This practice is infinitely more injurious to the health than the practice of the "heathen Chinee," who puts the tiny foot of the female infant into an iron boot to prevent its natural growth ; the foot will grow, however, and since it cannot grow in the right direction, it grows upwards, and thickens at the ankle. This is a barbarous practice, causing great agony to the helpless victims—but our victims suffer from innumerable internal ills, to say nothing of the effect on the blood produced by an insufficient supply of oxygen.

The lungs, which are allowed to become disused, permit the lower ribs to fall in, producing what young ladies call a "naturally small waist" ; whereas the size of the waist ought to be decided entirely by the distance of the lower ribs from the hips. A short-waisted person, therefore, who measures eighteen inches round the waist, suffers more in health by compression than a long-waisted person of the same proportions ; for in the former the ribs fall in less from want of lung-power, and more by encouragement.

I see so many instances of young women whose waists are small because their lungs are continually empty at their base, that I do not wonder at the mistaken notion being generally received. Young men suffer from the same habit, if leading sedentary lives, only because they have not been taught to retain their natural function of deep breathing ; without the power to fill the lungs properly, the public speaker and voice-user and the singer would cease to exist.

THE GATHERER: AN ILLUSTRATED RECORD OF INVENTION AND DISCOVERY.

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 submitted.

Two New Lights.

A new gas-light is reported from Austria, where it has been invented by Dr. Auer. A cotton wick saturated with an incombustible metal solution is introduced into the flame of an ordinary Bunsen lamp, and the result is a light similar to the incandescent electric light. What the metal solution is, has not yet been stated. Another kind of new light, which has been introduced recently at the Forth Bridge works, is produced by forcing air through creosote. The apparatus consists of a cylindrical vessel, as shown in the figure, capable of containing thirty gallons of heavy hydrocarbon oil. Air under a moderate pressure is conducted to the cylinder, which is fitted with a special burner having two tubes, one within the other, leading up to it. The inner tube dips into the creosote, and the pressure of air on the latter forces it up the tube. Air finds its way to the flame through the inner and outer tubes ; and the oil when lighted gives a working light for a radius of from 150 to 200 yards. The proportions used are four of air to one of oil, by volume. One horse-power is required to drive eight lights ; and a six-inch cylinder compresser is sufficient to provide air for twelve to fifteen lights. The light is not materially affected by wind or rain, owing to the air being supplied under pressure, and it would probably be useful during accidents on railways, as it can be worked by steam from the locomotive.

LUCIGEN.

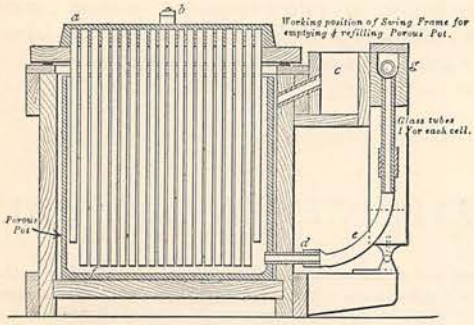
Toughening Paper.

Paper is rendered as tough as leather by mixing chloride of zinc solution with the pulp in making it. The greater the concentration of the solution the tougher is the product, which can be used for making boxes, combs, roofing, and even boots.

Stamp Box and Damper.

This ingenious article is certainly worth mention. The appliance has been devised with the object of rendering the use of the tongue unnecessary in the affixing of stamps or closing of envelopes. It is a ship-shaped apparatus, of handy size, and being made of brass is a presentable enough object for the desk or writing-table. The interior is hollow and is the receptacle for stamps. Behind and beneath is a tiny cistern for water. To fill the cistern you have merely to unscrew the tap at the back, and pour in water till it is nearly full. Before screwing on the tap, the appliance has to be placed with the tongue or prow downwards, till the pad below in front is moistened. The dampness of this pad is regulated by tightening or

relaxing the screw. In filling the box with stamps, they should be torn in lengths, then folded, and put into the box with the gummed surface downwards, care being taken that the end stamp shall lie on the platform of the prow so as to be visible through the hole in the lid. To use the apparatus you push the stamp out, draw the pad across the corner of the envelope, place the stamp over the space, and then detach it at the perforated line. To close the envelope, you have only to draw the pad across the gummed edges. This simple appliance meets an undoubted want.

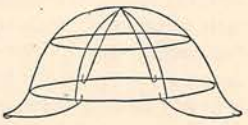


A Domestic Battery.

A recently-invented battery for supplying electric light and power to houses is illustrated in section in the accompanying figure. Its peculiarity is the handy arrangement of pipes for emptying and refilling the cells with solution at a single operation. In the figure, *a* and *b* are the zinc and carbon plates of the battery, which are separated from each other by a porous pot. The solutions used are acidulated water, and they are supplied to the cells by the following arrangement :—From the bottom of each porous pot *f* there rises a pipe *d*, terminating in a horizontal pipe *g*, which runs along the whole battery. A short length of india-rubber piping, *e*, enables this horizontal pipe to be lowered outwards until the liquid in the cell flows into it and escapes. The spent liquid is then removed from all the porous compartments of the battery; and fresh liquid is supplied through the pipes *g* and *d* afterwards. The zinc cells are filled by means of the reservoir *c*. Each cell has an electro-motive force of 1·89 volts, and an internal resistance of ·04 to ·06 ohm. The cost of lighting by this battery is given as ½d. per lamp per hour.

A Ventilated Cap.

A new cap or helmet, which allows of a circulation of air over the head, from front to rear, is illustrated in the figure. The frame is made of wire, and different covers can be fitted to it, according to the taste of the wearer. The air passes in under the front peak and out at the back. For hot weather, and heating exercises, the cap is both light and airy.



Facts about Growth.

The Principal of the Danish Institute for the Deaf and Dumb has made a large number of measurements and weighings on the children under his care, and made the discovery that there are three periods of growth in children during the year, with about thirty minor fluctuations. For bulk the periods are as follow :—The maximum from August to December; the period of equipoise from December to mid-April; and the minimum from that time to August. There are also three corresponding periods of increase in height, but the maximum corresponds to the minimum period of increase in bulk, and *vice versâ*, showing that when the body is making bulk it is relieved from making height. A child grows fastest in June and July, and much more slowly in September and October. Increase of bulk and height alternate with each other, the period of quiescence being the same for both forms of growth. As regards the minor fluctuations, or "waverings," high temperature favours increase of bulk. When the thermometer rises for a few days, the increase of bulk goes on at a more rapid rate, and when it falls there is a decrease, or, at all events, a lesser increase. A report of similar observations on trees shows that there are like periods of growth in bulk and height, a tree extending its length in April and May, and increasing its bulk in June and July, while during the remainder of the year it enjoys a period of comparative rest and inactivity.

A New Method of Making Bread.

The subject of bread reform has been brought forward so prominently during the last few years, that any new method of bread-making possesses a special interest at the present time. About two years ago a small pamphlet was published, entitled "Practical Instructions for making Bread at Home," in which the writer gave a description of the method that he had himself discovered. The system which he advocates has not yet become as well known as it certainly deserves to be; but it has found considerable favour among some bread reformers and those interested in such dietetic questions, one of whom writes of it as follows : "The very best white or brown bread may be produced without labour or the usual mess of baking. The method is so simple that the most delicate lady may make the bread for her family during the few minutes spent in ordering dinner, and so inexpensive that the poorest cottager, with a preliminary outlay of two shillings for utensils, or even less, may achieve the same result with her little fireplace and ordinary fuel." This may sound like exaggeration; but the author states that his own experience of the bread has been entirely satisfactory. The new method consists mainly in cooking the dough by boiling water, or steam, instead of in an oven,

THE MOULD.

thereby saving the trouble and difficulty of getting the oven to the right heat for baking, which has always proved the great obstacle to baking at home. The utensils required are simply these :—First, a tin mould or camp kettle, as shown in the illustration, in which the dough is placed, after it has been mixed with the usual ingredients—water, yeast, sugar, and salt ; and, secondly, a larger tin saucepan into which the mould fits. The water in the outer saucepan is allowed to boil around the tin mould for two or three hours, the lids of both utensils being kept closely down, and at the end of that time the loaf may be turned out. It will be found firm, solid, and palatable, with all the qualities of good bread. Here is one of the six recipes given by the author :—

A CAMP KETTLE.

"To make a loaf of fine flour, to fill a four-pint mould : Flour, one pound nine ounces. Water, twelve ounces and a half, equal to half a pint and half a gill. Yeast and sugar, one-third part of an ounce of each. A teaspoonful of salt."

The recipe for whole-meal bread is not quite the same, because whole-meal requires considerably more water than flour does to make it into dough of the proper consistency. But this method of bread-making is specially recommended for whole-meal loaves, which are thus obtained almost to perfection. As wheat-meal is now readily obtainable from any good miller, there is no reason why any one who is interested in this matter should not solve the question for himself.

The only part of the process which is likely to cause any difficulty is the mixing of the yeast. The author gives instructions as to the least troublesome way of effecting this ; or, if it be so wished, baking-powder may be substituted for yeast ; but the simplest method of all is one recommended by Dr. Hare, viz., to omit the leaven altogether. His recipe is as follows :—

"Mix one and a half pound of wheat-meal with an imperial pint of water ; put it in a tin mould with a close-fitting lid, and boil it in a good-sized saucepan of water, with its lid on to keep in the heat. The result is a two and a half pound loaf, costing about 2½d., of delicious bread."

A Fire-Extinguishing Ball.

Another very convenient hand fire extinctor has recently been introduced, in addition to the glass one which we noticed in a former GATHERER. The new device has the merit of being free from glass, and, therefore, there is no danger of fragments flying about. The extinguisher is shown in the illustration, and consists of an india-rubber ball filled under pressure with a clear liquid containing a vapour (presumably carbonic acid gas), which rapidly suffocates the flame. The ball bursts when sharply thrown against the fire ; but it may fall on the floor without mishap. Moreover, the elastic rubber scatters the liquid well over the burning fire. One of the balls, placed in the grate, will put out a chimney on fire.

A FIRE-EXTINGUISHING BALL.—FIG. 1.

Model Bricks.

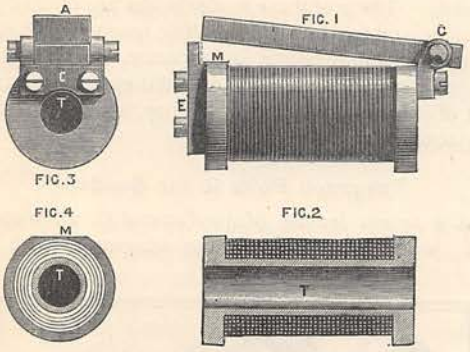
For the use of teachers in technical or kindergarten schools, a development of a well-known toy has recently been brought out. This consists of a box of sixty-four bricks, each one-quarter the length, breadth, and thickness of such a brick as is ordinarily used in building. Three of these model bricks are divided into quarters, and five into halves. The uses to which these model bricks may be put are apparent, but for explaining to a class the method of building any particular part of a flue or tunnelled wall they will be specially serviceable.

Telegraph Poles in the Soudan.

In a recent lecture, Major-General C. E. Webber, R.E., who had charge of the telegraphs with the Soudan expedition, stated that in the desert at some places the sand drifts over the poles and buries them. In such a case it is the custom to plant another pole over the top of the buried one, and raise the wire on that. In some cases as many as four poles have been raised above each other in this way. Wooden poles become in time so ravaged by the white ant that the blow of a stick will knock them over. At Assouan, General Webber found some examples of this state of things in the old Khartoum line which was used by General Gordon, until it was interrupted by the rebels. A very remarkable span of telegraph wire was effected by General Webber at Assouan across the Nile. Two

A FIRE-EXTINGUISHING BALL.—FIG. 2.

bluffs, one on each side of the river, were chosen, and tall masts erected on them, giving a height of 350 feet above an island in the middle of the stream. The telegraph wire was swung between these poles, and its lowest bend supported on poles planted on the island. The total length of this span was no less than a mile, all but seven yards. General Webber related that some of the natives of these regions have so elementary a notion of the working of the telegraph, that they believed it was only necessary for them to capture a telegraphist, cut the telegraph wire, and put one end of it to each side of his head, in order that he might speak the message



A New Electro-Magnet.

A new and handy form of electro-magnet has been invented by M. Recordon, and is illustrated in Figs. 1 to 4. It is formed of an iron tube T, with flanges having a flat edge at M, which is the pole of the magnet. To one pole is fixed a piece of iron, E, which serves to distribute the magnetism uniformly for a short distance above M. To the other pole is attached an armature A, by a hinge G, and thus the magnetic circuit is completed from pole to pole through the armature A. Fig. 3 shows an end view of the magnet; Fig. 2, a section through the coil and tube; while Fig. 4 shows the end of the coil and tube. These magnets are very strong for their size; one 6¼ inches long sustaining a pull of 110 lbs., when excited by three Leclanché cells. They are useful for making electric bells, and small electric motors.

Hints on the Care of Petroleum Lamps.

The Metropolitan Board of Works have issued the following suggestions for the care and construction of petroleum lamps, in order to avoid accidents. That part of the wick which is in the oil reservoir should be enclosed in a tube of thin sheet metal open at the bottom, or in a cylinder of fine wire gauze such as is used in miners' safety lamps, namely, twenty-eight meshes to the inch. The oil reservoir should be of metal rather than of china or glass. It should have no feeding-place or opening other than the opening into which the upper part of the lamp is screwed. Every lamp should have a proper extinguishing apparatus, and a broad and heavy base. The wicks should be soft, and not tightly plaited; they should be dried at the fire before being put into lamps. They should be only just long enough to reach the bottom of the oil reservoir, and wide enough to fill the wick-holder without having to be squeezed into it. They should be soaked with oil before being lit. The reservoir should be quite filled with oil every time before using the lamp. The lamp should be kept thoroughly clean, all oil should be carefully wiped off, and all charred wick and dirt removed before lighting. When the lamp is lit the wick should be at first turned down, and then slowly raised. Lamps having no extinguishing apparatus should be put out as follows:—The wick should be turned down until there is only a small flickering flame, and a sharp puff of breath should then be sent across the top of the chimney, but not down it. Cans or bottles used for oil should be free from water or dirt, and should be kept thoroughly closed. These suggestions apply to ordinary mineral oil lamps, such as are generally used, and not to benzoline or spirit lamps. While upon this subject we may illustrate a new self-righting hand-lamp, that is also self-extinguishing, because of a loose tube round the wick, which slides forward and puts out the flame. The lamp is filled from the side, and it is weighted in its lower part so as to make it recover its balance when disturbed. Owing to the construction of the burner, the oil cannot be spilt as in the ordinary benzoline lamp.

A Floating Dress.

The Lord Mayor of London, and a number of naval and military authorities, witnessed some experiments on the Thames recently with a new kind of dress which prevents the person wearing it from sinking in water and drowning. Persons wearing the dress flung themselves from a small boat into the river, and although unable to swim, they could not sink. The dress leaves the head clear of the surface of the water. The dress is made of a fabric into which fine threads of cork are woven with wool, silk, and so on. Without being singular in appearance, the cloth makes the wearer buoyant.

A New Fire-proof Plaster.

A new artificial stone, called asbestine, has recently come into use for the fire-proofing of buildings in the United States. It consists principally of silicate of magnesium mixed with powdered flint, caustic potash, and silicate of soda, or water-glass; and it is reduced to a putty and mixed with sand before application. A special advantage of this substance is the tenacity with which it adheres to smooth surfaces. One means of utilising the plaster is found by lining a room with thin sheet-iron, finely corrugated and protected against rust by a coat of asphaltum varnish or its equivalent, and by placing the plaster on this surface. It soon hardens, resists heating by fire, and is not cracked by the application of water while in a heated condition.

A Submarine Gun.

A gun for firing shot or torpedoes under water has been invented by Captain Ericsson, the well-known American inventor, and brought to Woolwich Arsenal.

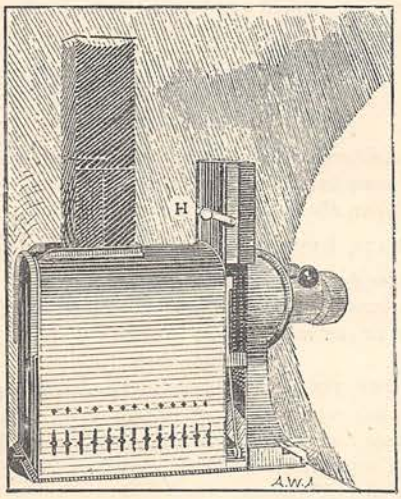
The gun is 30 feet long, and 40 tons of steel have been used in its manufacture. It is breech-loading, and the projectile measures 25 feet in length; the idea is to fix the gun 9 feet below the water-line and fire straight ahead from the cutwater. A diaphragm of india-rubber closes the muzzle and keeps out the water; but it is blown away by the discharge. It is asserted that with a charge of 20 lbs. of powder a range of 300 yards under water may be obtained. The projectile is fitted with a rudder to make it keep its course through the water. Until the gun is actually tried, we cannot expect to have a conclusive opinion of its merits from our military authorities.

A Useful Plant for Engineers.

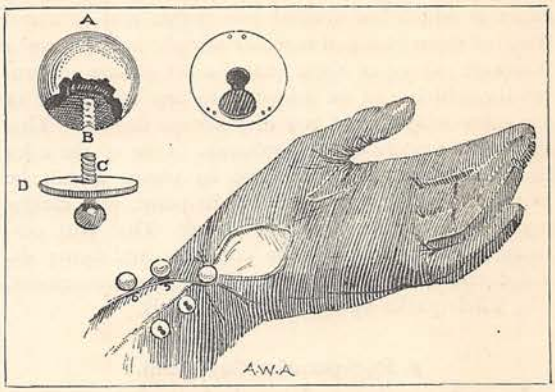
Engineers often have considerable trouble with the loose soil of newly-made embankments, so apt to slip or be washed away before they are covered with vegetation. According to a French railway engineer, the best plan is to sow the banks with the double poppy. Several months elapse before grasses and clovers develop their feeble roots, but the double poppy germinates in a few days, and in a fortnight has grown sufficiently to afford some protection to the slope, while at the end of three or four months the roots, which are ten or twelve inches in length, are found to have interlaced so as to retain the earth far more firmly than those of any grass or grain. Although the double poppy is an annual, it sows itself after the first year.

A New Magic Lantern.

A new magic lantern, termed the "Metamorphoser," is illustrated in the accompanying figure. A double vertical sliding stage is worked by a lever, so that the operator can raise it slowly, thus producing a panoramic effect; or quickly, so as to bring about dissolving



views. Thus the round white disc on the screen, which generally intervenes between two images, can be eliminated, and a succession of pictures produced. The illustration shows a side view of the lantern, with the working lever H. The lantern is likely to be useful to lecturers and others.



A New Glove and Boot Fastener.

A new glove and boot fastener is shown in the woodcut. It consists of a spherical button, A, having a hole with a screw thread, B, cut in it. Into this hole screws a stem C, having a disc D, and a small knob as part of it. A disc, having a corresponding slot, is sewn to one flap of the boot, while the knob is fixed to the other, and the knob keys into the slot of the disc, thus holding the flaps together, as shown.

Pocket Ship Signals.

A new method of supplementing the ordinary ship side lights in avoiding collisions has been suggested by Mr. Donald Grant. It consists in providing the officer on duty with a couple of signals small enough to be carried in the breast-pocket of his coat. One is coloured red outside, and when fired gives a red flare; the other is green outside, and gives a green light. The officer fires one of these lights according to the signal intended. A slight tap serves to light it, and after the light has burnt thirty seconds it explodes a small maroon, which gives a report that can be heard a mile off. After this the light continues to burn for another thirty seconds. The starboard tack signal is given in the same way.

An Ammonia Locomotive.

A new fireless locomotive has been tried in New Orleans for driving street-cars. The motive-power is obtained by evaporating ammonia after its liquefaction. The expansion of the liquefied ammonia causes a cooling of the cylinder, but this is counteracted by an ingenious provision of the inventor, which is not yet made public. The ammonia after being liquefied under pressure is fed into the apparatus, and the expanding gas, after operating the piston which drives the wheels, is absorbed into a weak aqueous solution of ammonia, from which it is afterwards separated and again condensed into the liquid form, thus serving for further use in propelling the car. The inventor is said to have declared that the trials have more than realised his estimate.

A Pocket Drawing-Square.

A portable apparatus which can be used to make engineering and other drawings has been invented by a lady. It consists of four nickel-plated steel rules, three of which are divided into inches and quarters. Two of them clamped together at right angles form a T-square; three of them make a set square or protractor, which can be adjusted to any angle, one of the rules being slotted and divided into degrees. This is a useful feature of the appliance. One of the rules has also a centre at one end by which it can be pivoted to the paper by a needle-point, and carries a sliding holder for a pen or pencil. This part performs the office of a beam compass, and being divided, can be set to any radius without measurement. The whole packs up into very small bulk.

A Recuperative Gas-Lamp.

In a recuperative gas-lamp the heat of the products of combustion is utilised for heating the fresh gas and air flowing to support the flame. In the form illustrated the heated products of combustion and the air are made to pass horizontally through passages in a "recuperator" or stove, which warms them up. Fig. 1 is an elevation of the lamp, the chimney of which can be connected to the main chimney of a house, so as to remove the products of combustion, and the lamp also acts as a ventilator by a simple modification. In Fig. 2, one half is a section through the air passages, the other half a section through the gas passages. The gas supply pipe, *a*, descends through the chimney *b*, and at its lower end is formed into a chamber *c*, which is practically the burner, for the perforated ring of steatite, *d*, is inserted in the mouth of this chamber. The recuperative arrangement consists of two discs *e* and *f*, bolted together, as shown, each having partitions between them, to form passages for the products of combustion and the air. For large lamps the recuperator is formed of fire-clay or porcelain, but for small lamps it is made of white cast-iron. Near the outer edge of the upper disc, there are holes formed to allow of the escape of the products of combustion to the chimney *b*, through tubes *g*. In order to obtain a large heating surface, specially wrought wire gauze is placed in the passages of the recuperator, and also within the inverted Argand burner *c*. The air enters the passage *h*, by the opening *i*, in the lower disc, and passes into the centre of the burner *c*, descending to the steatite ring, both on the inside and by the annular passage *j*, on the outside, the flow of the gas being diverted by the spherical pendant *k*. When the gas is first lighted, a portion of the products of combustion pass through small holes *l*, and thus reach the chimney *b*, by the dome and tube *m*. The chimney in a little time becomes heated, and the products of combustion are then drawn through the recuperator gas passages *n*, and tubes *g*. It is stated that by this lamp more than double the illuminating effect is obtained, than from ordinary naked gas-burners, with the same consumption of gas.

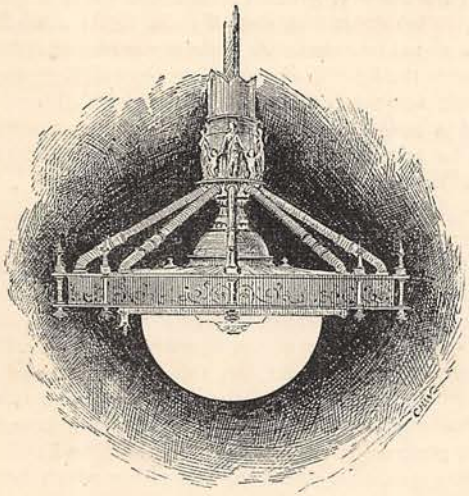


FIG. 1.

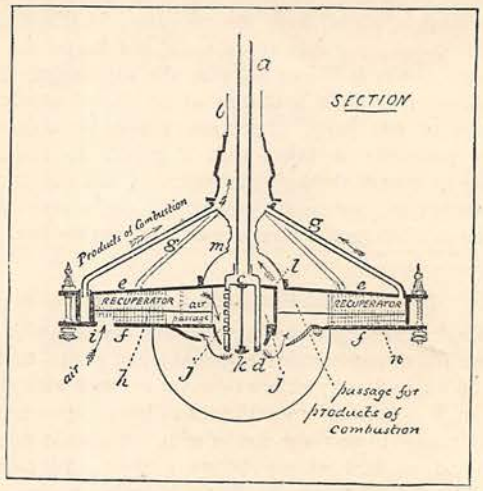


FIG. 2.

PRIZE COMPETITIONS.

FIFTY-POUND PRIZE STORY.

The Editor has the pleasure to announce that, after careful consideration of the fifty MSS. entered for this Competition, the Prize has been awarded to

MISS KATE EYRE, 215, Peckham Rye, London, S.E.

Further particulars, including the names of Competitors selected for Special and Honourable Mention, will be given in our next issue.

HANDWRITING COMPETITIONS.—*Intending Competitors are reminded that March 31st, 1886, is the latest date for receiving MSS. for these. The rules of the Competitions will be found in the January Part of this Magazine.*

POEM COMPETITION.—*The Editor hopes to be able to publish the award in this Competition in an early issue; but at the time of going to press the adjudication was not complete.*