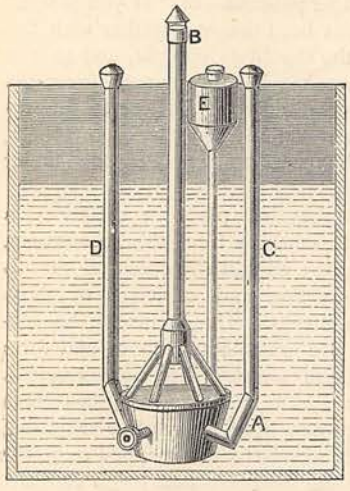
THE GATHERER.

A Rapid Water-Heater.

It is sometimes convenient to be able to heat a large quantity of water, say a barrelful, without the use of a boiler. Hence the apparatus which we illustrate, and which is the device of Mr. J. B. Webster, has recently been introduced. The apparatus consists of a sheet-iron chamber, A, of the form of a truncated cone, containing a small pan or lamp of petroleum, or other oil, which is set fire to. Inclined tubes convey the products of combustion to a central chimney, B, from which they escape into the air. The other tubes, C D, convey the fresh air to the fire. The oil burned is contained in a reservoir, E, and feeds downwards to the burner. The apparatus only requires to be plunged into the water.



A Luminous Liquid.

Lieut. Diek, of the Russian Army, has discovered a new luminous powder which has three colours—green, yellow, and violet, the last-named giving the most powerful light. Mixed with water in a glass vessel, an illuminating liquid is produced which may prove very useful in mining and military operations. The illuminating power lasts for eight hours, when fresh powder must be added.

A Stove Evaporator.

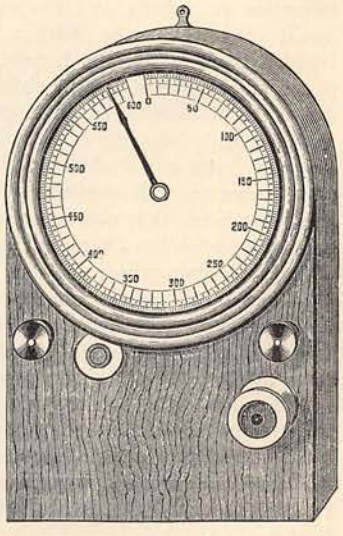
Rooms heated by furnace-pipes and other stoves are sometimes made unpleasant to the occupants, owing to the disagreeable effects of the hot air given off by the stoves. With a view to remedy this defect, the evaporator represented in the accompanying woodcut has been designed. As will be seen, it consists of a reservoir of water of suitable size and shape to be placed in front of or upon the stove. The heated air, deflected by a removable shield, passes over the water, which it absorbs in its passage. In this way moisture is imparted to the air of the room, and so neutralises the objectionable effects above alluded to. The form of the evaporator allows of ornamentation, plain or elaborate, according to the desire of the purchaser.

Home-made "Reservoir" Pen.

A pen that will obviate frequent applications to the ink-stand can be made with the utmost ease, and is said to be perfectly reliable. Two ordinary pens of the same pattern are inserted in one holder. The inner pen will perform the operation of writing, while between it and the outer one a supply of ink will be reserved—the twin-pen having, of course, been dipped in the ink—which will be amply sufficient to write several pages of manuscript, though the rate of writing will materially affect the quantity of work that can be performed with one supply of ink. It is not necessary that the two pens should be very close together, but should the ink not flow freely enough, the points may be brought nearer by using a tiny rubber band or bit of thread. The cost of a "reservoir" pen of this description is infinitesimal, and its merits can be tested by any one who will take the trouble to follow the foregoing instructions.

An Electrical Speed Indicator.

The apparatus which we illustrate from the design of Mr. W. Groves, is intended to show at any distance the number of revolutions per minute made by an engine or piece of mechanism. The construction is similar to that of the Wheatstone counter, but electricity is called in to transmit the indications to a distance by means of electro-magnetism, in an ingenious manner, which would, however, occupy too much space to describe in detail. The apparatus has the advantage of only one dial and indicating hand, by which the speed is shown at a glance.



Organic Matter in the Sun.

By means of a new method of spectrum analysis, in which the dark rays beyond the red end of the

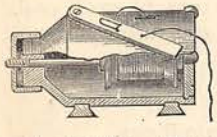
spectrum are photographed, Captain Abney, the well-known authority on this subject, has been led to conclude that there may be organic compounds in the sun. The dark lines are emitted only by bodies of low fusing point, such as calcium, sodium, &c., and hence it is inferred that the other lines observed in the dark photographs obtained of the ultra-red spectrum must be due to bodies other than the metals. Captain Abney is not certain that organic compounds do exist in the sun; but his experiments amount to a suspicion, or more, that ethyl and benzine exist either in the sun or space. When we remember that Dr. Huggins also infers that cometary and nebular matter contains hydro-carbons, we may place our faith in the belief of Captain Abney and Colonel Festing, that as science advances, we shall be able to say more and more exactly whether compound bodies exist in the heavenly orbs.

A Novel Whip and Reins Holder.

The annexed engraving represents a simple appliance for holding, in a combined form, the whip and reins. The whip-socket, of metal, wood, or other material, is fastened to the dashboard or other part of the vehicle convenient to the driver. The upper end is furnished at the back with a "guide" for leading the butt end of the whip into the socket—a useful arrangement in putting aside the whip when the carriage is in motion. The reins-holder consists of a flat spring and is secured to the side of the socket, with the upper end pressing against the outer surface of the "guide," to enable the reins to slip easily between the spring and socket, where they are detained by the pressure of the former. Here they will remain until the driver, by taking them again in his hand, forces them up through the spring.

Useful Sewing-Machine Shuttle.

Perhaps it is only in accordance with the "eternal fitness of things," that the appliance which we are about to notice is the invention of a lady. The annexed woodcut shows a new kind of shuttle for use in sewing machines, the novel feature of which is that it holds any ordinary reel of thread, and thus avoids the trouble and delay of re-winding the thread on the small reel generally used in such shuttles. The shuttle consists of a hollow cylinder, tapered at one end and fitted with a screw-cap, which receives the spindle upon which the reel is loosely mounted. This spindle extends through the opposite end of the shuttle, and is furnished with washers to keep the reel in its place. The plate that forms the larger end of the shuttle is held in position by a spring. To the upper side of the shuttle is pivoted a bar with a U-shaped slot and eye for receiving the thread and giving it a certain degree of tension, and the shuttle is slotted for the passage of the thread, which goes thence to the slot and eye in the bar, which is retained in working position by a spring catch. To remove the reel and replace it on the spindle, the larger end of the shuttle must be taken out. When necessary, the spindle may be removed by unscrewing the cap on the conical end of the shuttle.



A Useful Dust-pan.

Every housewife probably will approve of the novel dust-pan represented in the accompanying woodcut. As most people know, the task of sweeping a room with brush in one hand and pan in the other is by no means a light business. But the present arduous system is hard labour itself compared with the ease with which a room may be swept by means of the simple and effective device here illustrated. This improved pan enables the sweeper to employ the long broom while holding the pan by her foot. No stooping is needed, and the upright position permits of the free use of the long broom. The pan is of the ordinary size and shape, and owing to the arrangement of the patented appliance, the pressure of the foot causes it to lie closely to the floor, so that the dust always passes on to the pan. It can also be moved readily with the foot to any part of the floor. The engraving so clearly explains the manner of using this improved pan, that further explanation seems to be quite unnecessary.

Bleaching Sponges.

Sponges can be bleached to a very pure white by immersing them, after being thoroughly cleaned of sand and dirt, in a solution of one part of permanganate of potash in 100 parts of water, then washing them in water, squeezing them dry, and afterwards steeping them for fifteen minutes in a solution made by dissolving 8 oz. of hyposulphite of sodium and 1 oz. of oxalic acid in a gallon of water. On being washed clean they will be found to be white.

The Hammer Telephone.

A new receiving telephone has been devised by M. de Locht Labye, of Liége, which is called the "hammer" telepone, from the sound being produced by rapid blows of a small hammer on the sounding-plate.

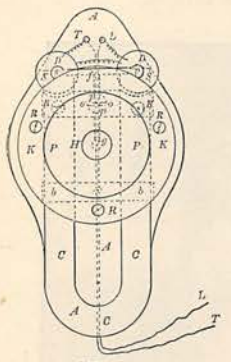


FIG. 1.

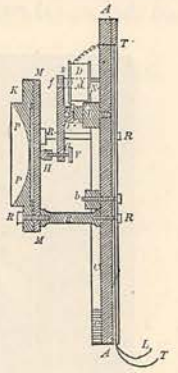


FIG. 2.

Figs. 1, 2, and 3 illustrate the apparatus; Fig. 1 being a front view, Fig. 2 a section through it, and Fig. 3 a general view. To a wooden plate, A, is secured by brass brackets, B B, a powerful horse-shoe magnet, N C S. To each pole is attached a small core of soft iron, *d*, surrounded by the coils, D D, of insulated copper wire. These coils are connected in the circuit of the telephone line by the wires L T. Opposite the cores of the electromagnetic coils D D, which are covered with gold-beater's skin, are the ends of a bar armature, *s n*, kept from actual contact with the cores by the film. This armature is attached by its middle to a bar of brass, *f g*, which swings on the axis *o*, fixed to the post *p*, which is made in one with the bracket B. The lower end of this bar, which is free to oscillate, is traversed by a screw carrying at one end a small hammer, H, which rests against the centre of a thick ebonite disc, M (Fig. 2), screwed to the resonator P, the whole being secured to the base-plate A, by the metal posts R R. By means of the screw V (Fig. 2), at the end of the hammer, the space between the poles of the magnet and the armature is adjusted to give the clearest articulation. The electric current coming in from the line traverses the coils of the electromagnets D D, and attracts the end of the armature *s n*, with a force varying according to the variations of the current — that is, according to the undulations of speech; and the hammer on the other end of the armature beats upon the plate in a corresponding fashion, and excites a sound in the ebonite disc, which is a reproduction of the original speech.

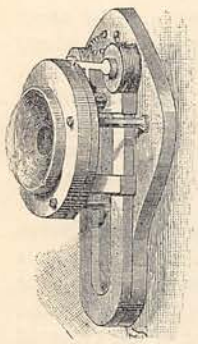


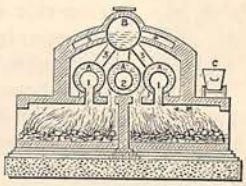
FIG. 3.

A Movable Fence.

In some parts of the country it is often desirable to use fencing that can be quickly erected, removed, or repaired, having regard also to strength and durability. Such a fence can be put up in a simple and inexpensive way. A number of posts set in pairs in Λ form, and connected at top and bottom by brace-bars, are erected in sockets of earthenware tiles. The top rails rest on the brace-bars, the overlapped ends of the rails being "locked" by the overhang of the inner edges of the tops of the posts, thus doing away with special means of adjustment. From the overlapped ends of the rails, stout wires are suspended and bent in upon themselves at regular distances, for the purpose of making "eyes" or supports in which the lower rails are held. The wire hangers are used at each end of the rail, and thereby keep the lower rails separate, saving material, and allowing of the ready removal of any bar. The ends of the lowest rails may be connected by splice-bars or bolts; and the fence may be steadied in high wind by the use of galvanised wires passed round these splice-bars and secured firmly to plates in the ground. The bars may be further supported by metallic or wooden braces running diagonally across the fence.

A Coking Boiler.

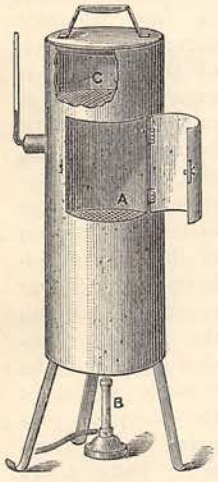
The cost of electric lighting is very considerable owing to the expense of coal for burning in the engines driving the dynamo-electric generators. The new coke boiler of Mr. Courtenay Kingsford, by which coke is made while steam is produced, may however be the means of lowering the cost of electricity for lighting purposes. The figure represents a section through such a boiler, the coke ovens being shown below, and the boilers, A A A, with flame-flues, 1, 2, 1, above. The steam chamber, B, is shown over all. The flames only leave the boiler after passing by the flues, 3, 3, 4, and 5 to the chimney. Coal is fed into the coking fires by the small truck shown at C. All smoke is consumed by the plan in question, and for this reason it is also suitable for electric lighting in towns. Such a boiler 18 feet long by 3 feet in diameter, evaporating 300 gallons of water per hour, will produce 160 tons of coke per month from, say, 266 tons of small coal. That is to say, nearly 9 tons of coal are coked per day of 24 hours.



The Cleansing of Waste-Pipes.

It often happens that the waste-pipe from the kitchen sink or the bath becomes obstructed so much as to prevent water from flowing away rapidly. The accumulation of refuse—rags, paper, scraps of meat and bones, and other things—sometimes stops the pipe altogether. Then the plumber must be called in and expense incurred. A leading American journal describes a simple, cheap, and effectual method of clearing the pipe. Before retiring at night, the servant should pour into the pipe enough *liquid* potash lye of

36° strength to fill the "trap," or bent part of the pipe just below the outlet. About one quart will suffice for a bath or sink. *See that no water is allowed to run in till next morning.* During the night, the lye will transform all the refuse matter into *soft soap*, which will be entirely washed away by the first current of water next morning. The lye should be kept in heavy glass bottles, covered with wicker-work, and be locked up when not in use. It does not act upon metals, and does not therefore "eat" the pipes like strong acid. The gentleman who describes this interesting and useful means of cleansing waste-pipes states that, in an experience of over thirty years, he has never had occasion to make more than two applications of the process in any one case.



A Drying-Stove.

The drying-stove illustrated is the design of M. Thierry, a French chemist. It consists of a metal stove, having two copper gauze grills, A and C, one above the other. The heat necessary to determine the upward current of drying air is set going by the Bunsen burner, B, under the stove. The stuff to be dried is placed on the grills, seen through the sides of the stove. Chemists and others will find this apparatus useful.

Granolithic Conduits for Electric Wires.

The term "granolithic" is applied to an artificial stone invented by Messrs. Berry and Stuart, which is being used for paving purposes, and which is a non-conductor of electricity. It is therefore likely to be useful for making conduits for holding electric wires laid along the streets in cities. These wires may either be bare or insulated, and they are laid in grooves cut in the stone. Electric light or telegraph wires can in this way be laid, as it were in the pavement itself, or at least under it, and they will thus be more easily got at than when laid in iron tubes as they are at present.

Useful Pair of Shears.

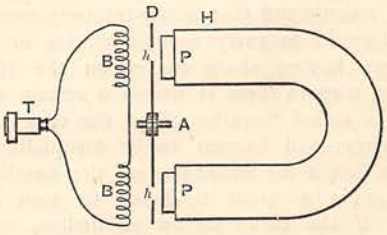
The Americans have a wonderful knack of producing what they call "combination" tools, and one of the latest inventions in this particular line well maintains their reputation for novelty and ingenuity. The tool is intended for cutting wire and tin ribbons, such as are used for fastening boxes which have to carry very heavy goods, and stand much knocking about. It combines a pair of shears, a tack-hammer, a claw for pulling out tacks, and a screw-driver. The shears are provided with bow handles like those of an ordinary pair. One bow is furnished with a little hammer-head, and the other with a claw so placed that the part of the bow just in front of it will supply a fulcrum when the tool is used for tack-drawing. The two cutting edges are made on a line with the pivot, so that a powerful and firm grip may be had for cutting tin or wire. One blade is made short, and the other is longer and tapers towards its extremity into the shape of a screw-driver blade. This is a fair example of the *multum in parvo* class of article with which we are becoming so familiar in this country.

Glass Sewer-Pipes.

The suggestion has been made that considerable sanitary advantages would result from the use of sewer-pipes made of glass. It is possible that the experiment of producing such pipes may have been tried, but we are not aware of it. The probability is that they could not be made at a sufficiently low price to induce builders and others to use them. Apart from this consideration—which is, however, of the utmost importance—there is no doubt that glass sewer-pipes would not only be very durable, but, owing to their smooth hard surface offering no hold for the lodgment of refuse matter, would possess great value from a sanitary point of view.

New Use for Old Quills.

There has been and is, it is known, a growing scarcity of whalebone, owing to the increased wariness of the great marine mammal and other causes. This has, of course, enhanced the cost of the material. Various substitutes have been from time to time employed, such as cane, steel, bones, rubber, horn. The notion, however, has occurred to an ingenious inventor that the quill portions (stalks or stems) of feathers after they have been stripped—as, for example, those of geese, turkeys, chickens, and other "birds"—might be utilised, after certain mechanical "treatment," for the purpose which whalebone commonly serves. These have hitherto had little or no commercial value, and might be turned to account in this way. He contends that they would make a better substitute for whalebone than any yet devised. Not only could this new stiffening material be used for ribs for various articles of dress, but also for some kinds of surgical appliance, for elastic rods (such as whips) and for other purposes. The idea is certainly novel.



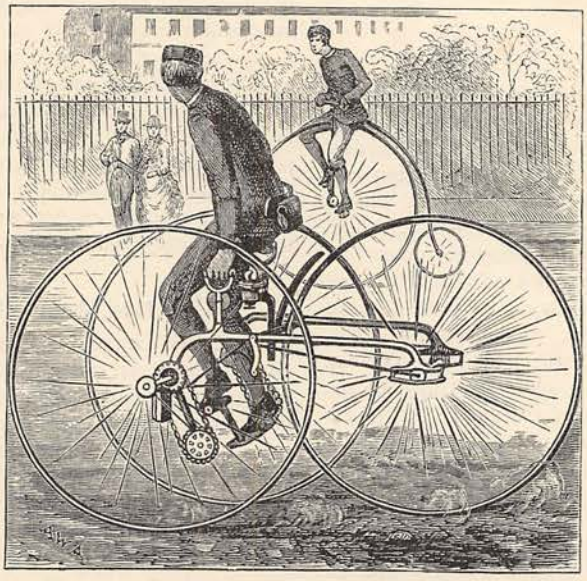
The Magnetophone.

Professor Carhart, of Evanstown, Illinois, has devised a curious apparatus, which is a kind of "magnetic syren." It consists of a powerful horse-shoe magnet (see the figure) having the poles, P P, placed on

one side of a metal disc, D, which is mounted on an axle, A, so that it can be rapidly rotated. On the other side of the disc are placed two bobbins of wire, B B, in circuit with a telephone, T. Holes, *h h*, or V-shaped grooves (it matters not which), are cut in the disc round its rim, and these holes pass in front of the bobbins as the disc revolves. Now the metal disc has the effect of screening the bobbins from the magnetism of the poles, P P, except when the holes pass between. Hence there is an induction of electricity in the bobbins by the magnetism every time a hole passes; and a note is caused in the telephone by the rapid succession of electric pulses set up by induction as the disc rotates. The pitch of this note is proportionate to the speed of the disc.

A Quadrant Tricycle.

The figure illustrates a new tricycle termed the "quadrant," which has three wheels of equal size, so that the weight is equally divided amongst them. This gives the steering or third wheel a better "bite" of the ground, and facilitates the act of steering. The machine is open-fronted and is braked at the axles. The axle of the hind wheel revolves in sliding boxes, operated by a steering-rod.



A QUADRANT TRICYCLE.

A New Mode of Joining Tramcars.

The fatal accidents which have occurred at Birkenhead, Blackburn, Huddersfield, and elsewhere, through the overturning of tramcars, have led the Board of Trade to recommend that steam-tramway companies be not licensed to carry roof-passengers on steep-grade lines having sharp curves on the inclines. In turning corners there is always a certain amount of what is called "overhang" of the cars; and if the passenger-load happen to be unequally distributed, so that it preponderates on the overhanging side, there is a great tendency to turn over—especially if the curve be on an incline, and the car be travelling at a quick rate of speed. To obviate this risk, and also to provide a superior mode of connecting tram-engines with their cars, an invention has been patented by Mr. E. C. Wickes and Colonel Beaumont, R.E., by which the car is divided into two parts—one portion containing the engine and part of the passengers, and the other carrying the remainder, inside and outside, altogether fifty-six persons. The length of the whole is less than 30 feet, or about 5 feet shorter than the space occupied by two horses and car carrying forty-six persons. The car is jointed about the middle, and held by a perch-pin in the floor and roof, which enables the car to move freely in a lateral direction, and to take the sharpest curves with ease, each portion tending to keep the other on the line. The passage between the two is about a foot in length, and could be dispensed with entirely. It is protected from the weather by cylindrical shells moving within each other, in such manner that in the sharpest curves no portion of the passage is exposed to wind or rain. The overhang being, so to speak, cut in two, is deprived of all danger—the latter portion of the vehicle following the former round the curve with the greatest freedom; and thus the valuable roof-space for carrying purposes is not sacrificed, whilst safety from upsetting is practically insured. Where mechanical power is employed, the advantage of this is obvious, as every passenger carried tells in the receipts; and however great the load, there is no "cruelty to animals." The cars are of handsome appearance; and being used with compressed-air engines, nothing is seen of the latter, which occupy about 6 or 7 feet of the front portion of the car, and are of course free from the heat, smoke, steam, or fumes of the ordinary steam-locomotive. The mode of junction is said to be equally applicable to connecting steam-engines with their cars, or for connecting a series of ordinary railway carriages. Cars according to this patent have been constructed for use on one of the suburban tramway lines of the Metropolis, and are shortly expected to be in daily operation.

SONG COMPETITION.

Intending competitors are reminded that, in accordance with the regulations published in our June (1883) *number, February 1st,* 1884, *is the latest date for receiving MSS.*