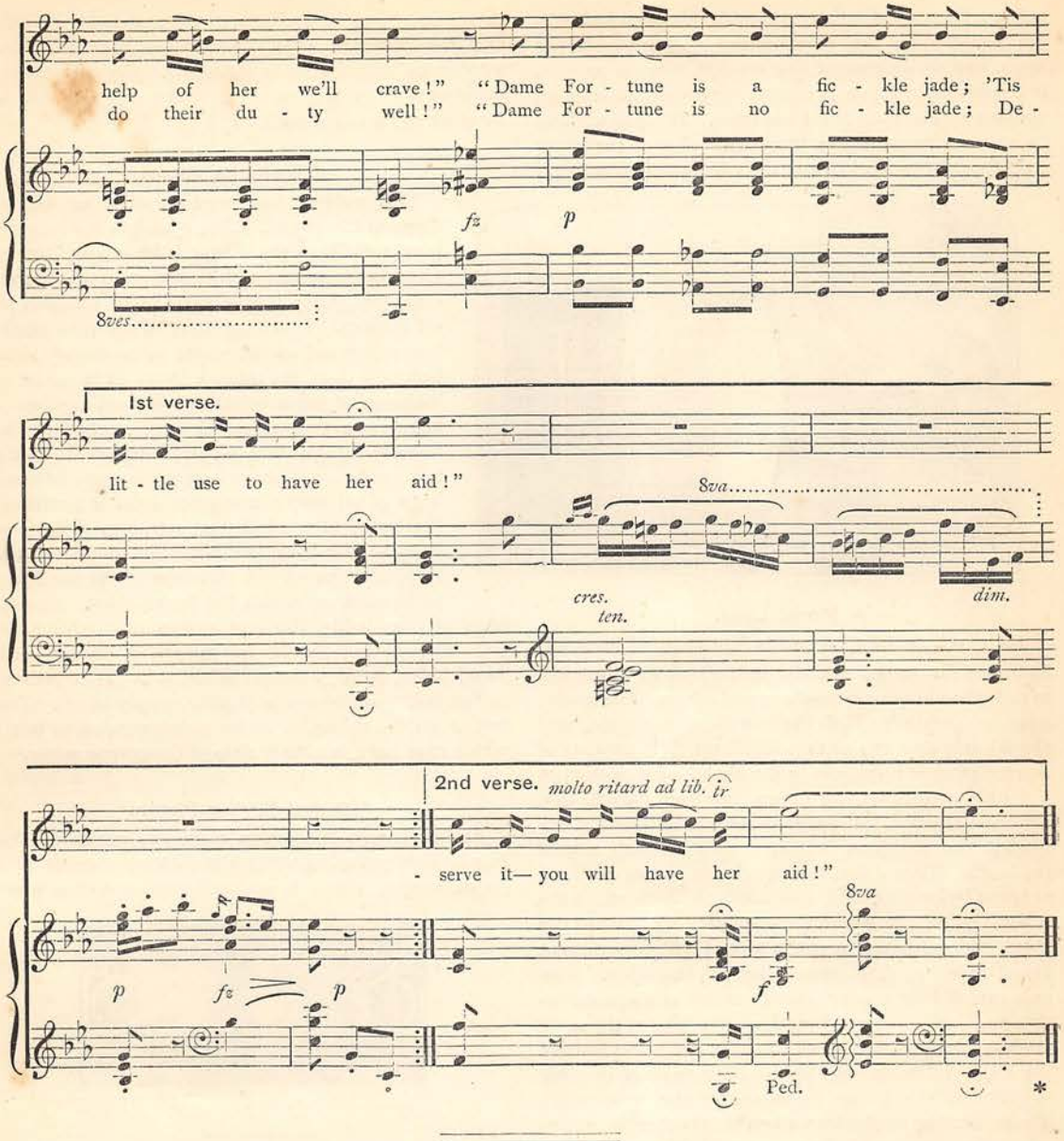


THE GATHERER.

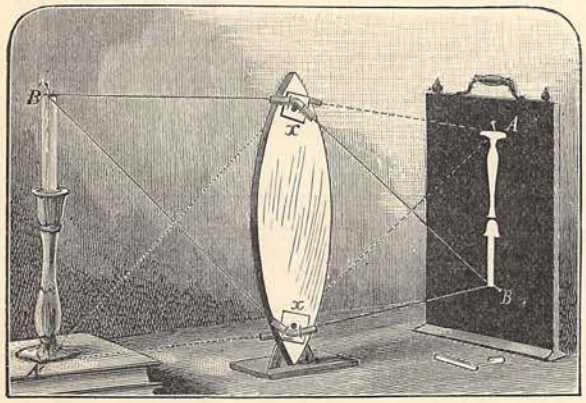
Electric Ship Lights.

RECENT experiments made on board H.M.S. *Crocodile*, in Portsmouth Harbour, have demonstrated that the incandescent lamp is far superior to the ordinary oil lamp used for ships' port, starboard, and mast-head lights. A 50-candle power Edison lamp was pitted against the ordinary oil lantern, and several observers sent a mile to sea in order to compare their brightness. The electric lamp was by far the brighter, and a 16-candle power Edison lamp was therefore substituted for the 50-candle power one. Even this was visible at a much greater distance than the oil lamp; the latter being cut off by a haze, while the former remained distinctly visible to the observers when two miles away. It is expected that the Admiralty will adopt the new light in preference to oil on ships carrying electric machinery.

Azotine.

A French inventor, M. Heddebault, has found that when rags of cotton and wool, mixed, are subjected to the action of a jet of superheated steam under a pressure of five atmospheres, the wool melts and sinks in a liquid mud to the bottom of the receptacle, while the

cotton, linen, and other vegetable fibres stand, and are suitable for the manufacture of paper. If the liquid mud is desiccated, the residue, termed azotine, is completely soluble in water, and very valuable on account of the nitrogen it contains. It costs nothing to prepare, because the increased value of the paper pulp freed from wool covers the expense of steaming.



A Model Lens.

Mr. J. B. Haycraft, of the Mason College, Birmingham, has designed the model lens which we illustrate, in order to aid science teachers and others. The model may be constructed of the simplest materials, and should only cost two or three shillings. It consists of a piece of deal board cut in the shape of a section of a double convex lens as shown, and fixed upright to a standard of wood. Four small squares of board, *x*, are fixed in the positions indicated, two on each side of the lens. Glass tubes bent at obtuse angles are fixed to these by staples, and can rotate with them on the screws, by means of which the squares are fixed to the lens. Two pieces of string, A A′ and B B′, to represent visual rays, are then passed through the tubes. Now as a ray of light passes through a lens of given curvature and density, it will (practically) be bent at the same angle so long as it passes through the same part of the lens. In the model this constant angle of bending is given to the string by means of the bent tubes. These rotating on the lens allow the teacher diagrammatically to represent the rays passing through it.

Wild Plant Fabrics.

An attempt is now being made in the United States to utilise the fibres of various wild plants, especially grasses; and some very good raw material in the shape of threads, ranging from the fineness of silk to the coarseness of hemp, have been prepared. The cotton stalk, usually burnt as trash, is made into a coarse thread equal to Indian jute. Flax straw yields a product which serves for the manufacture of linen, or as a substitute for cotton, when mixed with wool. Other plants, such as the bear grass, Spanish bayonet, okra, nettle, ramie, pita, baurbor, wild coffee, and wild cotton plant, have been made to supply threads which can be dyed, and spun into bagging, rope, pack-thread, paper, or fabrics for dresses and upholstery. The ramie and Sisal hemp fibre can be mixed with silk, and the common American grasses can be turned into fibres suitable for wig-making. Cocoa-nut fibre supplies a material for stuffing chairs, which is said to be quite equal to curled hair.

Oil on the Waves.

This subject has been studied in full by Captain Chetwynd, R.M., who has made a report upon it to the Royal Lifeboat Institution. Captain Chetwynd admits the value of the process, and states that a very small quantity of oil suffices. It is necessary, however, to apply it to windward of the space to be calmed, and hence he does not think it likely to be useful to lifeboats or other craft running out against a heavy sea, unless the oil were applied at the bows and given time to spread astern. In a ship hove to he considers it best to hang one or more bags of oil over the weather side, or put them overboard to windward attached to light lines, because the bags do not drift so fast as the ship, and the oil will therefore cover the space to leeward on which the latter rides. Canvas bags are, he holds, the best means of applying the oil. The canvas should be porous, or pierced with small holes, to allow the oil to escape. This plan is self-acting, and insures a regular supply of oil. The use of oil, he thinks, is to be recommended in boats which may have to pass a strip of dangerous water.

A Spiral Spring Piston.

At the Textile Exhibition there was recently exhibited a new piston, in which the packing consists of a spiral spring, which is normally straight, but when

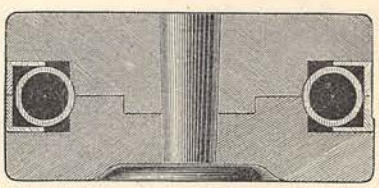


FIG. 1.

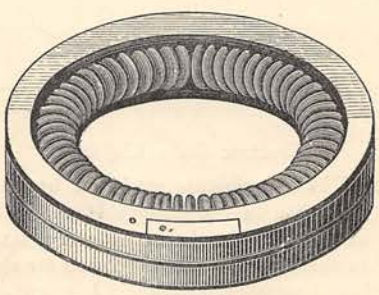


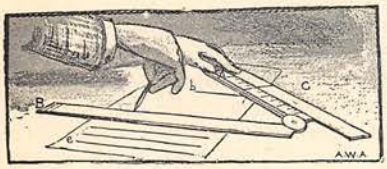
FIG. 2.

applied to the piston is bent into a circle and sprung into the ring, as shown in Figs. 1 and 2, the former of which represents a vertical section of a piston fitted with a ring, and the latter a perspective view of the spring bent into its place in the ring. The action of

the spring tends to enlarge this ring, and the makers have tested the packing successfully on a large number of different kinds of engines.

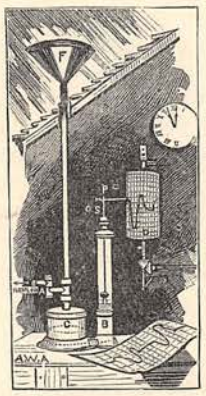
A Line Divider.

Our illustration shows a novel contrivance for dividing any space into an equal number of parts. It consists of a hinged ruler A B, having the limb A fitted to slide in an undercut groove on the plain rule C, which has needle-points on its under side to prevent it slipping on the paper. The limb A is also divided on both edges into eighths, quarters, half-inches, and inches. To explain the use of the instrument, let us suppose the space *d* to *e* is to be divided into any number of parts—say thirteen. Taking the half-inch line, hold the rule B on the line *e*, and open the rule A until the division marked 13 on the inside edge is coincident with the line *d*. Now notice that the single line on the rule C is opposite the 13, and in this position press it down so that the needle-points on the under side bite the paper well. Place the fingers firmly on C, slide the part A upwards so that it may stop consecutively opposite each of the thirteen divisions, as indicated opposite the line on the rule C; a pencil line drawn along B, across *d e*, at each stoppage opposite the numbers 12, 11, 10, 9, and so on, will give the divisions required. To produce the lines in ink, the rule, after setting, may be moved to the upper line first, and the division lines drawn afterwards. It will work in any position, and divide a space into from two to eighty parts.



A Recording Rain-Gauge.

A new rain-gauge which records the varying strength of rainfall consists, as shown in the figure, of two cylindrical vessels of different heights, B C, fixed vertically, and connected with each other at the bottom, so that when a quantity of mercury is introduced it will stand at the same level in both vessels. From the top of the shorter cylinder rises a funnel, F, several feet high, which receives the rain. Within the tube of this funnel, at a point A, is fixed a disc of agate, having a small perforation through which the rain issues after it is caught by the funnel, and passes into the overflow-pipe as shown. Within the other cylinder, B, is placed a float which rests on the mercury, and rises or falls with it. This float carries a vertical stem S, having a pencil P, or other marker at its end, and this pencil draws a line on a revolving drum D, of ruled paper as shown. The drum is revolved by a simple clockwork, not shown in the drawing, and makes one turn round in twenty-four hours, so that the line shows the variations of rainfall during this period. The action of the apparatus is as follows. The rain-water received in the funnel sinks to the surface of the mercury in C, and exercises a pressure upon it which is proportional to its height in the funnel-pipe, that is, to the rainfall at the time, and this pressure, communicated to the mercury in the vessel B, raises the float and pencil P. As the strength of the shower abates, the mercury in B sinks, and the pencil is lowered on the drum. Thus a wavy line records the varying intensity of the rainfall. Such an instrument would be useful to water engineers, as well as meteorologists.

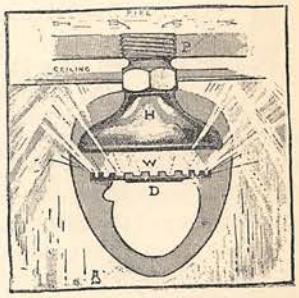


An Electric Light Locomotive.

Trains on the Liverpool and Manchester line of the London and North-Western Railway Company are about to be permanently lighted on a new and improved plan. This consists in constructing the locomotive so that it not only draws the train, but works a dynamo fitted to it. This is done by adding a Brotherhood engine to the tender, and feeding it from the locomotive boiler. The Brotherhood engine in turn drives the dynamo which generates the current; and the latter, after traversing the Swan incandescent lamps in the carriages, completes its circuit by returning to the dynamo. There are double lamps in each compartment, arranged so that if one is broken the other will be immediately lighted.

The Grinnell Fire Extinguisher.

Our illustration explains the action of an automatic fire extinguisher which is being largely used in America. It is the invention of Mr. Grinnell, of Rhode Island, U.S., and has recently been introduced into Great Britain. The system consists of lines of small pipes carried through the factory or house to be protected, and connected to the public water-main, or a tank at the top of the building. These pipes run along or near the ceiling of the apartments, and every eight or ten feet extinguishers of the kind here illustrated are attached to the pipes. Thus P is the screw attaching the extinguisher, which consists of a heart-shaped envelope enclosing a kind of bell-mouth, which opens by a hole H (not shown) into the pipe. This hole is ordinarily closed by a diaphragm, D, held in place by a trigger, or lock, supported by fusible metal. When a temperature of 155° F. is reached, owing to the heated air of the fire rising to the ceiling, the fusible trigger melts, the diaphragm falls down into a niche provided for it, and the water,



under pressure, escapes as shown at W. On striking the diaphragm, which is toothed at the edges in order to distribute it in jets, the water is deflected up to the ceiling, from which it falls in a regular shower. The advantage of such a contrivance is that it operates automatically, and before the fire has attained serious dimensions. Even electric automatic fire-alarms are open to the objection that they do not bring immediate help, but merely summon the fire brigade quickly. In Grinnell's extinguisher the fire brigade is, as it were, already on the spot. For theatres, cotton factories, and such-like places, the invention is certainly to be commended.

A New Laryngoscope.

Our figure illustrates a new laryngoscope manufactured by Messrs. Woodhouse and Rawson. The laryngoscope is a surgical instrument of great value in cases of sore throat when the back of the mouth has to be examined. The new instrument consists of an ebonite handle, H, having at the butt end a pair of terminals, T T, with which to connect on the wires from the poles of a small voltaic battery or accumulator. At the other end is a small incandescent lamp, L, and an adjustable mirror, M, that is used to project the light of the lamp into the throat. A press-button, B, in the centre of the stem serves to complete the electric circuit, and start or stop the light. The current producing the light in the carbon filament of the lamp is that from three Leclanché cells, and will keep it going for ten minutes at a time. After this period, which is sufficient for most examinations of the throat, the battery polarises, and requires a rest to recover its strength. The filament of the lamp is of a new sort, called the "hair filament"—very slender, but strong. While upon this subject, we may add that Mr. Preece's result to the effect that the illuminating power of an incandescent lamp is proportional to the "sixth power" of the current sent through it, has been verified by Captain Abney and Professor Kittler. It follows that if the current be doubled in strength the luminous intensity of the light produced by it is increased sixty-four times. The law only holds, however, within the ordinary working limits of a lamp. When this is exceeded, a new proportion comes into play, till at length a point is reached when the filament breaks up by the too intense current. Mr. Preece recommends that this critical point, or rather the current producing it, should be ascertained for every sort of lamp as a safeguard for electricians.

Peat Moss Fibre.

Some time ago we chronicled the successful application of clean peat as a poultice for wounds, and now we have to mention its use as a material for the bedding of horses and other animals. The peat, as prepared at Barton-on-Humber, is selected from the fibrous tops of our peat-bogs, and is a vegetable matter of antiseptic properties which, especially when used as litter for animals, becomes a good manure when applied to the soil. It is cleanly and absorbent, and the *humus* which it contains is an excellent food for plants, as gardeners have long known. The peat fibre is now supplied to the Zoological Gardens, London, for the bedding of wild animals, as well as to leading tramway companies, Lord Derby, Lord Vernon, and other owners of large stables. Peat is so common within these islands that every fresh use for it is a matter of congratulation. It is now used in the shape of charcoal for sanitary purposes, for the production of gas, and, compressed with coal-dust and tar, for fuel. Probably it would also yield a charcoal suitable for electric light carbons.

Petrified Wood-Work.

Along the line of the Atlantic and Pacific Railway, and in other parts of the Western United States, there are large tracts of petrified forest, which the practical American has now found a use for. In San Francisco a factory was recently erected for cutting the stony trunks and limbs of the primeval trees into mantelpieces, tiles, panels, and other architectural parts, usually made out of marble, slate, or other ornamental stones. The new material is hard, fine-grained, and resembles onyx, but is capable of taking a finer polish than onyx, and is said to be driving it from the market. Several new companies have applied for concessions of portions of the forest tracts; but it is to be hoped in the interests of natural history that some of the forest will be preserved in its original state.

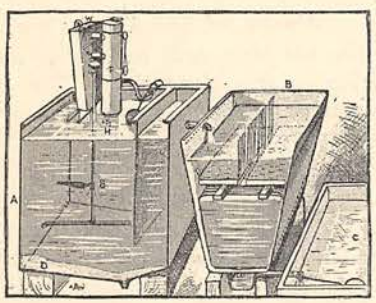
Health Clothing.

Dr. Gustav Jaeger, professor of physiology at Stuttgart, has devised a system of sanitary or health clothing, which is meeting with favour in Germany. His theory is that dead vegetable tissues do not dissipate the emanations of the skin, whereas dead animal tissues, which have been, of course, specially adapted to animal bodies, do. Moreover, he holds that a person is less liable to disease when his body does not contain too much fat or water. His nervous activity is also greater at such a time, that is to say, his keenness of sensation, as is proved by a special apparatus of Dr. Jaeger, in which after a Turkish bath has reduced the moisture of the body, a gain of 13 per cent. in nervous activity is frequently registered by subjects experimented upon. Dr. Jaeger, holding as he does that linen, or other vegetable clothing, does not so well admit the dispersion of moisture from the body, has designed a woollen dress consisting of tight-fitting stockingette underclothing of pure undyed wool, fastened over the shoulder, and of double thickness over the breast. The coat, or jacket, is double-breasted, buttoned well up to the throat, contains no lining or padding except of pure wool, and is either undyed, or treated only with uninjurious fast dyes. The same rule applies to trousers, and the vest is either discarded, or made in the form of flaps sewn

to the inside of the coat. Inside the sleeves and trouser-legs is a contrivance which, fastening tight round the limb, prevents up-draughts; for colds, rheumatism, lumbago, and so on, are caught by the sudden rush of cold air to a particular part of the body, not by the gradual cooling of the whole. The feet are clad in pure woollen socks with divisions for each toe, while the upper part of the boot is made of felt, the lower part of felt or porous leather, and the inner soles of perforated leather and layers of felt. Thus the boot is quite porous, and the feet are kept as clean and pure as the hands. By doubly protecting the front of the body where the blood-vessels converge, these are stimulated; and as an even temperature is maintained throughout, there is little need of an overcoat, at least in temperate climes. These clothes are also cool in summer. Instead of a starched linen collar, Dr. Jaeger substitutes one of unstarched white cashmere, which is not only comfortable, but a safeguard against sore throats. The same principles are carried out in night clothing; the sheets of the bed being of wool, or camel-hair, or white cashmere. The mattress and pillows should also be stuffed and covered with wool, and Dr. Jaeger thinks that a person so protected may keep his window well open at night; but we think this is a point to be careful upon, because open windows admit draughts on the exposed head, and some kind of screen should therefore be employed to prevent this. Samples of the clothing were exhibited at the International Health Exhibition, and a depôt for its sale has been opened in London.

A Water Softener.

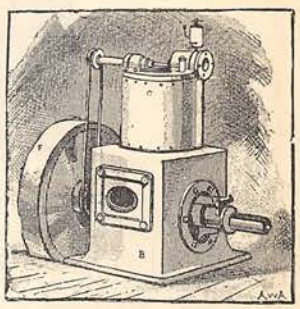
An inventor, whose filters we have from time to time described in the GATHERER, has brought out a composition called "Anti-calcaire" for softening water, that is to say, removing the salts of lime in it. Temporary hardness is due to bicarbonate of lime in the water, and permanent hardness to sulphates of lime



and magnesia, which, unlike the bicarbonate, are not removed by boiling the water. The Anti-calcaire acts on all these salts and precipitates them, thus making the water quite soft. As much Anti-calcaire as will cover a shilling, put into a jug-full at night, will render the water clear and soft in the morning. Of course the same process on a larger scale is applicable to a tub or cistern-full; but the inventor has devised a special arrangement, which we illustrate. It consists of two cisterns—one, A, for softening, the other, B, for filtering the water before it passes into the collecting reservoir C. The water from the main strikes upon and revolves a small water-wheel, W, which in revolving actuates a mechanism which not only discharges the Anti-calcaire into the water, but stirs the latter up. Thus in the cylinder or box, P, there is a quantity of the powder which is fed forward to a drop-hole, H, by a stirrer and screw worked by the water-wheel. The powder drops out of the hole, H, into the water, and is mixed with the latter by the stirrer S. It then deposits the precipitate, D, on the bottom of the cistern, the clear water flowing over into the next cistern, which is fitted with a filtering apparatus. This arrangement can be made on a scale suitable for the supply of hospitals, factories, aquaria, and other large establishments. Fish are apt to be infected with a certain fungus if kept in hard water, hence the necessity of softening it for aquaria. An arrangement like this, occupying 8 ft. by 4 ft. by 5 ft., is capable of dealing with 12,000 gallons of water per day.

A Small Engine.

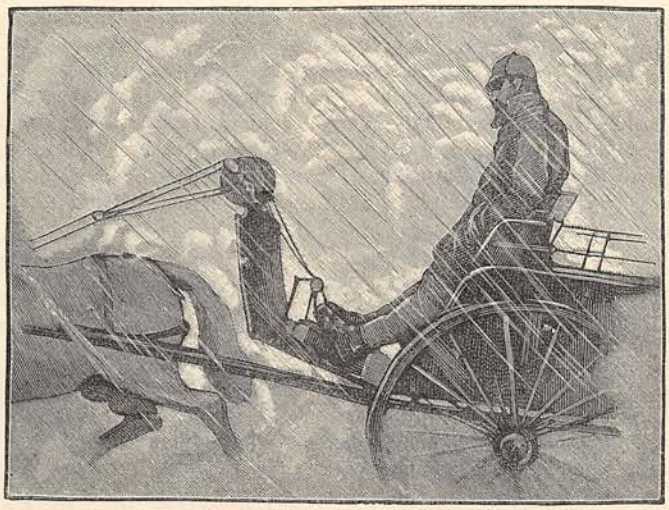
Our figure illustrates a new "Electric" high-speed engine, introduced for a variety of purposes, but chiefly for driving dynamos in electric lighting. The cylinder, C, is mounted on a base-box, B, containing the working parts of the engine, and into which the exhaust steam passes. The engine is of the single-acting type, and all its parts are exceedingly well adapted to the functions they have to perform. F is the fly-wheel, giving great steadiness of motion, a desideratum in electric light engines, where the dynamo should run smoothly and at a high speed. Another desideratum in dynamo-driving engines is, that the engines should not be too sensitive to changes of speed in the dynamo, caused by changes in the electric or lighting circuit. The engine shown has a ten-inch cylinder, with nine-inch stroke, and runs at 500 revolutions per minute.



An Improved Coffee-Pot.

It is well known that coffee contains other elements than those which make this popular drink what it is; and how to get rid of these more or less harmful ingredients has long been a matter of study. A new coffee-pot called the "Criterion," recently introduced from Germany, bids fair to achieve this. In appearance it is not unlike the ordinary French cafétière, but both of the two strainers are very much finer than is the case with the French pots, and the upper one, instead of being immediately under the lid, is secured by stops very close to the bottom one. By this arrangement the whole of the coffee is kept together and the boiling water is obliged to pass through, and thus extract

the essence from it. So fine are the strainers, that the water occupies nearly eight minutes in passing through them, and the whole of the good properties are thus extracted from the coffee. A measure which holds the exact amount of coffee required to give a good and wholesome decoction with the water contained in the upper part of the cafétière is provided with it, and it is claimed for the new coffee-pot that, if the water and coffee be used in the precise proportions indicated, only the good properties are extracted from coffee and none of the bad ones.



Treadle-Driving.

A new method of driving horses by means of the feet, so as to keep the hands warm in cold stormy weather, has been introduced recently. The method can be used either with or without the ordinary plan of hand-driving, the latter being resorted to in genial weather if preferred. The illustration shows the arrangement in action. The feet rest on a firm board, and the horse is guided by raising or lowering the toes, thus bearing on one or other rein by means of straps in connection with them, which pass over the pulley mounted on the front board of the vehicle as shown. The driver's hands are quite free and may be inserted in the pockets of his great-coat. The apparatus can be attached to any vehicle in a very few minutes and can be used by a very young person. When the driver leaves the vehicle there is a gentle bearing on the horse's mouth which tends to keep him quiet.

Telephoning through Water.

Mr. Alexander Graham Bell, the inventor of the telephone, has been making some interesting experiments with that instrument at sea. Two boats were rowed out into deep water, about a mile and a quarter apart. In one was Professor Bell, and in the other an assistant, the former being armed with a telephone, the latter with a voltaic battery and an apparatus for rapidly interrupting the electric circuit—100 times per second. One terminal of the telephone was connected to the water over the bow of Professor Bell's boat, the other entered the water at the stern; and whenever the water was charged, by a wire, at two points some distance apart, by the interrupted current of the battery in the other boat, Professor Bell heard a musical note in the telephone held to his ear. We may add that the subject of submarine telephony has excited considerable attention of late; Lord Rayleigh, at the British Association Meeting in Montreal, having enunciated a theory which shows that it is impossible to telephone speech through more than forty miles of an Atlantic cable. Actual experiments on other cables—for example, that between Dublin and Holyhead—have shown that speech can be transmitted sixty miles on a line of that type.

"WORDS FOR MUSIC" COMPETITION.

AWARD OF THE PRIZE.

The Editor has pleasure in announcing the award of the judges in this Competition. The Prize of Three Guineas offered for the best Song (i.e., *words for music*) *has been awarded to*

MISS MARIAN PENDLEBURY, 1, Methven Terrace, Grange-over-Sands, Lancashire,

whose Song, "When Martens follow Spring," the Editor hopes to publish in an early number of the Magazine.

Honourable Mention is awarded to the following competitors, in order of merit:—

ALICE MARY HEWITT, Southampton.
HARRIET E. KETCHLEY, Kirby Moorside, Yorks.
H. W. BOYD MACKAY, Exeter.

The number of competitors was 141.

MUSIC COMPETITION.—*Intending competitors are reminded that February 2nd,* 1885, *is the last day for receiving MSS.*