

THE GATHERER.



An Electric Table Fan.

The small Griscom electric motor which we have referred to on several occasions is shown in the illustration mounted so as to drive a small table fan. The fan, F, is attached direct to the spindle of the motor, M, the whole being supported on a standard, S, at a convenient height to cause a refreshing motion of the air. The current from a battery of six bichromate cells is conveyed to the motor by two conducting wires, W. The motor weighs only $2\frac{1}{2}$ lbs., and is 4 inches long by $2\frac{1}{2}$ inches in diameter.

An Electrical Watch.

The invention of an electric watch having only two wheels, and actuated by an electric current from a very small battery, is reported from St. Petersburg by Professor Chowlsou, who speaks very highly of its performances as a standard time-keeper for observing purposes, but does not as yet reveal its mechanical construction.

New Mode of Insulating Wires.

M. Widdeman, a French chemist, has observed that an insulating skin can be produced on metal wires by decomposing plumbates and alkaline ferrates with the electric current. The method is as follows:—Prepare a bath of plumbate of potash by dissolving 10 grammes of litharge in a litre of water, to which 200 grammes of caustic potash has been added, and boil it during half an hour. Let it rest, decant, and the bath is ready for use. The wire to be covered with the insulating skin is connected to the positive pole of the battery, and a small strip of platinum to the negative pole. Both wire and platinum are then plunged in the bath. Metallic lead in a very divided state is precipitated at the negative pole, and peroxide of lead on the wire. This layer of peroxide takes all colours of the spectrum, and the insulation is highest when the wire takes a brownish-black tint. If this insulator is durable, it will prove of great service in electric lighting.

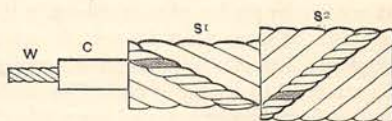
Towing by Endless Chains.

A very ingenious mode of navigating rapid rivers against the stream has just been tried, with great success, on the Rhone, by M. Dupuy de Lome. It

consists in having a tug-boat, fitted with fore and aft pulleys, on each side of the deck. Over these an endless chain passes, and dips into the water until its lower part rests on the bottom—thus forming a sort of grip, or anchorage, for the vessel on each side. The chains are quite independent of each other; and to propel the craft, the pulleys are rotated, thus causing the chains to travel round and round. Both chains are actuated by engines worked by one man. To steer the tug, one or other chain is driven faster; and it is found that very swift rapids can be mounted in this way. In order to provide for varying depths, the length of chain in the water can be regulated by altering the distance between the fore and aft pulleys at will.

A Green Moon.

"Once in a blue moon" is a proverb which may have originated in some such phenomenon as was witnessed in the South of England on Wednesday evening, December 5th. During one of those remarkably bright red sunsets which we had during the past autumn and early winter, the crescent moon was seen to be of a distinctly green colour, comparable to the green sun witnessed at Ceylon and Madras recently. From different parts of the world come accounts of similar strange atmospheric phenomena. Thus, at the Cape of Good Hope, one sunset was remarkably brilliant, and caused the foliage and flowers to deepen in hue. These effects are so general that some suppose them connected with the recent volcanic outburst at Krakatoa, when enormous masses of fine dust were shot into the air. When we consider that the tidal wave produced by the volcanic eruption in question was felt at Colon on the Isthmus of Panama within two days after its occurrence, and on the coast of France, 12,500 miles away, we need not marvel if the volcanic dust should affect our sunsets. M. de Lesseps, who announced the tidal wave at Colon, points out that it must have travelled round Africa and up the South Atlantic before penetrating the Gulf of Mexico. Another explanation of the astronomical phenomenon is that the earth was at the time passing through a meteoric cloud rather more considerable in extent than that through which its path generally lies in early winter, and which is the cause of the "November meteors."



A New Cable.

A rope which will not kink, or at least tend to kink, is useful in many ways. When the rope takes the form of a submarine telegraph cable, it is still more

important that it shall not kink, for there are more cables destroyed and injured by kinking than by any other accident. Hitherto, the "lay" of the iron and hemp sheathing of cables has all been made in a spiral running round the cable in one direction, and kinks have frequently resulted from this mode of manufacture, which gives a spring to the cable in the opposite direction to the "lay." When extra strain is put on a cable with kinks in it, these are pulled out, and the cable forcibly wrenched asunder. To obviate this difficulty, Messrs. Trott and Hamilton have designed a way of covering cables which is equally applicable to the manufacture of ropes and hawsers. They take care that the "lay" of alternate layers of sheathing shall cross each other, as shown in the figure, where *w* is the copper wire, or conductor, *C* the insulating core of gutta-percha, *s*¹ the inner layer of hemp sheathing, and *s*² the outer layer. It will be seen that *s*¹ is a right and *s*² a left-hand lay. Moreover, the hatched portions of the figure show that the threads making up each *cord* of the layers are arranged to cross so that a twisting strain on the cable shall tend to compress them closer together. Thus every precaution is taken to prevent those loops forming, which are so troublesome in working with cables.

Harvesting Ice.

Some idea of the magnitude of the ice industry in America may be gathered from the fact that it supports a monthly trade paper, and that the total annual

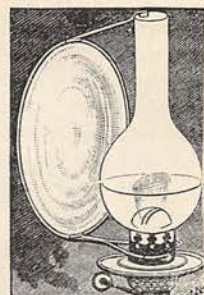


ice-crop of the States is twenty million tons, of which some twelve million tons are consumed. Mining and storing this ice has given rise to a separate branch of engineering, and special implements for the purpose. There are scrapers of various kinds to remove the snow; tracers, or hand-ploughs, to mark out the areas to be cut by grooves. These grooves are afterwards deepened by a tool, called a marker, fitted with knife-edges, which, on being lowered to the ice, cut it deeply. The ice-area is cut and cross-cut with these tools, then trenched or sawn by the ice-plough shown in the figure, until two-thirds of the total thickness is cut through. This plough consists of a succession of curved blade-like teeth attached to a long beam. The teeth are so formed as to clear themselves, and carry the chips out of the groove with little resistance. A channel is cut by the above means between the ice-field and the elevators which raise the blocks into the ice-houses. The blocks are then loosed by ice-chisels, floated to the elevators, and raised by steam-power on endless chains

working up an inclined plane. The ice-rooms are built one hundred feet long by forty feet wide, and the ice-cakes are placed so as to leave a three-inch space all round, to prevent undue wasting when broken out for summer use. The cost of all this preparation is only twenty-five cents per ton.

A Movable Lamp Reflector.

The woodcut illustrates a new and handy reflector for hand or table lamps, which can be removed at will. The upper part of the reflector hooks on the glass shade by projecting wires at the top, and clasps it round the base by pincing-wires. No shadow is cast forward by the arrangement, which throws the light from any side.



A Sun-wound Clock.

A clock at Brussels was set going nine months ago, and has not yet run down, owing to the plan adopted for its winding up. An up-draught is obtained in a shaft by exposing it to the sun, and this turns a fan, which winds up the weight of the clock until it reaches the top. It then works a brake, which stops the fan until the weight has gone down a little, when the fan is free to act again.

A New Compass.

M. Mascart, the well-known electrician, has devised a new compass, which finds the magnetic meridian by the well-known experiment of moving a coil of wire across the lines of magnetic force of the earth, and inducing a current in them. When the axis of rotation of the coil is on the magnetic meridian, or north and south magnetic line, the induced currents in the ring, when rotated, will be nil. M. Mascart employs a galvanometer to indicate the induction currents, and the coil is properly mounted on an azimuth circle to give the direction of the meridian. Trials at Parc St. Maur Observatory, Paris, prove that the new compass is as reliable as the existing instruments.

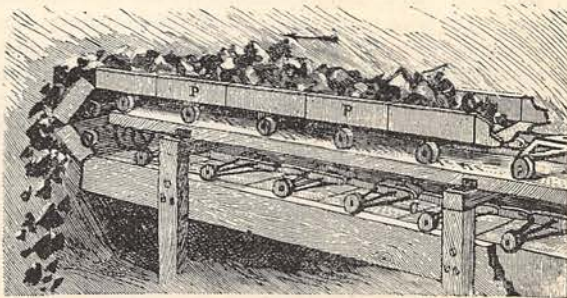


FIG. 1.

Endless Trough-Conveyer.

A novel mode of conveying goods is illustrated in Fig. 1, where, as will be seen, an endless link-belt

or chain, carrying a series of troughs, P P, placed end to end, keeps constantly circulating over pulleys and bringing forward the full troughs to be emptied over, while it returns the empty troughs, C, bottom upwards, to be filled again. The link-chain, which is shown in detail in Fig. 2, runs along

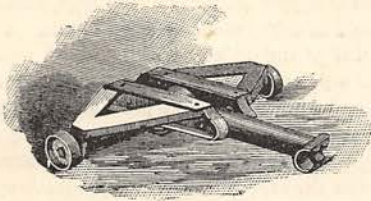


FIG. 2.

on small wheels or castors. The device dispenses with a line of barrow-men, and has been used for conveying hot roasted iron ore from the kilns to the crushers.

Coloured Photographs on Glass.

The delicate coloured photos on glass now in fashion are produced by fixing a paper photograph on a cushion-shaped glass with transparent cement, and when dry, rubbing away two-thirds of the thickness of the photograph with sand-paper. This film is rendered transparent by soaking in melted paraffin wax, and applying transparent colours, which appear soft when seen from the front. The background is then painted on another cushion-shaped piece of glass, and fixed behind. An improvement has just been made by Mrs. Decker, daughter of the late Mr. C. F. Varley, F.R.S., who finds that this second piece of glass can be dispensed with. The photograph is dipped in paraffin a second time, after the transparent colours have been applied, and the heavier colours are painted on the back of this second coat. A third layer of paraffin is then applied, and the background painted on that. Another coat of paraffin protects the whole.

Portable Meat-Safe.



The figure shows a simple invention which may be of considerable household service, especially in hot weather, when meat is apt to be attacked by flies. It consists of three rings of stout cane or wood, covered with gauze. A hook is provided to hold the joint and hang up the safe, which is collapsible except when hanging downwards. The device is so simple that it can be home-made.

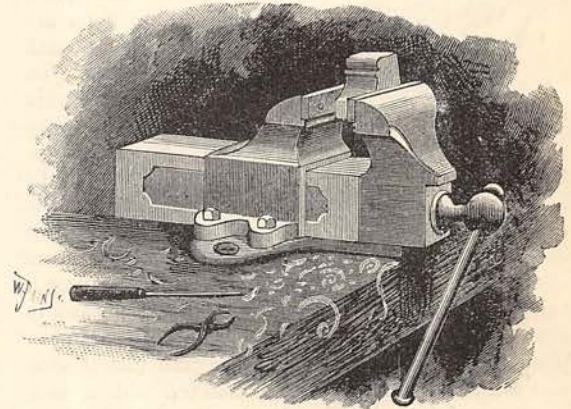
Gibbs' Grain-Dryer.

Large grain-dryers, such as we described in the GATHERER for December, 1883, and weighing from three to four tons each, are now being made for Hereford, Paisley, Douglas, and Londonderry. By an oversight in our account, these dryers, which are so

useful in our moist climate, were stated to dry from ten to fourteen bushels of wheat per week. This should have been from ten to fourteen thousand bushels and upwards.

New Potato Digger and Picker.

Attention has recently been called to an improved form of machine for digging and picking potatoes, though it is difficult to say how far ordinary manual labour can be superseded with advantage in this respect. Without going into any description of the details of this machine, it will here suffice if we explain very briefly the principle upon which it acts. Two ploughs are arranged in the fore part in order to part the soil on either side, while a single plough passes beneath and raises the potatoes and the earth in which they are lodged. The shaker or picker separates the tubers from the soil and delivers them to the rear of the machine, the mould falling through the picker to the ground. No doubt in this way a field could be cleared in a tolerably short space of time.



A Handy Vice.

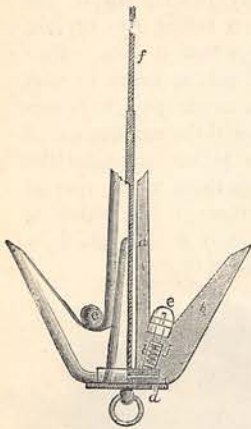
A cheap and serviceable vice for amateurs is shown in the accompanying woodcut. The jaws are of hard steel, polished bright, and $2\frac{7}{8}$ inches long. The body of the vice is painted. It will grip up to $3\frac{1}{4}$ inches, and its total weight is $9\frac{1}{2}$ lbs.

Catechu and Boilers.

Recent experiments at the waterworks in Berlin have practically demonstrated that gum catechu, well known as an astringent drug, is useful in removing the crust from the interior of boilers. Before this remedy was applied, a firm incrustation $1\frac{1}{8}$ inches thick formed on the boilers of the waterworks after a few months of working, and it was necessary to remove this periodically. A quantity of catechu, 11 lbs., laid on the bottom plate of a boiler soon reduced this deposit to a soft mass, which could easily be removed. The boilers in question evaporate 143 cubic feet of water during an average day's work of thirteen hours, and 11 lbs. of catechu added at the end of two months serve to clean the plates of crust. The matter is now under discussion in

the German scientific press, and Herr Hiller shows that the quantity of gum to be used varies with the quality of the water. The catechu should be added some eight or ten days before the cleaning of the boiler, so as to give sufficient time for the loosening action to be completed. It should not be added when the boiler is filled again, because it dissolves in the water and may foul the taps.

A Tell-tale Grapnel.



In grapnelling for sunken bodies, such as submarine cables, lost chains, and so on, it is convenient to know when the object is hooked. Hitherto, this has been roughly told by the strain on the rope as the vessel trawls the grapnel after it on the bottom. But it often happens that in rough stony ground, and more especially where there are corals, the flukes or teeth of the grapnel catch on these, and produce a strain similar to that produced by the cable. Mr. H. Kingsford has, however, designed a grapnel, illustrated in the figure, which announces the capture of the cable by ringing an electric bell on board the ship. This is done by fitting a push-button, *e*, similar to that of an electric house bell, in the pit of the fluke *b*, between it and the stem of the grapnel. On being pushed in against the force of the spiral spring *j*, the needle *l* perforates a sheet of india-rubber, and makes contact with a metal plate, *c*, connected with a conductor, or wire, which passes up through the stem of the grapnel *a*, and the grapnelling rope *f*, to the ship. This contact closes the circuit of an electric bell on board, and causes it to ring. The sheet of india-rubber is employed to keep the sea-water from getting to the plate, the rubber closing up as soon as the needle is withdrawn. A sole-plate, *d*, carries the ring, to which a loose weight of chain is attached to keep the grapnel well down on the bottom.

A Travelling Electric Light.

On the Cumberland Valley Railway, of Pennsylvania, there is a car specially fitted with dynamos and stationary steam-motor, lamps, &c., to supply the electric light to any part of the line it may be wanted at in case of a collision, or for night work on the track. The idea is a good one, and will, we trust, be adopted by British railway companies.

A Single-Rail Railway.

M. Lartigue, a well-known French engineer, has devised a method of transporting goods in wild countries by means of a single rail. It was devised to transport

alfa (a plant used in paper-making) from the interior of Algeria to the coast towns; but it is applicable to all open countries free of fences. The rail is of iron, and is supported on two iron legs, which can be readily stuck in the ground by a workman. The height of the rail is 31 inches above the ground, and each length of rail weighs 33 lbs., while the supports for it weigh 31 lbs. A pair of iron panniers are hung over the rail, and run on it by two wheels, fixed on a double steel bar, carrying the panniers. The centre of gravity of the load is below the rail, and there is thus no danger of a capsizing. A camel can draw 60 panniers loaded with *alfa* along such a rail. The railway is cheaply built, as no preparation of the ground is necessary; and six men can lay $2\frac{1}{2}$ miles of line per day.

Twenty-four o'Clock.

The plan of numbering the hours consecutively up to twenty-four o'clock, and doing away with the "A.M."—"P.M." system, is gaining ground in America. The Cleveland, Akron, and Columbus Railway now print their time tables on this plan, and watches and clocks are about to be made with twenty-four hours marked "consecutively in a double circle inside the ordinary figures."

Asbestos Enamel.

M. Erichsen, of Copenhagen, uses powdered asbestos to make an enamel for coating pipes, walls, &c. The powder is mixed with soluble salts, such as silicate of potash, and mineral or other colours, such as combine with silicic acid, to form a product which resists the action of oxygen, heat, cold, or damp. The coating furnishes a refractory glaze which protects the material, be it wood, stone, or metal, from weather action. When applied to wood or masonry, the surface must be washed with soap and water.

Lighting Boilers.

The Patent Steam Boiler Company have recently lighted the interior of their boilers while in use by means of electric lamps. The object was to show and examine the peculiar action of the deflectors placed in these boilers to separate the water and the steam. The application was carried out by Mr. Lane, the company's engineer, and was completely successful in exhibiting the currents, cascades, and whirlpools which are formed in the boiler.

A Transplanting Tool.



A tool for assisting in the transplanting of young plants and flowers, by removing them from the earth without loosening their roots, is shown in the accompanying illustration. It consists of two scoops, attached to handles, and pivoted together like the blades of a pair of scissors.

The scoops are opened out, and pressed into the soil on each side of the plant, which is then raised out of the ground and carried to its new position.

Ventilating Mines by Electricity.

The Carola mine in Saxony is now ventilated by fans driven by electric power. A dynamo driven by a steam-engine is fixed on the pit-head, and another is fitted below to drive the dynamo there, which is coupled to the axle of the fan. The current is led from the stationary to the second dynamo by a copper conductor, and returns to the stationary dynamo by a wire rope already in the mine. With this arrangement a million cubic feet of air can be supplied to the mine at a cost of threepence.

Soapstone for Fire-Bricks.

Soapstone is being introduced in America as a material for fire-bricks. It does not glaze, and is capable of resisting very high temperatures. For domestic use, for lining furnaces, steel holes, &c., it is considered very useful.

A Great Boulder.

The famous Washington boulder at Conway Corner, New Hampshire, has been accurately measured and found to be 30 feet high, 46 feet long, and 35 feet wide. It is of solid granite, and weighs 3,867 tons by calculation. This is probably the largest isolated piece of granite in the world, and is apparently a vestige of ancient glacier action.

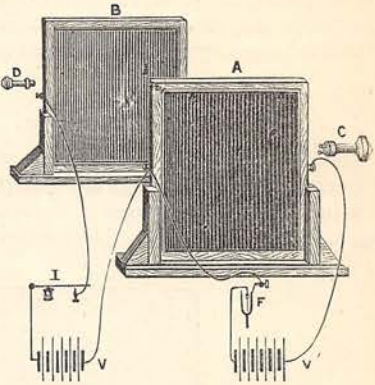
Artificial Lithographic Stone.

M. Möller has discovered a substitute for lithographic stone, which promises to be useful, and has already been employed for delicate work by some lithographers. M. Möller's plan is to prepare a plate of metal coated with a calcareous deposit in the form of a film. This calcareous deposit is practically the same as the natural lithographic stone—that is to say, carbonate of lime, mixed with a little silicious and aluminous earth. The inventor uses hard water containing carbonate of lime in solution, and deposits the carbonate from it on the metal plates. The solution of carbonate for the purpose is also kept in bottles for producing a fresh surface when required.

Railway Signalling by Induction.

Mr. Willoughby Smith, the President of the Society of Telegraph Engineers, has observed that a telephone without any wire connections, but simply held in the air to the ear, can, under certain circumstances, give out musical notes, and probably also speech, though this has not yet been attempted by him. His arrangement is shown in the figure, where A and B are two large flat coils or spirals of wire held in frames, and covered for protection by sheets of paper. The coil A is in circuit with a voltaic battery V, and tuning-fork

interrupter of the current F; and the electric current, interrupted at every vibration of the fork, circulates in the coil. If, now, a telephone C, either complete or in skeleton form (that is, having its coil removed, and consisting only of the magnet and iron plate), be held to the ear within a foot or two of the coil A, the note of the tuning-fork will



be distinctly heard in it. The hum is very loud, and is, no doubt, due to induction of the coil through the air influencing the magnetism of the instrument. In the same way, the coil B, in circuit with a battery V, and mechanical interrupter I, causes the skeleton telephone D to emit loud sounds. Mr. Smith proposes that this device should be adapted to railway signalling, in foggy weather, as a substitute for the clumsy and disagreeable plan of detonating signals laid on the line, and exploded by the passing train. He would have one of the coils, say B, placed on the line between the rails, and connected with the signalman's cabin by wires, battery, and interrupter. The signalman would let the current pass when he wished to stop a train, and the telephone D, carried by the train in the guard's van, would announce the fact as the train passed. To increase the effect, the telephone might be in circuit with a second coil A, which, in passing over the coil B on the line, would be influenced by induction, and actuate the telephone connected with it.

Electricity and Friction.

An American experimenter has found that the tractive force, or friction, between the wheels of a car and the rails on an electric railway is increased 20 per cent. when the current is put on—that is to say, the electric current passing from the rails, as conductors, to the metal wheels of the cars, on its way to the electric motor, actually increases the grip of the wheels on the rails by this amount.

Photography in Hospitals.

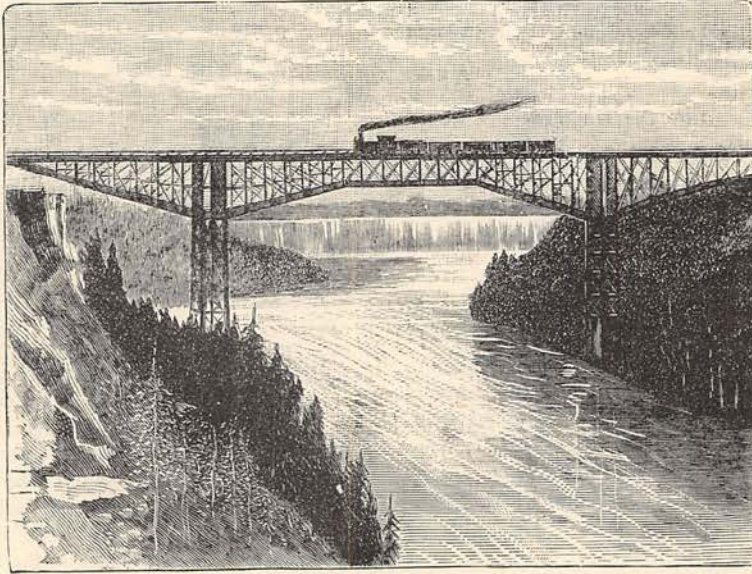
Most of the French hospitals have now a photographic studio attached, for photographing the patients at different times. The rapid dry-plate process is employed, and Professor Charcot, of the Salpêtrière, has devised an electrically operated camera for taking a series of views in rapid succession. Certain patients are photographed on entering the hospital, and at regular times after; such, for example, as hysterical patients. The photographs are multiplied by the new printing processes for the general use of the

medical profession in studying disease, and copies are also kept in albums within the hospital for reference. Micro-photography, or the photographing of minute objects, is also a valuable branch of hospital work, which is becoming better recognised every day.

Asphalte Mortar.

An artificial asphalte, or asphalte cement, is used in Pomerania for wall-copings and waterproof coatings of structures. It is composed of coal-tar, clay, asphalte, resin, litharge, and sand. The mixture is applied cold,

bridge; it spans an awful gulf 870 feet wide from shore to shore, and over 200 feet high. Our view of it shows it as seen from the American bank of the river, looking towards the celebrated Falls, which are just visible in the background. The structure consists of two huge steel towers, over 132 feet in height, resting on stone piers 39 feet high. Each tower supports a "cantilever" fully 395 feet long. The principle of a cantilever is that of a beam supported at its centre, with arms branching both ways, one arm being depressed by a counterweight, while the load on the overhanging arm produces an uplifting force in the



NEW BRIDGE OVER THE NIAGARA RIVER.

like ordinary mortar, but the space for it is first made thoroughly dry. A coating of hot roofing-varnish is laid over the mortar, and rough sand strewn over the whole. The mortar is said to be very durable.

Lighting Cars by Batteries.

A Pullman car on an express from London to Leeds, by the Midland Line, was recently lighted by electric incandescent lamps, fed by a voltaic battery of a new sort, which goes into a small space. The car was lit by ten Swan lamps, fed by a battery only four feet long by eight inches square; and the success of the trial was such that several railway companies have ordered the apparatus for their lines. The battery is that known as the "Holmes-Burke," and its construction is a trade secret as yet; but it is probably an improved form of some well-known battery.

New Bridge across Niagara River.

The accompanying illustration represents the handsome railway bridge recently completed across the Niagara river, and intended to connect the New York Central and Michigan Central systems. It is situated some 300 feet above the old railway suspension

opposite end, which is resisted by the counterweight. This type of bridge (which is self-supporting during erection) was rendered necessary owing to the impossibility of raising temporary supports in the tremendous rapids below. One end of each of the above-mentioned towers rests upon a structure on the bank, while the other end stretches out over the river. The shore ends of the cantilevers are anchored to piers of substantial masonry, and both arms are connected by an intermediate span of 120 feet. The total length of the bridge proper, upon which a double line of rails has been laid down, is 910 feet 4½ inches between the centres of the anchorage piers, the span between the towers being 470 feet. From the surface of the water to the base of the rails the height is 239 feet.

PRIZE COMPETITIONS.

The award of the Prize of Five Pounds for the best Poem on Spring Time will be made in our next number.

Intending Competitors for the Prize offered for the best Musical Setting of the Words published in our June (1883) Part, are reminded that February 1st, 1884, is the latest date for receiving contributions.