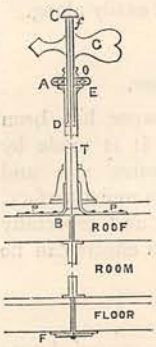
THE GATHERER.

An Indicating Weather-Cock.

M. Emile Richard, inspector of the water service at Versailles, has designed the weather-cock which we illustrate, for the purpose of enabling a person indoors either by night or in stormy weather to see how the wind blows. It consists of a fixed stem, A B, composed of an iron tube, T, standing on a base-plate, P P, which is fastened to the roof of the building. The upper part, C D, is movable round its axis with the wind, and carries a vane, G. This part is formed of a tube of zinc, *f*, turning within the outer tube, T, which serves as a socket for it. It rests by means of a bronze disc, O, on little glass castors, which run upon the bronze platform, E. A mushroom head, C, crowns the whole, and sustains a stout brass wire, which depends from it through both tubes, and through the roof to the interior of the observatory, or house, where a needle is fixed across it at F. This needle, therefore, by the torsion of the wire is caused to follow all the movements of the vane, and tell the observer how the wind blows.



Triptolith.

Triptolith is the name given by its inventor to a new substitute for lime, cement, and plaster. It is composed of sulphate of lime, coke, and oxide of iron. It is lighter than plaster, and requires less water to form a workable mortar than ordinary lime. It sets very rapidly, but the time of setting can be lengthened from ten to sixty hours, by the simple addition of slaked lime in certain proportions. After setting it has the strength of ordinary bricks ; but it can stand a pulling strain with much greater strength than mortar. For facing and plastering it is said to be well adapted, especially as it adheres firmly to brick and stone surfaces and becomes harder than plaster of Paris. Moreover, oil and colours adhere to it very well.

Reducing Gold and Silver Ores by Electricity.

An economical process for extracting the precious metals from their ores by means of electricity has lately been discovered. It consists in forming a bath of some salt of the metal in the ore, and using for the plate, by which the electric current enters the bath, slabs of the sulphur ores of that metal. These slabs or "anodes" are decomposed by the current, and sulphur falls to the bottom of the bath, whilst the pure metal, say gold, is deposited on the "cathode" or plate by which the current leaves the bath. The cathode may, of course, be a plate of the metal to be reduced. The deposited metal is in the first place reduced from the bath, but that in turn supplies its deficiency by helping itself to the metal in the sulphur ore in decomposing it. In operating on sulphides and sulphurets containing several metals, it is necessary afterwards to separate these metals from each other, but this is also done by the aid of a second or a third electrolytic process of the same kind.

Uses of the Sunflower.

It may not be generally known that the sunflower, which has recently claimed such a prominent place for purposes of decoration, has considerable commercial value. Its nut-like seeds are not only extremely valuable as food for poultry, but they also afford an excellent oil, especially useful for lubricating machinery. The residue of the seeds, after the oil has been expressed, makes a cake said to be superior to linseed as food for cattle. The stalks furnish a good textile fibre, largely used by the Chinese, and the blossoms yield a lasting and brilliant yellow dye.

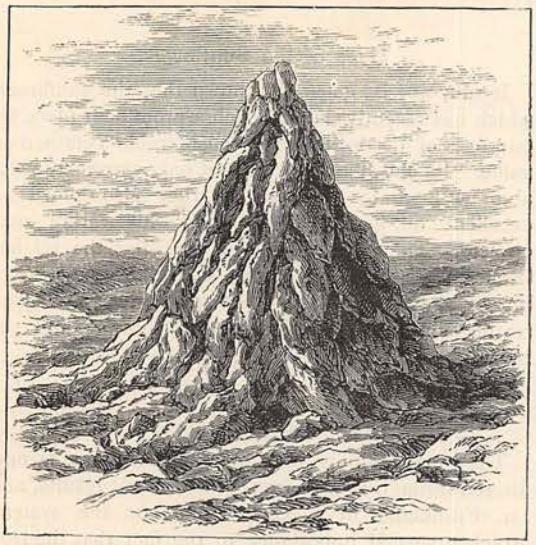
Filtering through Spongy Iron.

The water supply of a part of Antwerp is now filtered through spongy iron with the best results, and Dr. Frankland, in a recent report on the system, attaches special importance to the fact that the iron is "absolutely fatal to bacteria and their germs." He further considers it would be an invaluable boon to the metropolis if all the water from the Thames and Lea were subjected to the Antwerp treatment. This consists in letting the water, which comes from the river Nethe, settle for twelve or twenty-four hours in reservoirs, and then pumping it on to spongy iron filters, from which it flows by gravity to sand filters below. The iron filter consists of a concrete bed, on which are laid two loose layers of brick, and then a layer 3 feet thick of spongy iron mixed with three parts of gravel $\frac{1}{8}$ inch in diameter. Over this mixture is laid 3 inches of gravel, and over that two feet of sand, thus making a total thickness of 5 feet 3 inches. The sand filters also consist of a concrete bed with two layers of brick, while on the bricks is laid 12 inches of $\frac{1}{8}$-inch gravel, then 3 inches of fine gravel, and $2\frac{1}{2}$ feet of sand, thus making a filter 3 feet 9 inches in depth.

A Novel Clock.

An American watch company has constructed a very ingenious clock for the United States Signal Service. The brass case is made air-tight, and can be partially exhausted of air by a pump. The atmosphere inside is thus kept at a uniform pressure indicated by a barometer. The clock is kept going by a main-spring seven feet long, making eighteen turns round the barrel. It is wound electrically, as it goes by means of a battery and electro-magnets.

The electric circuit is opened and closed every second by a seconds pendulum vibrating within the case. The electro-magnets thus act every second, and wind up the spring a little more. Thus the spring is always kept half uncoiled, and the clock goes on perpetually unless some accident occurs to the electric circuit. This is indicated at once by a special hand on the dial, but the clock will continue to go for four days longer of itself, thus giving time for the electric circuit to be put right.



A Stack of Lava.

The engraving represents a curious conical heap of lava, sometimes to be seen on the surface of the lava-floods which pour out of the crater of Mauna-Loa in the island of Hawaii. They attain the height of thirty or forty feet, and are caused by outbursts of gas from the molten lava, which carry with them jets of the fluid. These fall around, and harden into a kind of chimney-stack for the escaping gases.

A Luminous Water-Gauge.

A device for showing the water-level in boilers has been invented by Herr Schlag, of Berlin. It consists of a half-luminous float, which illuminates the water-bubbles so that they are visible in the dark. The float is a small glass capsule, kept vertical by grains of shot at the lower end. It is filled with a mixture of Balmain's luminous paint and phosphate of alkali salt, which becomes luminous at temperatures of more than 50° Fahrenheit.

Steel Casks.

Steel casks and barrels are now made in Wolverhampton. A sheet of steel is taken to form the body and its two edges are brazed together in a seamless fashion. The head is riveted to the body, and the bottom is shrunk on hot. The rims are thick enough to give a good purchase to cranes and hoisting tackle for loading purposes. The bush for the tap does not project beyond the rim, so that it is not liable to be knocked off. The casks are more durable than wooden ones, and lighter, an eighteen-gallon one weighing ten pounds less. This is, of course, a consideration in transporting them. The shape of the steel cask is quite the same as that of wooden ones, the bulge allowing of their being rolled easily along.

A New Ornamental Paper.

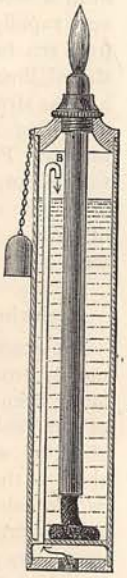
In Belgium a new kind of satin paper has been brought out for decorative purposes. It is made by covering common paper with adhesive size and sprinkling dyed asbestos powder on its moist surface. Asbestos readily takes up all colours, and especially those of aniline, so that some very rich effects can be produced.

A Monster Flagstone.

Probably the biggest flagstone ever quarried was recently laid in front of the residence of Mr. R. L. Stuart, New York. It is of "river bluestone," and measures 26 feet 6 inches by 15 feet 6 inches in superficies, and is 9 inches thick. The total weight is 30 tons. If raised on edge it would make one side of a cottage, and is quite smooth in surface. It was quarried in Sullivan County, and after being brought down the Hudson on a barge, was lifted by "screw-jacks" high enough for a waggon to back under it, then drawn to its destination by eighteen powerful horses.

A Benzine Candle.

The homely candle has at length found a rival in the benzine oil device which we illustrate below. Hitherto colza and petroleum oils have been burnt in lamps with glass shades, but these are to a certain extent inconvenient, as they cannot be held in a slanting position. Benzine is one of the more volatile hydro-carbons distilled from crude petroleum, and as it burns with a clear and smokeless flame, it can be used without a funnel. But being volatile at ordinary temperatures it requires a particular kind of burner, for there is danger of explosion from the vapours mixed with air. This drawback is overcome in the arrangement figured, where the benzine is contained in an iron pipe. The wick is enclosed in a tube which reaches nearly to the bottom of the pipe, so that if the candle be upset the oil cannot run out through the wick. The reservoir ought not therefore to be filled quite full. If this is observed the candle will burn in any position between the vertical and horizontal, and there is no dripping of grease as with the ordinary candle. The end of the wick is made of asbestos and therefore does not consume like



vegetable wicks. There is no danger of explosion because there is no communication between the vapour above the benzine and the flame. To keep the pressure equal on the outside and inside of the lamp an air tube, B, runs through the reservoir from below. This vent also serves to carry away the benzine vapour to a safe distance from the flame. Of course, care must be taken that the vapour is not brought into contact with the flame of any other candle or lamp. The products of combustion are as free from smell as those of a stearine candle; and the size of flame can be regulated from the size of a candle-flame to that of a night-light. This of itself is a slight practical gain. A small cap hung from a chain serves to put out the light. The quantity of benzine burnt in five hours costs one halfpenny, and any candlestick will serve for a support. Walking-sticks with the benzine are also made, to which the candle can be attached on a dark night.

The Stinging Tree.

The stinging tree of Queensland, Australia, is a shrub growing from two inches to fifteen feet in height, and though pleasant to the eye, it emits a disagreeable smell, and causes excruciating pain for months to any one who is unfortunate enough to be stung by it. There is no mark, but the part affected is tender in rainy weather or when wetted. Dogs and horses have sometimes to be shot after being stung by it.

A New Conservatory Heater.

A new plan for heating conservatories has recently been brought out by Mr. Hellier. It consists in generating steam in a copper gas-boiler within the conservatory. The steam, together with the products of combustion, then passes through a coil of iron pipes to different parts of the interior, and finally escapes outside. The air to keep up the fire is not taken from the inside, but comes from without by a pipe running under the floor. Four ordinary No. 1 gas-jets are sufficient to generate steam enough to heat a greenhouse, and a length of 50 feet of 3-inch cast-iron pipes.

An Electric Launch.

An interesting application of electricity to motive purposes was recently made on the river Thames. This was the trial trip of an electric launch from its birthplace at Millwall to London Bridge and back. The craft, which we illustrate in Fig. 2, was 26 feet long, 5 feet in the beam, and drew some 2 feet of water. It was fitted with a 22-inch screw propeller, which by means of suitable gearing was revolved by the power derived from a Siemens dynamo-electric motor of the size known as D 3 on their lists. Two of these dynamos, marked A A in Fig. 1, which is a section through the launch, were taken in order that a spare

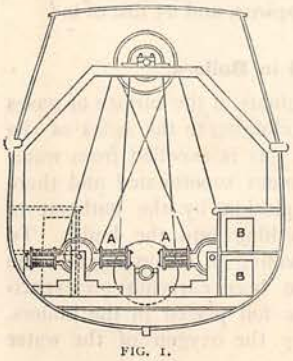


FIG. 1.

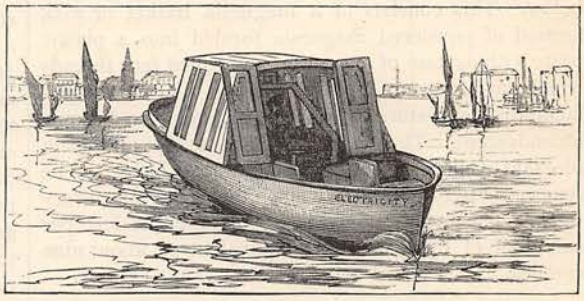


FIG. 2.

one might be at hand, and either or both could be actuated by the same current. The current which rotated their bobbins was derived from forty-five electric accumulators of the kind invented by Mr. Sellon and Mr. Volckmar. These were stowed away under the seats and flooring of the launch, as shown at B B (Fig. 1), and formed a good ballast. They were charged before setting out with electricity capable of generating in the dynamos an energy of 4 horse-power for six hours continuously. The dynamos were connected by belts with a centre-shaft overhead, and arranged with a friction clutch to put the dynamos in or out of gear. From the shaft another belt passed to a pulley on the axis of the screw. With four passengers on board the little E.S. *Electricity* (to coin a new abbreviation for electric ship) ran from Millwall to London Bridge and back in twenty-four minutes, or at a speed of eight knots an hour. There was no noise or smoke, and the craft appeared to glide through the water like a living creature.

A Curious Use for Ants.

A singular way of utilising ants is reported by Dr. C. J. Macgowan, from Han Chow, Hainan, China. It appears that in many parts of the province of Canton the orange-trees are infested by worms, and to rid themselves of these pests the natives import ants into the orangeries from the neighbouring hills. The ants are trapped by holding the mouth of a lard-bladder to their nests. They are then placed among the branches of the orange-trees, where they form colonies, and bamboo rods are laid from tree to tree to facilitate their movements through the orangery.

A Magnesia Light.

Mr. Clammond, a well-known inventor, has produced a very brilliant light by heating a piece of magnesia in flame of mingled gas and air. The gases have, however, to be heated before mixing, and the air is blown into the gas under a pressure of 1⅛ inches of water. For this purpose mechanical power is required to work the blowing fan, and hence the new light is best suited to factories where power is already at hand. The burner

consists of a brass headpiece having two orifices by which the air and gas enter. The details of the burner, which it is unnecessary to describe at length, consist of chambers and partitions for blending the gases in various proportions and conveying them to the burner below. This consists of a magnesia basket or wick formed of powdered magnesia formed into a plastic paste with acetate of magnesia, and rolled into threads which are woven into a mesh. These meshes facilitate the mixture of gas and air, and soon become incandescent. The light is very steady and of a pleasant yellowish tint. The baskets have to be renewed after forty hours' use, that is to say, every week. The gas consumed is about 1½ cubic feet per carcel jet of light, which is equivalent to about nine candles.

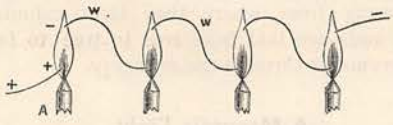
A New Ruler.

A ruler which absorbs the ink that comes on it from the side of the pen has an advantage over the ordinary hard-wood ruler. Such a

ruler has been devised by Mr. G. L. Knox, of New York, and consists of an ordinary square having along one edge a deep groove, in which is laid a folded strip of sheet metal. In the recess of this metal is a strip of blotting paper, or other absorbent material, having its outer edge near the outer edge of the ruler, as shown in the figure. The metal of the folded plate has some elasticity, which grips the blotter securely in its place. The metal clip can, of course, be removed at will to renew the paper, or adjust its edge to a proper distance from the edge of the ruler.

A Battery of Flames.

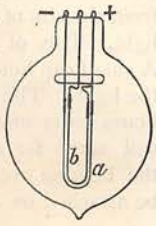
The electrical properties of flames have lately been investigated by Herren Elster and Geitel, and they find that in ordinary gas-flames the film of hot air inside is electrically negative to the outside shell, which is positive. Thus, if wires are inserted to different depths in the flame a current of electricity can be obtained from it. The electro-motive force is rather over that of a Daniell cell. The same results were obtained with flames of spirit-lamps and candles; and the experimenters constructed a "flame-battery" of twenty-five spirit-lamps, which gave a current twenty-five times the strength of that from a single flame. This battery is illustrated in the sketch, which shows by the



signs + and — the electric states of the flames and the manner in which the different flames were connected together by wires. Thus the positive pole of the battery leads from the bottom of the first flame, A, and the top of the same flame is connected by wire, W, to the base of the negative next, and so on "in series" until the last element of the battery is reached, from which proceeds the negative electrode as shown.

The Duplex Electric Lamp.

In the ordinary electric incandescent lamp the intensity of the light cannot be varied except by cutting off a portion of the current, and thus lowering the temperature of the glowing carbon filament. The result is that the colour of the filament changes to a ruddy gold, and the tint of the light is reddened. In the Duplex electric lamp there are two filaments, as shown in the sketch, and the light can be reduced to half the intensity by simply cutting the current off one of them, without altering the bright taper-like tinge of the light. As will be seen, the two carbons, *a b*, are joined together at one terminal wire or electrode (+), and separate at their other terminals (—), so that the same current can either be sent through them one after another, or split up between both. The lamp is, therefore, a very handy one, and has advantages over the ordinary single filament lamp.



While upon this subject, we may mention that Mr. Werderman has devised an incandescent electric lamp in which the glowing filament is made of silicium, which, being an incombustible substance, can be heated in the open air, and does not require a vacuum round the filament as carbon does. We may also add that two new carbon filaments are to be seen at the Munich Electrical Exhibition of this autumn: one devised by Herr Müller, which, instead of being straight, is kinky; and one by Herr Cruto, which, being hollow, gives a larger illuminating surface for the same resistance.

Utilising Wood-Smoke.

At the Elk Rapids, Michigan, there is a blast furnace where charcoal-iron is made in large quantities by means of furnaces burning wood. The quantity of smoke is very great, but it has recently been turned to good purpose by Dr. Pierce, a chemist. The smoke is drawn by large suction-fans into a set of stills, where it is condensed into pyroligneous acid, from which are produced acetate of lime, alcohol, tar, and gas, which latter is consumed under the boilers. Each "cord" of hard wood is stated to give off 28,000 cubic feet of smoke, and as 100 cords are burned every twenty-four hours in the charcoal-furnaces, the total quantity of smoke is 2,800,000 cubic feet. This yields 12,000 lbs. of acetate, 200 gallons of spirits, and 25 lbs. of tar.

Zinc Foil in Boilers.

Boiling is known to originate at the surface of gases dissolved in the water, or clinging to the sides of the containing vessel. If all gas is expelled from water by boiling, the water becomes superheated and there is danger of sudden explosion by the outburst of steam on dropping something into the boiler. To facilitate the process of boiling in steam-engines, the French Government have been carrying on experiments with pieces of zinc foil placed in the boilers. The zinc is converted by the oxygen of the water

into oxide of zinc, and hydrogen gas is liberated. This promotes ebullition, and the oxide combining with fatty acids mingled with the water, forms a kind of zinc soap which coats the tubes of the boiler and prevents their fouling with hard deposits of salts. The soapy matter is readily cleaned away. M. Tréve, however, is of opinion that for marine boilers the zinc action is not so regular as might be desired, and suggests that a warm blast of carbonic acid gas should be blown into the water by mechanical means instead. The carbonic acid could be developed by the combination of carbonate of lime and hydrochloric acid.

A Corrugated Vent.

The woodcut shows a new form of vent-lining for chimneys, introduced by Mr. T. Fraser, of Aberdeen.

The interior is corrugated while the clay is in a soft state, and the sharp ridges of the corrugations being at right angles to the line of draught up the chimney, the soot does not settle on them. The chimney, therefore, does not require sweeping, and smaller vent-holes may be used than with the smooth linings. It has often been observed that rough-lined vents require less sweeping than smooth ones, and Mr. Fraser has turned the principle in question to account.

Gas from Metals.

A new process for manufacturing illuminating gas from certain metals and chemicals is announced from Australia. Mr. John Dixon there has been engaged in experiments to this end for several years, and gas-works on the new system have been at length built. The metallic gas is said to be superior to coal-gas in lighting power, and also more economical. Until further intelligence is received, however, it would be premature to say whether coal-gas has met its match or not.

Artificial Graphite.

An Italian physicist named Conte has succeeded in preparing graphite or plumbago by artificial means. It is chemically pure and quite homogeneous, crystalline and having a metallic lustre. Being highly elastic it is very suitable for making the filaments of incandescent electric lamps, and also for micro-telephone transmitters. Electric lamps made of it were sent to the Munich Electrical Exhibition.

A Gigantic Strap.

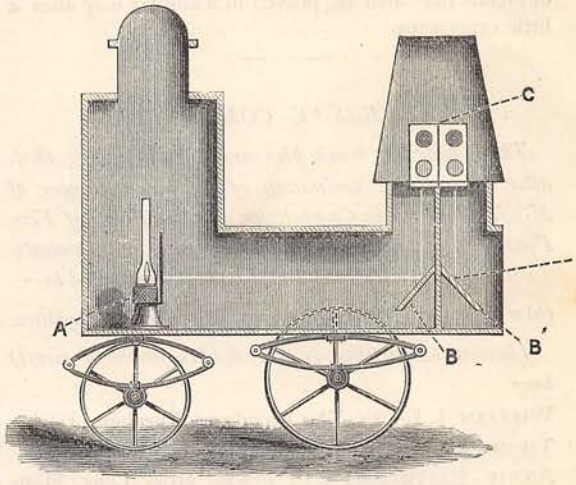
The biggest strap for transmitting motive-power to machinery is probably that recently put up at Berlin. Its width is about six feet three inches, and its weight one and a half tons. Some 200 of the largest and heaviest ox-hides were used to make it, and in the starch factory where it is fitted up it is intended to transmit 500 horse-power of energy.

Woodland Sounds by Telephone.

A short time ago, while Mr. N. G. Warth, manager of the Midland Telephone Company, Gallipolis, Ohio, U.S., was conversing by telephone with Major H. B. Hooner, of Pomeroy, Ohio, some twenty miles away, he was surprised to hear the croaking of frogs and songs of wild birds very distinctly. The telephone wire is known to pass through some dense woods on its course, and the explanation is that some loose joint in the wire acted as a microphone, and taking up the woodland sounds, transmitted them to the telephone at the end of the line. The accident shows that it would be possible to have wild-wood music brought into the heart of the City every morning along with fresh milk and flowers. While upon this subject we may mention that another telephone observer recently heard the crackling of aurora in his instrument, which was connected by one pole to a water-cistern, and the other to the gas-pipes of the town—Mont Clair in New Jersey. A similar crackling is heard during thunderstorms, but the auroral crackle is more delicate, and was mingled at intervals of half a second with short taps.

Keeping Silver-Plate Bright.

Articles of silver and silver-plate rapidly tarnish in rooms where sulphurous coal is burned, owing to the sulphuretted gases given off. If, however, they are occasionally dipped in a solution of hyposulphite of soda, or rubbed with a cloth wetted in the solution, and afterwards dried with a soft towel and rubbed with chamois, they soon recover their pristine brilliancy.



A Photometer on Wheels.

Mr. W. F. Sugg, the gas engineer, has invented a portable photometer, which is useful for measuring the intensity of street-lamps as they stand. As shown in the sketch, it consists of a standard lamp, A, of the Keats pattern, burning spermaceti oil, and provided with a screen in front having a horizontal slit in it, which allows a beam of about two candles to pass through. This beam falls on a white disc, B, inclined

in front of it, and having a piece of printed newspaper pasted on it. At the same angle to the vertical there is another disc, B′, also having a twin piece of newspaper on it, and this receives the light from the lamp whose light is to be compared with that of the standard. The two discs are separated by a partition carried up some distance above them. A mirror suitably placed above them at C, in a dark chamber, enables the observer to see both discs reflected side by side, and to compare their relative intensities. The apparatus can be moved away from the street-lamp until the intensity of its rays equals that of the candle. With it the light falling on any part of a roadway at a distance of three feet from the ground can be measured.

The Microscope and Building.

In examining building materials before submitting them to the testing machine, the microscope may be made very useful. Mr. Robert Grimshaw, in a paper to the American Franklin Institute, points out that by its means weak or faulty timber, stone, or metal may be recognised, and the time taken up in testing them thereby saved. In the case of timber, for example, the trunks and limbs of exogenous trees are built up of concentric rings of woody fibre held together by radial plates. The denser and stronger the wood, the closer these rings come together and the more numerous and thick are the radial plates. With photographs of sections of a standard piece of timber in his possession, the engineer, by aid of a magnifying-glass, can tell whether a piece of timber is above or below the standard as regards quality. The colour and texture of metals may also be proved in a similar way after a little experience.

PRIZE ESSAY COMPETITION.

The Editor has much pleasure in announcing that, after a careful examination of the large number of MSS. submitted in Competition for the Prize of Five Pounds to the author of the best Essay on "Domestic Training for Girls," the Prize has been awarded to—

(MRS.) MARY ANNE MYRING, Duffield, Derbyshire.

Honourable mention is accorded (in order of merit) to—

WILLIAM J. LACEY, The Broadway, Chesham, Bucks.
THOMAS OAKEY, 6, Falconer's Road, Scarborough.
ANNIE EASTWOOD, 3, El Prado, Moss Lane, Manchester.
KATHERINE F. SAINSBURY, Duxford, Cambridge.
ANNIE M. BRUNSDON, Moorfields, Hereford.

It is hoped that room will be found for the Prize Essay in an early issue.

The Editor begs to remind his readers that, in accordance with the published conditions, he cannot in any case whatever undertake to return the MSS. of unsuccessful competitors.

Why all this Smoke?

A LETTER TO THE EDITOR.

SIR,

Do you not think you could find room in your Magazine for a grumbler's column, a small space set aside monthly for the discussion of real grievances and nuisances—those only, of course, which are endured by the community in general, and not by individual members alone? If so, I cannot but think you would add largely to your usefulness and popularity.

As an instance of what I mean, I venture to bring under your notice one of the great nuisances which all dwellers in towns and cities are compelled to endure—smoke. And yet why is it so? Why should a huge black cloud of unconsumed carbon hover continually, like a spirit of evil, over our streets and houses? Why should the least suspicion of fog in the atmosphere be made an excuse by the smoke for filling eyes and nose and mouth and lungs with its noxious particles? Why should dwelling-house and office alike be invaded from morn to night, from night to morn, by specks of soot and smoky vapours? Can it be that scientific men are altogether powerless to cope with this increasing evil?

I see, indeed, that at the last meeting of the British Association the learned President pointed out the importance of gas as a heating agent, and spoke favourably of smokeless coal, arguing that by the use of these the smoke of cities might be lessened. Furthermore, a Smoke Abatement Exhibition has been held, and numerous societies have been inaugurated expressly to deal with the acknowledged nuisance. But, alas! so far as we can see, all has been in vain: no good seems to result, and each wondrous project appears to end as it began—in smoke.

And yet something might surely be done. When scientists and theorists fail, then is the time for practical men to step in, and in the hope that there may be some such among your readers, who may make valuable suggestions on the subject, I appeal to you to insert this communication in your pages.

I am, Sir, &c.,

EX FUMO DARE LUCEM.

*** We shall at all times be glad to hear, on this or other suitable subjects, from any one of our readers—it being, however, borne in mind that the space at our disposal for such matters is very limited, and that the insertion of communications, whether in whole or in part, must be entirely left to our discretion. In no case can we undertake to return unused communications. All letters must be accompanied by the name and address of the writer, not necessarily for publication, but as a guarantee of good faith.—THE EDITOR.

POEM COMPETITION.

Intending Competitors for the Prize of Five Pounds offered by the Proprietors of this Magazine for the best Poem on "Happiness," are reminded that the competition closes on December 1st, 1882.