made of it lose their good appearance quickly, and curl up at the edges. The worsted trade, however, is looking up—which reminds me, by-the-by, that Leeds is setting a good example to London. In connection with the Ladies' Council of Education, a class for cutting-out and dressmaking, specially intended for the benefit of governesses and ladies of limited means, has been started, as an opening is considered to exist for ladies as daily dressmakers, whose employment would be to attend families, and assist in renovating and re-modelling dresses, &c. There certainly is such a want, and it is most desirable that a practical knowledge of dressmaking should be diffused among the women of the lower and middle classes. Lady Bountifuls might be doing much good by starting such lessons in country villages.

For home dinner wear, thick white twilled cottons (trimmed with a colour), pale Pompadour cashmeres, twilled llamas, and flannels in greys, pale blues, and heliotrope are much worn. Many, however, are made costly by their rich trimmings. Feather ruches, handsome gimps, and sealskin fringe (which is really chenille), all these are used, costly though they be.

Tigers' claws, which have been received with favour as trimmings for hats, now appear on caps for evening wear, but they are not so repulsive as the vipers made of striped plush with metallic eyes, which Parisians are wearing for necklaces.

As at this season of the year evening dresses are in request, among our illustrations will be found a few suitable for quiet réunions, small dinners, &c. Let us turn to the group of three, consisting of a matron and two younger ladies. One of the latter (who is teaching her pet dog to beg) wears a dress of soft Surah silk and plaid satin. The Surah is dahlia-colour, and the plaid is crimson and dahlia. The under-skirt is kilted and edged with a double crimson balayeuse; the tunic, opening with a point in front, is also edged with the same; while the tablier, the bretelles, and the bands above the elbow are of plaid satin. The result is a seasonable yet smart-looking toilette, the crimson giving a touch of brightness to the *ensemble* very desirable at this time of year.

The seated figure wears a dress of soft creamy nun's veiling or barège; skirt made with flounces and bouillonnés, a gathered bodice, and much creamy lace trimming; gold bracelets, and gold-embroidered kid shoes. The looker-on is a youthful married woman in moonlight satin and plush, moonlight being the poetical name given to a pale shimmering shade of green. The front of the skirt is satin gathered in clusters; the bodice and train are plush; but, remember, plush should be worn with caution, as it thickens the figure, therefore only slightly-built women should adopt it for bodices or jackets, fashionable though it be.

There are two dresses sketched in outline, one for evening, the other for afternoon wear. The former is a stylish combination of lace, satin, velvet, and broché, showing several shades of heliotrope and violet; velvet is used for the bodice, broché satin for tablier and train. The afternoon costume is myrtle-green velvet, with beaded passementerie, the beads showing many shades of green and heliotrope.

Two useful walking costumes are also illustrated. One of them is entirely of seal-cloth, a handsome material, all but undistinguishable from real seal-fur, perhaps more perishable, but infinitely lighter in weight; it has also the advantage of being less costly. The cloak worn by the second figure is black brocade trimmed with dark fur, the hood also being fur-lined. Our initial letter gives a new fichu of lace and silky muslin, with a Christmas rose at the throat, for the partiality evinced for the wearing of natural flowers is as great as during the summer.

THE GATHERER.

Hot Ice.

In the *Midsummer Night's Dream*, Theseus, Duke of Athens, expresses his astonishment at Bottom's bill of the play, with its "very tragical mirth," by exclaiming, "Merry and tragical! Tedious and brief! That is hot ice, and wondrous strange snow. How shall we find the concord of this discord?" Now, Shakespeare notwithstanding, and paradoxical as it may appear, modern science has found the concord of hot ice. Recent experiments of Mr. Thomas Carnelly, of Sheffield, have led him to the conclusion that in order to convert a solid into a liquid it must be subjected to at least a certain pressure. Unless it experiences this pressure, or a greater one, no amount of heat will melt the solid, but it will simply sublime away in vapour without melting. Arrived at this conclusion, it followed that solid ice could be obtained at temperatures far above the ordinary melting point by simply reducing the atmospheric pressure around it below the tension of aqueous vapour at the freezing point of water (4·6 millimètres of mercury); and Mr. Carnelly has succeeded in obtaining blocks of ice at temperatures so high that it was impossible to touch them without burning one's fingers! And on one occasion he actually froze a small quantity of water in a vessel so hot as to be intolerable to the touch.

New Electric Lamps.

An excellent electric lamp for domestic lighting has lately been brought to our notice. It is similar to Mr. Edison's, but forestalls the latter in date, and excels it in power and durability. As shown in Fig. 1, it consists of a glass bulb, A, containing a round loop, B, of specially prepared carbon, the two ends of which are electro-plated and soldered to two platinum wires, C D, passing through the lower part of the envelope. The carbon loops are as fine as a hair, and as elastic as a watch-spring or a steel wire, and are made by carefully heating them by degrees *in vacuo*, so as to shrink them and render them of a more dense and compact structure. The result is that they neither waste away when the electric current is sent through them, nor sublime into vapour and deposit on the globe, as Mr. Edison's carbon loops did. In order to prevent the outer air leaking into the bulb, the platinum wires, C D, are enclosed in glass tubes and sealed into the bulb, which is exhausted of air by a Sprengel air-pump, and the lamp is ready for use. The current passes up one platinum wire, traverses the carbon loop, which it heats to a white glow, then passes down the other wire.

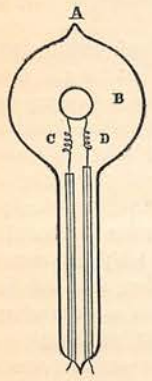


FIG. 1.

At a recent lecture in Newcastle the hall was beautifully lighted by twenty of these lamps, and the current feeding them was generated by a gas-engine consuming 120 cubic feet of gas per hour, whereas to light the room by gas the usual consumption was 200 cubic feet per hour. With a somewhat superior light the cost was, therefore, in favour of these (Mr. Swan's) lamps.

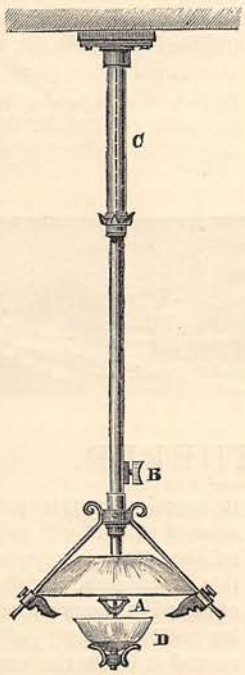


FIG. 2.

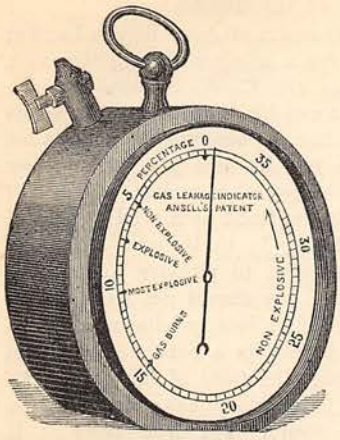
Another lamp, suitable for indoors, is that of Herr Werdermann, as modified by Mr. Joel. A pendant form of it is shown in Fig. 2, and consists of a brass tube, C, containing a slender rod of carbon, which rests with its point, A, on a round copper knob fixed within the lower glass shade, D. The current is put off and on in the same way as gas, by turning the cock, B. In its passage from the vertical carbon rod to the metal knob the electricity heats the fine point of the rod to a dazzling whiteness, and as the rod is thereby slowly burned away it gradually descends in the tube to feed the electric fire. One of these lamps will effectually light a room 16 feet long by 12 feet wide, and the light is mellow and steady.

The Ventilation of Ships.

A few weeks ago a party of visitors assembled on board a yacht in the Victoria Docks, to inspect a new system of ventilation invented by Captain F. L. Norton, the American owner of the vessel, the *Ocean Pearl*. This system is already in use in the United States; it is self-acting, and advantage is taken of the pitching motion of the vessel to get rid of the foul air. The ventilating apparatus consists of two vertical tubes placed one on either side of the stern-post, connected into one tube at the top, but subsequently branching into two again, inside the vessel horizontally, which are the exhaust and discharge tubes respectively. The former is carried forward with a number of lateral branches to the cabins; the latter, the discharge, is a short tube and opens to the air. A check-valve is fitted into both tubes. The mode of working is as follows:—Supposing the ship to be raised at the stern by a wave, the water contained in the vertical tubes falls, and thus sucks the foul air in the branch tubes, &c., through the horizontal exhaust tube. Then the fall of the stern raises the water and discharges the foul air through the short length of tube, the discharge—the return being counteracted by the check-valve, so no air can enter the vertical tubes except from within. The fresh air, of course, enters from the deck; every forward roll or plunge of the ship sucks the vitiated air through the tubes, and the following downward after-dip drags the foul air out. In a calm, however, a mechanical arrangement is worked by hand, and is equally serviceable; and the discharged foul air is also used for sounding a fog-horn, when necessary. There is no reason, so far as we can see, why this very ingenious arrangement cannot be equally adapted for mines, or be otherwise made useful.

A New Fire-damp Indicator.

The disastrous explosions in coal-mines, that so frequently are accompanied with an awful loss of life, have not unnaturally excited the attention of inventors anxious to provide some means of lessening, if not of preventing, the dire results of these calamities. Many instruments have been devised with the object of detecting gas-leakages and escapes of sewer-gas, and of indicating the presence of fire-damp and choke-damp. The Ansell Gas-leakage Indicator, among the latest of these inventions, is a small portable apparatus for ascertaining the amount of gas in a mixture of gas and air, in order to determine whether or not it is of explosive character. This instrument is about the size of a carriage clock, and is furnished with a three-inch dial graduated at every half per cent. up to 35 per cent. At 5 per cent. the dial is marked "non-explosive," at 7½ per cent. "explosive," at 10 per cent.



"most explosive," at 15 per cent. "gas burns;" while beyond this point a "non-explosive" mixture is indicated by the hand of the appliance. The hand is worked by a kind of aneroid barometer, which is acted upon through a slab of terra-cotta at the back of the mechanism. This porous substance being exposed to the mixture which it is desired to test, in one or two moments the hand on the dial will indicate the percentage of gas present in the compound. A tap at the top of the apparatus allows the contained gas to escape, and the hand to return to zero. The theory of the instrument depends upon the law of the diffusion of gases. From what has been said it is obvious that the Ansell Gas-leakage Indicator can be used in dwelling-houses as well as in mines and elsewhere.

New Fog-Horns.

An ingenious and powerful fog-horn blown by compressed air has been invented by Messrs. Sautier, Lemonnier, and Co., the eminent lighthouse engineers of Paris. The compressed air is furnished by an air-pump or compressor, which is kept constantly working while the fog lasts, and the sound is produced by a stream of the dense air impinging on a thin tongue of steel acting as a musical reed. The apparatus is arranged to give a succession of blasts at certain intervals while the fog lasts, and this is effected quite automatically. The same engineers have also constructed a small steam-siren for use on board ship and on locomotives instead of the ordinary steam-whistle. An interesting modification of the fog-horn was recently exhibited at the engineering exhibition in the Agricultural Hall at Islington by Captain Barker. It is designed for use at sea to enable ships to telegraph their course to one another during a fog. The horn stands on a metal table marked round with the various points of the compass and the corresponding sound-signals. By simply turning a handle these signals are sounded by the blast.

Photographing Nebulæ.

Photographs of the sun, moon, and stars have long been taken, but owing to the extreme feebleness of their light the nebulæ were never pictured in this way until Dr. Henry Draper, the famous discoverer of oxygen in the sun, recently succeeded in taking a portrait of the bright nebulæ in Orion's belt. He was enabled to do this by the new "dry" plates, which are extremely sensitive to light, and can because of their dryness be exposed to the light for a very much longer time than "wet" plates. As yet only the brighter nebulæ can be photographed, but when the method is refined the fainter ones will probably be imaged also. The large number of these tracts of glowing gas which can be counted in the midnight sky, and their varying characters, will open up a vast field for the observations of astronomers all over the world, and a comparison of their results will tend to throw fresh light upon the nature of these embryo worlds.

Paraffin as a Wood-Preserver.

A German chemist, Dr. Schal, has established the useful fact that wood impregnated with paraffin is protected against rot, especially when employed in alizarine manufactures, where it is exposed to the decaying action of damp acids and alkaline lyes. Wooden vessels, which unprepared become quite rotten in two months, will last for two years if treated with paraffin. The wood is cured by drying it in warm air for three weeks, then steeping it in melted paraffin, to which is added some petroleum, ether, or sulphuret of carbon. In preparing this bath, however, great care has to be exercised owing to the inflammability of its ingredients. To keep the paraffin in the pores of the wood the latter should be coated with oil varnish or soluble glass, washed after drying with hydrochloric acid, to form silicic acid to clog the pores. Paraffin melted with equal parts of linseed or rapeseed oil is also, according to Dr. Schal, useful for coating those iron vessels which in chemical manufactures are liable to rust.

Automatic Washing Machine.

A new mechanical washer for cleansing clothes without resorting to destructive friction is illustrated in the annexed woodcuts. The method of use is as follows:—The clothes are soaked over-night, then wrung out, and the soiled parts and seams are thoroughly soaped. The washer—of which Fig. 1 is a general view, and Fig. 2 a view of the bottom underneath—is put into an empty copper with a quantity of soda, depending on the number of clothes to be cleaned. The clothes are then placed in the empty copper, after being twisted slightly to exclude the air, and packed

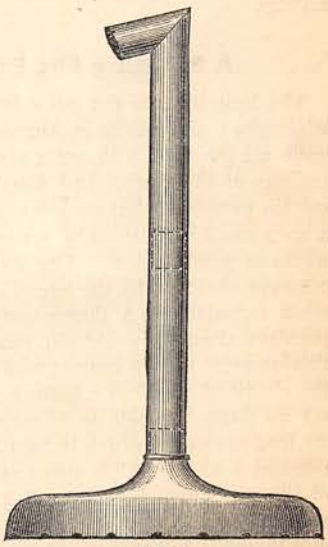


FIG. 1.

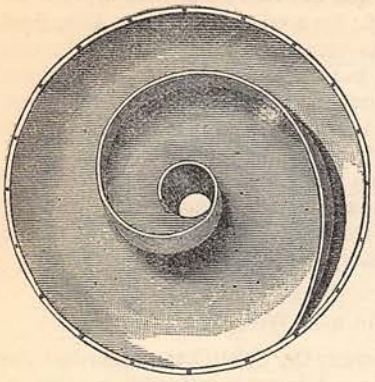


FIG. 2.

tightly to within two inches of the top of the upright tube or funnel of the washer. Soap is sliced amongst the clothes, and the copper is filled up with clean water till within two inches of the opening of the funnel. A good fire is then kindled, and when boiling sets in a current of steaming water will flow up the funnel and circulate through the clothes, thus cleansing them thoroughly in a gentle manner. The water, of course, enters by the holes round the base of the washer, and escapes by the horizontal mouthpiece at the top. From a quarter to half an hour is all that is necessary to scour the dirtiest clothes, which are afterwards to be rinsed in cold water, then blued, dried, and finished in the usual way.

Artificial Marble.

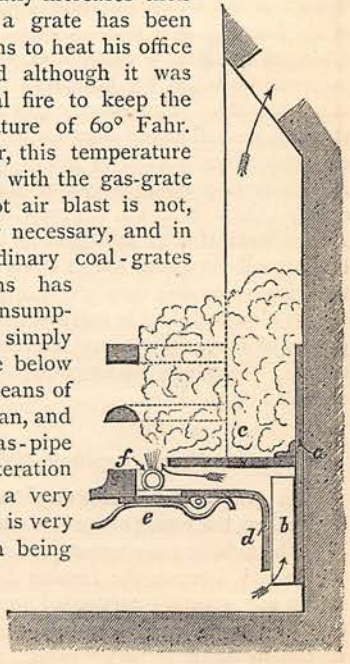
The manufacture of "bonsilate" or artificial marble has become quite an industry in Newark, New Jersey. It is said to be made from green ground bones as a basis, cemented in some way which is not made public. The material can be moulded in a plastic state into bars, sheets, or slabs, and turned, polished, or sawed into the desired shape. By the addition of colouring matters it can not only be made to imitate marbles, but coral, jet, and malachite. It is chiefly used for billiard balls, canes, dominoes, buttons, and such-like articles.

A Self-acting Fire Extinguisher.

The best time to put out a fire is, of course, at its beginning; and hence in America many of the large mills are provided with water-pipes running along the ceilings of the rooms, and fitted with outlet roses at certain points, so that an attendant by merely pulling a lever can let a stream of water pour down upon the works or goods below. The services of an attendant are even obviated by the use of an automatic arrangement actuated by a thermometer. When the temperature rises to a certain point the mercury of a thermometer makes contact with a wire and completes the circuit of an electric battery. The current thereby set up flows through an electro-magnet and attracts an iron armature, which in turn actuates a detent and releases a wheel, which opens or closes the stop-valve of the water-pipe by means of a lever, and allows the water to escape from the rose. The device is simple and therefore unlikely to get out of order.

A Cure for Smoke.

The increasing prevalence of dense fogs in London has recently called forth a number of suggestions for checking the evil, and Dr. C. W. Siemens has described a new gas-grate of his invention which seems to answer well in practice. These grates ought, in his opinion, to have no jets for the gas except those immediately behind the lowest front bar; the grid of bottom bars should be replaced by a solid plate, and gas-coke or anthracite ought to be used instead of incombustible pumice-stone to produce a radiating surface. Moreover, the gas should not be mixed in the pipe with air as is often done, producing a bluish flame, but should be burned in a pure state between the pieces of coke near the front of the grate. To carry out these ideas Dr. Siemens has constructed the grate shown in the figure. The iron plate, *c*, is riveted to a stout copper plate, *a*, facing the back of the fire-grate, and extending 5 inches above and below the point of junction. The plate, *c*, stops short about 1 inch behind the lowest bar of the grate in order to make room for a half-inch gas-pipe, *f*, which is perforated with a zig-zag line of holes for the escape of gas along its upper surface. This pipe rests upon a lower plate, *d*, which is bent downwards towards the back, so as to provide a passage 1 inch wide between the two plates. A trap-door, *e*, upheld by a spring is provided for the discharge of ashes falling into the channel. The vertical part of the passage is traversed by a strip of sheet copper, *b*, about 4 inches deep, bent in and out like a lady's frill, and riveted to the copper back-piece—copper being an excellent conductor of heat—and this piece, being at least three-fourths of an inch thick, carries the heat from the back of the grate to the frill-piece. An air-current is thereby set up which, traversing the horizontal flue, impinges on the gas-flames, and greatly increases their brilliancy. Such a grate has been used by Dr. Siemens to heat his office for some time, and although it was difficult with a coal fire to keep the room at a temperature of 60° Fahr. during cold weather, this temperature is easily maintained with the gas-grate described. The hot air blast is not, however, absolutely necessary, and in several of the ordinary coal-grates which Dr. Siemens has altered for the consumption of gas, he has simply closed up the space below the lowest bar by means of a close-fitting ash-pan, and introduced the gas-pipe behind. This alteration can be effected at a very trifling expense, and is very cleanly, the ash-pan being withdrawn only at intervals of several days for emptying; but the appearance



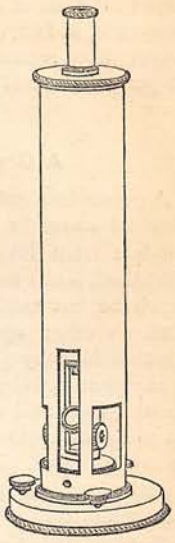
of the fire is in this case far less brilliant than when the hot air draught is added. As regards the relative costs of the coal and gas fires, Dr. Siemens finds that during nine hours' use he burns sixty-two cubic feet of gas, and 22 lbs. of coke, which at the average London prices amounts to 0·524*d.* per hour. As a coal-grate it formerly burned two and a half large scuttles a day, reckoned at 19 lbs. each, which, at 23*s.* a ton, makes a rate of 0·633*d.* per hour.

A Moving Railway Station.

From the locomotive engine we are apparently getting to the "locomotive station," as a very curious arrangement for obviating the frequent stoppages of trains may be called. This ingenious invention of Mr. Hanrez consists of a "waiting-carriage" comprising an engine with special gear. The carriage is placed on the siding, and in it the intending passengers take their places and their luggage, instead of waiting on the platform. When the train arrives it does not stop, but the waiting-carriage is picked up. This feat is accomplished as follows:—The train is provided with a hook on its last carriage, which catches a ring supported on a post and connected with a cable, which is wound upon a drum in the waiting-carriage. When the hook catches upon the ring, the cable commences to unwind from the drum. This movement compresses a system of springs, and the carriage is pulled gradually away, the speed by degrees increasing, while all jerking is obviated by the springs aforesaid. The cable which has been let out is now re-wound by the engine attached to (being part of) the carriage, and the carriage is then coupled to the moving train. When the carriages—made on the American principle—are united the passengers are transferred to the "main" train with their luggage, the waiting-carriage is disconnected, and its engine takes it back to the station again whence it started. The plan is ingenious, but we doubt whether upon our crowded railways it will be found altogether convenient.

The Chronodeik.

Watchmakers at home, and surveyors or explorers in new countries, often get the true time by equal altitudes of the sun taken by the help of a sextant and an artificial horizon, or a watchmaker's transit instrument; but a very simple and portable instrument for the purpose, termed the "Chronodeik," has been invented by Mr. S. C. Chandler, junr., of Boston. It consists essentially of a swinging bar pivoted at its upper end, and free to take up a truly vertical position. This bar carries a small telescope which it also keeps vertical, the object-glass being below and the eye-lens above. A small mirror is also attached to the bar beneath the object-glass, and it can be clamped in a definite position by a milled-headed screw. The mirror and clamp are shown in the accompanying woodcut, which represents a general view of the chronodeik. It is fitted with levelling-screws at the bottom, and a dark glass is provided with the eye-lens. In using the instrument to find the time, the mirror is adjusted till it reflects an image of the sun straight up the tube of the telescope, so that the eye looking down the telescope sees the solar disc bisected by a horizontal hair placed in the axis of the telescope. Of course when, without moving the instrument meanwhile, the image of the sun is in this position before and after noon, the true time of solar transit across the meridian, or 12 o'clock, can be observed. The instrument is only 9 inches long by 2 inches in diameter, and it gives the time-piece error within a second.



An Electric Hammer.

Last winter Dr. C. W. Siemens exhibited an electric furnace in which cold steel was rapidly fused by the heat of the voltaic arc. This contrivance has been paralleled by his brother, Dr. Werner Siemens, of Berlin, who has produced a hammer driven by electricity. This implement consists of three hollow coils of insulated wire, having a movable core or rod of soft iron, free to move up and down under the axial attraction of the coils when a current of electricity circulates in them. The central coil is traversed by a constant current which magnetises the rod or hammer, and the two extreme coils are traversed by alternating currents from a dynamo-electric generator in such a manner that they alternately attract and repel the magnetic rod up and down, so as to make it beat like a hammer. The range of the blow is limited on one side by a spiral spring placed within an elastic cushion. Of course a very great rapidity of action can be given to the hammer, and the arrangement is also applicable to the working of a rock-drill.

Ericsson's Torpedo.

Accounts come to us from America of a terrible engine of destruction against which no existing iron-clad can stand. Captain John Ericsson, the famous engineer, has, it appears, designed a new torpedo or submarine projectile, which is fired from a gun on board the torpedo boat and enters the water at the extraordinary speed of 160 miles an hour, but of course this rate cannot be kept up long in a resisting medium like water. It is shaped like a cigar or rifle cartridge, and the head is charged with 250 lbs. of dynamite. When it strikes the ship against which it is launched the dynamite of course explodes, and scatters devastation far and wide. The terrible power of the new weapon is mainly due to the substitution by the inventor of gunpowder for propelling the

torpedo instead of clockwork or compressed air. The weapon is, in fact, a subaqueous shell and mortar, and judging from recent trials at Sandy Hook, New York, its powers of naval destruction are enormous.

A Geyser in a Coffee-cup.

A geyser in a coffee-cup savours a little of the metaphorical storm in a tea-cup; nevertheless a correspondent from New Zealand, Mr. J. L. Sinclair, of Auckland, sends us an account of a pretty experiment which he has made illustrative of geyser action, and with no other apparatus than a coffee-cup about 3 inches high by 3¾ inches wide, and having a fissure in the glaze running horizontally round the interior for about ¼ inch and situated about 2½ inches below the lip of the cup. On filling this cup with boiling water an eruption took place, and drops of water were projected several inches into the air. Until the fissure was completely covered no disturbance of the water took place, but when the cup was full the pressure of steam in the crack doubtless caused the ebullition.

Fog Spectres.

During one of the last October fogs a resident in Putney observed a curious imitation of the famous spectre of the Brocken in his own back garden. Having occasion to go there about half-past ten one night during a thick white fog, through which, however, a star could here and there be seen, he found a gigantic shadow of himself projected on the fog by the lighted candle which he carried in his hand. The shadow was about 12 feet high, and very oddly distorted like the Brocken spectre. The great Faraday was wont to amuse himself by producing the same phenomenon in his own home by means of dense vapours.

Prize Double Acrostics.

III.

Two fields of war, and blood, and strife,
Where men sought for each other's life,
Groaned forth with many a dying sound
From England's corpse-encumbered ground:
The one where foreign spear and mail
Bore back the storm of arrow-hail;
The other where but English fought,
And brother life of brother sought.
The following words will give a clue
By which they may be known to you:—
A spot beloved of every race,
A word my pen doth often trace;
A strain of music set for me,
A plant whose strength surpriseth thee;
A measure that with ease is spanned,
A lake in Afric's sunny land;
A sea-bird on the wavelet's tip,
A part conspicuous of a ship.
Their foremost letters and their last
Will show where blew each battle-blast.

IV.

I slept; and, as I slept, I dreamed;
And lo, before my sight there seemed
A city beautiful and fair,
Methought it was beyond compare;
And sure it was the noblest planned
Of all within that foreign land!
And then it disappeared again,
And in its place a part of Spain
Was viewed, and then a town of Kent
Before again the dream was spent.
And then there came before my view
The memory of a debt long due,
Which had been paid in such a way
That left the money still to pay.
I was pursued; I took my flight
To where there stood a battled height.
Within the walls a convent stood,
With many a form in monkish hood,
And many a warrior bold and brave
In accents stern the welcome gave.
But ere I scarce the place could know
It vanished to the vale below;
And there the city, church, and all,
Rose with a spire so wondrous tall,
I scarce could think the former scene
Was that where once the place had been!
I slept no more; but to my mind
The vision still was left behind.
But in such vague, confused array,
Each place seemed still to point the way
Where first and last I was, it seemed,
When I lay down, and slept, and dreamed.

The first, the foremost letters tell;
The last, the finals show as well.

(*To be concluded.*)

Song Competition Prize Announcement.

One hundred and eighty-four compositions have been sent to us in competition for the Prize of Five Pounds offered in April last, for the best musical setting of Wordsworth's "Lucy." The examination of so large a number of settings occupied no little time, but our greatest difficulty consisted in deciding between the three highest. These three had each a recommendation peculiar to itself. On the whole, we feel justified in awarding the Prize to MR. HENRY HOUSELEY, 18, *Newstead Grove, Nottingham. We cannot, however, speak too highly of the musicianly character of* MR. EATON FANING'S *setting; or of the poetic appreciation of the words evinced by* MISS KATE FUSSELLE, *whose competition, if it had received more finish in technical detail, would certainly have obtained the prize on the score of suitability. The Editor would also very highly commend the settings, all fairly equal in point of merit, of the following composers:—* MESSRS. MYLES BIRKET FOSTER (*London*), WALTER BATTISON HAYNES (*Leipsic*), *and* G. HERMANN LOTT (*London*).

The Editor begs to remind his readers that, in accordance with the published rules, he does not undertake to return the MSS. of competitors.

It is hoped that the successful song will be published in the next part of the Magazine.

Art-Needlework Competition.

The last day for receiving work under this section is February 1st, 1881.