to being set thus each brick is dipped in a boiling mixture of Val de Travers asphalte and Trinidad bitumen. The bricks are then laid so as to break joint, and the interstices are filled in with boiling pitch. Lastly, over the bricks is spread a covering of asphalte half an inch thick, and mixed with coarse sand and grit. The grit prevents the asphalte from being greasy in wet weather.

A Curious Optical Phenomenon.

The recent observations of Professor Tyndall are interesting in the extreme. On opening the door of his cottage in the Alps on the evening of the 27th September last, he observed his shadow, thrown by a small lamp on the wall behind, projected on the fog outside, and round his head a luminous circle or halo, without colour, which proved to be an artificial rainbow. This he succeeded in reproducing by means of a copper boiler, from which steam was let out into the cold air to form a fog, and the light of the lamp behind the head to replace the sun. With an electric light the circular bow was very distinct and showed signs of colour, its outer circumference being red and its inner blue. Moreover, the corresponding secondary bow was seen beyond it, with its colours reversed. To those who may wish to make the experiment in an inexpensive way, Dr. Tyndall recommends a spray of spirits of turpentine and petroleum.

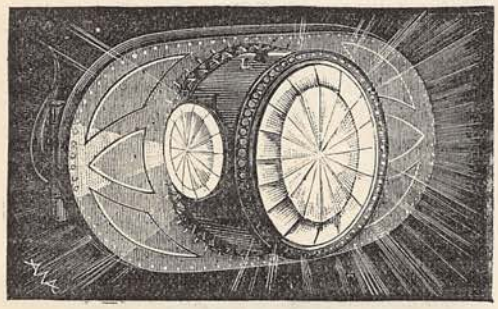
Steel-framed Carriages.

A steel-framed railway-carriage has been built by the North-Eastern Railway Company at their works,

Darlington. After sufficient trial it is expected that steel will be adopted by the company in place of wood for the frames of their carriages and waggons.

Electric Jewels.

M. Trouvé, the well-known Parisian electrical instrument maker, has devised a number of very pretty personal ornaments, such as breast-pins, diadems,



AN ELECTRICAL BROOCH.

and brooches, which, while resembling jewelled articles, possess a still greater brilliance. They are made by means of miniature electric incandescence lamps, enclosed in gold or silver cases, studded with coloured glass or "paste" gems, lighted from within by the lamp. Wires are led from the lamp to a small pocket bichromate battery of from two to five cells coupled in series, and enclosed in an ebonite case of three compartments, and having double sides. The case for three cells is only seven centimètres long by ten high, and six thick. The light lasts for thirty-five minutes. Our illustrations represent a scarf-pin and brooch. In the latter, the butt of the small lamp is shown at L. While upon this subject, we may mention that fireflies have been imitated at a place of entertainment in Vienna, by means of fine swinging wires, each bearing a tiny incandescent lamp at its end, and representing the flashes of a firefly dancing among the foliage by sudden eclipses of the light, produced by interrupting the current in the wires. The best battery for such purposes, or for button-hole and bouquet lights carried on the person, is undoubtedly formed by the tiny chloride of silver cells made by Messrs. Elliott and Co. They give a brilliant light for several hours, not merely for a few minutes as small accumulators do.

AN ELECTRICAL SCARF-PIN.

The Great Paris Telescope.

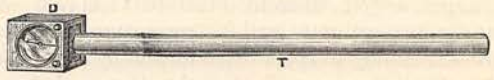
The Observatory of Paris has just been fitted up with a very fine equatorial, designed by Mr. Lœwy, and presented by M. Bischoffsheim. Its chief peculiarity is that the tube is bent in the middle to an angle of 90°, the whole thus forming two sides of a square. The light is imaged round the corner by a mirror at the bend, and sent up to the eye-piece. The eye end of the tube rises upward, and the observer sits on a chair above, and looks down into the reflected sky as if he were examining a microscopic specimen. This arrangement permits of great ease of working, and the usual cumbrous dome over the instrument can be dispensed with.

A White Rainbow.

The very rare phenomenon of a white rainbow, or *cercle d'Ulloa*, was seen at Courtenay (Loiret), France, on the morning of the 28th November, 1883, by M. Cornu, the well-known astronomer. The sun rose in the midst of level bands of cloud, and was very pale in hue. A thick hoar-frost covered the ground, and a light fog formed a thin veil through which the sky was visible, free of clouds at the zenith, but clouded at the south-east. Opposite the sun a great white arc, or rainbow without colour, was pictured on the fog, and recalled to M. Cornu the smoke crowns made with phosphuretted hydrogen gas. The apparent height from the summit of the arc to the horizon was 23° 26′; the apparent amplitude, or span, 80°; and the apparent height of the sun at the time (9.41 a.m. Paris time) was 17° 34′.

A New Voltmeter.

A voltmeter is a device for measuring the electro-motive force or "pressure" of an electric current. That illustrated is a novelty in its way, and is the device of Lieut. Carden, R.E. It consists of a very fine platinum-silver wire ·0025 inch in diameter, enclosed in the long brass tube T. The current whose

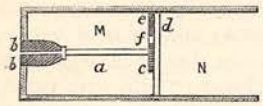


electro-motive force is to be measured, is sent through the wire, which is heated by its passage, and the dilatation produced is indicated by the needle on the dial D, and a diagram provided with each instrument. A safety-fuse is attached to prevent the wire from fusing by too strong a current. Brass is chosen for the case, because it has the same coefficient of expansion as platinum-silver for a given rise of temperature; hence, so long as the wire and case are at the same temperature, the needle of the instrument keeps at zero. Such an apparatus, though very simple, will measure to 120 volts, which is above the ordinary "pressure" used in incandescent electric lighting.

An Electric Firelock.

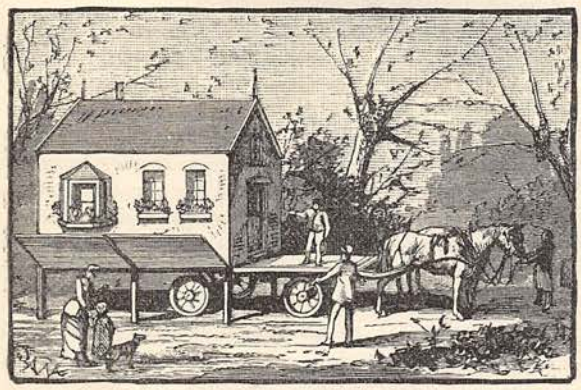
Pieper's electric gun is an ordinary gun, in which the powder is exploded by a platinum wire, heated with an electric current supplied by a small accumulator carried at the belt, and capable of firing 10,000

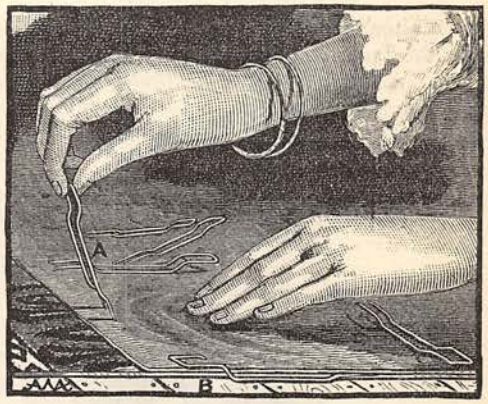
rounds. One pole of the accumulator is in connection with a metallic glove, which the sportsman wears on the left hand, and the other with a metallic shoulder-strap. When the gun is brought to the shoulder to take aim, the circuit is almost complete. The figure shows a section of the cartridge; M is the powder chamber, the axis of which is occupied by the copper rod *a*, which bears on the bottom plate, but from which it is insulated by a small ebonite piece *b*. The rod *a*, presses on the brass button *c*, of the disc *d*. Close to this is a platinum wire *f*, $\frac{1}{10}$ mm. in diameter, connected on one side to the button *c*, and on the other to the strip *e*, attached to the cartridge shell. The firing pin, when pressed against the end of the rod *a*, closes the circuit, the platinum wire is heated, and the charge exploded. The advantage of an electric firelock on a gun is that no mechanical shock of the lock need disturb the aim. Whether it may be safer than a trigger, will depend on the way the electricity is applied. Pieper's gun was exhibited at the Vienna Electrical Exhibition, where, as a curiosity in its way, it attracted considerable notice; and it may lead to further improvements in the same direction.



Movable Houses.

A French architect, M. Poitrineau, has devised a number of useful constructions which are in reality movable houses. They are made in pieces which are easily fitted up anywhere; and, moreover, the entire building can be shifted about by aid of a low waggon drawn by horses. The waggon is backed under the raised floor of the building, and fixed there; the legs of the building are shortened by unscrewing the lower part, and the whole edifice then rests on the waggon and can be removed. For tourists, artists, sportsmen, and others roughing it for a season in country parts, these portable houses may prove of service. They are fitted up inside with all the necessaries of civilised life. The boards round the foot hang down when the house is properly placed. A German officer has also invented a portable field tent of felting, which is designed to obviate the bad effects of a camping-out without shelter. The felt is impregnated with incombustible matter, to render it safe against fire. Besides being water-tight, these houses are cool in hot weather, and warm in cold. They are packed into transport boxes provided with ventilating holes, and have been recently introduced into the Danish army.





A Carpet Fastener.

The woodcut represents a simple American device for fastening carpet-covers. The fastener is a staple with sharp ends and the sides bent as shown at A. When the fastener is to be used it is held nearly upright, and the points are pushed through the carpet-cover and carpet to the floor. The upper part is then lowered backward, the points being at the same time slid along, until the fastener is in the position shown at B, with its points not rising above the cover again.

Power from Natural Gas.

The glass manufacturers of Pittsburg, Pennsylvania, U.S., have recently utilised the natural gas of that region for driving their machinery, and the introduction of the system is likely to extend to other manufacturers. Indeed, the Edgar Thomson Bessemer Steel Works, at the town of Braddock, Pennsylvania, have also resolved to employ the gas-power from a well at Murraysville. The gas is brought in pipes from the well, and utilised by gas-motors to drive the machinery and light the workshops.

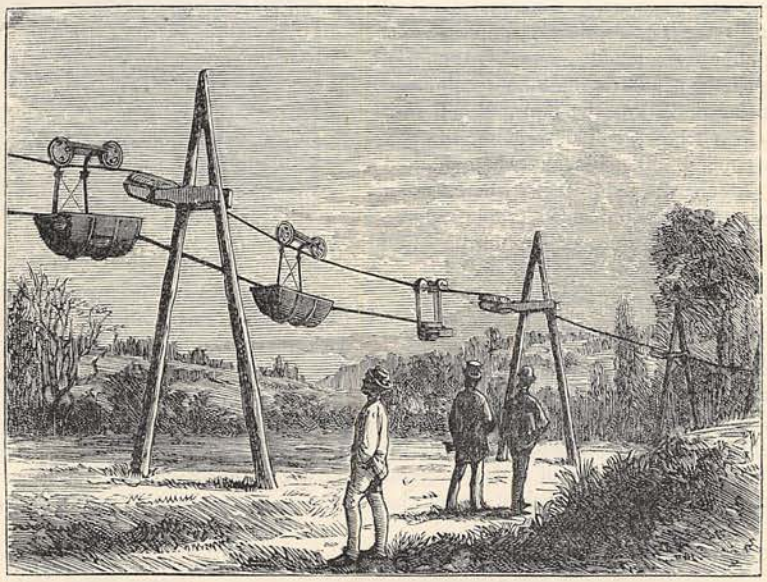
Curious Needles.

At the International Exhibition of Needlework to be held at Sydenham in July, two famous needles will be shown. One is that presented to the German Emperor when visiting the Kreuznach needle factory. On seeing some very fine needles, 1,000 of which only weighed an ounce, His Majesty expressed his surprise that needles so fine could be threaded, whereupon the foreman of the boring department requested a hair from the Emperor's beard, and returned it to

him bored and threaded. The other needle was manufactured at Redditch and presented to Queen Victoria. It is a sort of miniature Trajan's Column, engraved with scenes from Her Majesty's life, so fine that a magnifying glass is required to see them. The needle can also be opened, and is found to contain a number of even finer needles, on which other scenes are engraved.

Electric Wire Transport.

At Weston, near Hitchin, has been erected a trial line of the "telpherage" system, invented by Professor Jenkin. We have described the principle of this novel mode of transporting goods or passengers in a previous number of the GATHERER, and now illustrate the original line. We have chosen that in which only one steel wire is used to support the locomotive and the "skip" or carriage; but Professor Jenkin has another arrangement with two wires. The steel wire conveys the electric current to the locomotive, and also supports the latter and the carriages or trucks. Only one of these is shown; but the band connecting the locomotive with it, runs on and connects a series of "skips" in one train. The locomotive is one of Ayrton and Perry's electromotors, specially adapted to run on the steel wire. Telpherage is likely to play an important part in future locomotion, and hence the first trial of it has all the interest of a progenitor



ELECTRIC WIRE TRANSPORT.

A New Potato.

At a recent meeting of the Linnean Society, Mr. J. G. Baker drew attention to a new kind of potato which is indigenous to the moister parts of Chili, and is more suited to a moist climate like ours than the common potato, which comes from the dry parts of that country. Two plants of this new potato under cultivation yielded 600 tubers in one year, the tuber-bearing stems reaching seven feet long. The botanical name of the new potato is *Solanum maglia;* but other varieties, such as the *S. Commersoni*, now being tried in France, and the *S. Jamesii*, under test in America, are also suited to moist climates. Mr. Baker also remarks that the ordinary potato becomes a prey to disease on losing its vitality by tuber-bearing at the expense of other functions; and he is of opinion that the best way to prevent the disease is to grow the potato best adapted to the climate, and restore vitality to the plant as soon as it ceases to flower and fruit, by cutting off the tuber-stems and saving the roots which nourish it.

1883 POEM COMPETITION.

The Editor has much pleasure in making known the award of the Judges to whom the one hundred and ninety-five poems received in response to his invitation were submitted. The subject given was "Spring time or any subject directly bearing thereon," and the Prize of FIVE POUNDS *is awarded to*

MINNA LOVELL, 10, Ellerdale Road, Hampstead, N.W.

HONOURABLE MENTION *is awarded to the following competitors, in order of merit:—*

(1) Marie G. Daly, Birkenhead.
(2) William Boyle, Box, Wilts.
(3) Lillias Campbell Davidson, Shirley, Hants.
(4) Emma Mary Hordle, Wareham.
(5) A. Parker, Brighton.

The Editor hopes to publish the Prize Poem in an early Number of the Magazine.

Particulars of another series of Prize Competitions will be announced in due course.