

pie of two to four pounds in weight is quite large enough to bake with certainty as to the contents being thoroughly cooked, and the crust free from cracks; but don't be discouraged, for if the last catastrophe should happen it will probably be a sign that you have been over-liberal with the fat, and the gap can be concealed very easily with a few sprigs of parsley.

Now as to the time the pies should remain in the oven: the thing is to hit the happy medium between "cinders and rawness"—easier said than done, so far as some people are concerned. However, see that your oven is hot when the pie is put into it—ten minutes in a cold oven, and it is doomed to fall; the heat may then, in a quarter of an hour or so, be reduced a little; still, the oven must be "sound," and kept as nearly as possible at a uniform temperature. If your pie gets gradually brown as the baking goes on, and retains its shape, rest contented; if, on the other hand, the crust falls—that is, the pie spreads out, decreased in height—your oven is too cold, and if it becomes brown very quickly it is too hot.

Now for the finishing touch in the shape of gravy, which in all cases must be strong enough to "jelly." First, the meat pies: any bones uncooked can be stewed very slowly, until the stock is strong and reduced considerably; remember, you will only need about a tea-cupful for a two-pound pie. Season with salt and pepper, an onion, celery, or anything handy, as well as herbs and spices; a few drops of colouring can be put in, if preferred. If no bones are obtainable, simmer the flavouring ingredients in water, and when

oysters have been used add their liquor, and dissolve in it sufficient gelatine to set firm. In hot weather it will be well to add gelatine to the gravy made from bones.

For poultry and game pies the bones simmered with seasonings will suffice in cold weather; all the trimmings, such as heads of rabbits, necks of fowls, &c., to be put in. In hot weather use gelatine as well, or a calf's foot or cow's heel.

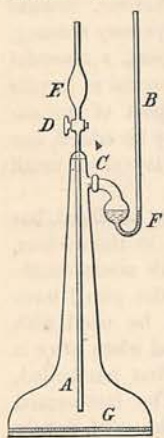
For sweetbread pie make the gravy particularly nice in flavour, and plenty of it, as the sweetbread will yield none of its own in the baking. A few drops of lemon-juice, or any vinegar—tarragon, cucumber, and the like—may be used to give piquancy; and a bit of "glaze" is a certain improvement at all times, as it not only stiffens, but gives colour and flavour as well. Let the pie stand some time before you gravy it, as the meat will gradually sink and it will consequently "take the gravy" better, which must be poured, while *quite hot*, through a funnel very gradually. The meat at intervals should be moved with a thick skewer.

Lastly, bear in mind that this kind of gravy will suffice only for pies that are to be served with the lids on; for those without lids it must be clarified with whites and shells of eggs in the usual way; as a rule, those who require it will know how to make it. It will perhaps be noticed that I have not introduced truffles into any of the forcemeats. I may say that I have omitted them solely because those people who can afford them and appreciate their peculiar flavour are independent of instruction as to their preparation.

## THE GATHERER.

### A Gas Escape Tell-tale.

A very simple and ingenious instrument for detecting leakage of coal-gas in a house, or on a larger scale the presence of fire-damp in mines,



has been designed by Herr von Thau. It consists, as shown in the figure, of an inverted glass funnel, having a porous diaphragm, G, across its mouth, and a glass tube, A, running up the stem. This tube communicates with the outer air by a stopcock, D, and mouthpiece, E. A lateral tube, C, springs from the funnel-neck and has a U-bend, F, on it, and a vertical leg, B, which forms a capillary gauge, and is graduated in divisions. The bend of the gauge is filled with water as shown. To use the detector, open the stopcock, D, to allow the air inside and outside the funnel to come to one pressure, then close the cock and hold the wide mouth of the funnel with its porous diaphragm over the gas-pipe. If there is a leakage, the light coal-gas or fire-damp will rapidly diffuse into the

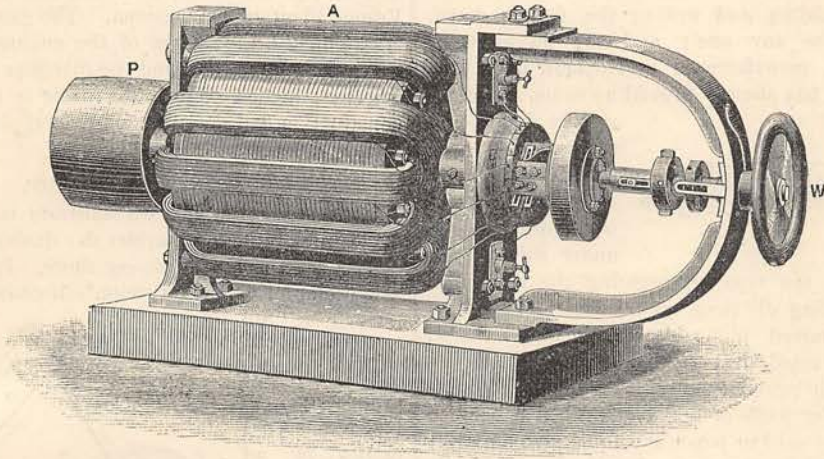
funnel, and the increase of pressure therein will be shown on the gauge by a rise of the water-level in the graduated stem. The rise in a given time indicates the percentage of gas in the air. Mr. Libins, an English inventor, has also devised a very similar apparatus, with this difference, that the pressure within the vessel swells out an elastic diaphragm, thereby closing an electric circuit and ringing an alarm bell. This device therefore serves to announce to a household, or to miners in a pit, that gas is escaping in dangerous quantities.

### Storm-Sounds in the Telephone.

A Belgian has lately studied the phenomena in a telephone during a thunderstorm which occurred at Brussels on June 30. The line was provided with a proper lightning protector, and there was therefore no personal danger. During the height of the storm he heard a continuous noise in the instrument, which he compared to the sound of frying. From time to time it grew louder; sometimes there would be a little popping sound, like a bubble bursting, and sometimes the series of crackling noises which attend the fall of a drop of grease on a red-hot plate. This latter noise

came abruptly and loud with each flash of lightning, and seemed to precede it. The observer noticed that his ear heard this sound before his eye perceived the flash. The same noises were produced when there was no flash, but then they were less loud. These sounds prove the existence of currents of electricity in the telephone wires during a storm, and the inference is that telephone lines may be a source of safety to a city, since they may help to discharge the lightning. But they also show that a proper lightning protector is necessary to each instrument.

double covering, the space between being filled with sawdust to retain the heat, and is divided into two parts. The lower half contains a reservoir, which holds about sixty litres of water and is fed by a patent boiler, which stands outside the box and is warmed by an oil lamp, or hot water may be used by itself. The upper portion of the box forms a warm chamber where a small basket or cradle is placed, large enough to hold one or two infants. From an opening at the side this cradle can be withdrawn; and a glass covering to the box allows the child and a thermometer to be watched



#### A New Electric Motor.

The figure illustrates a useful little electric motor for driving drills, lathes, tricycles, &c., devised by Professors Ayrton and Perry, the well-known electricians. The chief peculiarity about it is that it reverses the usual condition of things, and the field magnets revolve while the armature is stationary. In the figure, A is the stationary armature of large size enclosing the magnets. The coils of this armature are joined to the stationary commutator, C, which is sometimes flat, sometimes round. The brushes revolve over the commutator, producing a north and south pole in the armature as they travel. The rotating field magnets are carried by a spindle. The speed and direction of revolution of the motor are determined by the position of the brushes. The wheel, W, serves to adjust this position. The pulley, P, is attached to the other end of the magnet spindle, and by means of a bolt drives any other machine connected to the motor.\*

#### A Mechanical Nurse.

The French *couvreuse*, or mechanical nurse, designed more especially for very delicate or prematurely born children, has proved very successful on trial at one of the Paris hospitals. It is an invention of Dr. Tarnier, who adapted the idea of the chicken rearer of the *Jardin d'Acclimation* to this purpose. It consists of a plain wooden box measuring about 2 feet 8 inches by 2 feet 4 inches, and 2 feet 4 inches in height. It has a

from time to time. The fresh air is heated by the water vessel before it reaches the child. The temperature is kept at about 86° F., and though the change of temperature on withdrawing the child to be washed is considerable, colds are very infrequent results. It is proposed to supply every French hospital with one of these mechanical nurses. Small portable *couvreuses*, which can be carried by hand from house to house, and perambulators made on the same plan are also suggested.

#### An Electric Ceiling.

One of the novelties in electric lighting, which elicited much admiration at the Vienna Electrical Exhibition, is a hall, having its ceiling in the form of a dome, painted blue to represent the sky, and "thick inlaid with patines of bright gold" in the form of small star electric lights. The effect is very pretty, and adds another to the many beautiful ways in which electric lamps adapt themselves to decoration.

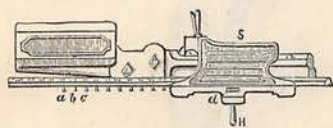
#### Coloured Metal Films.

Rainbow colours are produced on metal objects in various ways. Brass buttons, for example, are tinted by stringing them on a copper wire through the eyes, and dipping them in a bath of plumbate of soda freshly prepared by boiling litharge in caustic soda and pouring it into a porcelain dish. While in this solution they are touched one after the other with a platinum wire connected to the positive pole of a battery until the desired colour appears. The electric current must

not be too strong, and the colours are enhanced by rinsing the buttons in water and drying. A golden yellow colour is given to bright brass by dipping it in a neutral solution of acetate of copper, greyish green by repeatedly painting it with dilute solution of chloride of copper, purple by rubbing hot with chloride of antimony, and golden red by rubbing with a paste of four parts of prepared chalk and one of mosaic gold.

#### A Registering Steelyard.

The advantages of a steelyard or weighbridge which will print its own record on a ticket, and thus prevent mistakes in reading and writing the figures down, are obvious to any one; and the invention of M. Chameroy, manufactured in England by a Birmingham firm, has already proved its value. The device is simple, and consists in casting



raised types, *a*, *b*, *c* (see accompanying figure), on the under side of the balance beam, the type representing the figures of the corresponding divisions on the scale. The slide, *s*, which is moved along the beam until a true balance is obtained, has also a small bar sliding through it, with raised type on its under side to record the smaller parts of the load. When a balance is obtained, the card or paper slip to receive the print is then inserted in the hole, *d*, and by pulling the handle, *H*, it is pressed against the types and indented with the figures.

#### Artificial Breathing.

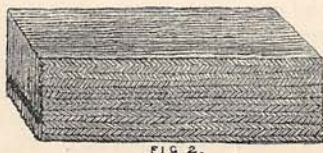
Professor Graham Bell, the well-known inventor of the telephone, has devised an apparatus for producing breathing action in persons found in a drowning condition, or who have swooned from sickness. The action consists in causing a partial vacuum over the chest, thereby making the latter rise and expand as it does in the act of breathing. This vacuum is then destroyed, and the chest collapses again. The action is kept up automatically until the breathing becomes natural.

#### Asbestos Packing.

Asbestos is now largely used for packing the cylinders of steam-engines, it being soft and an excellent non-conductor of heat. Mr. Bell's packing, shown in the figure, is made



of asbestos cloth, made waterproof with vulcanised india-rubber, and rolled into a rope. This form is shown in Fig. 1. Another form, with an india-rubber core, is shown in Fig. 2. After a year's wear this packing is sometimes found good.



#### The Earth Torpedo.

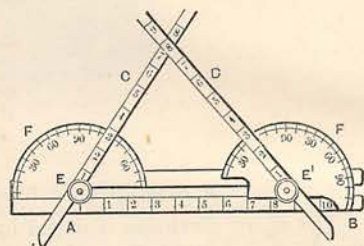
The new torpedoes invented by Herr von Lubowitz, an Austrian officer of Hussars, are designed to explode either by electricity or a mere jar. They are intended to be hidden in the ground at a slight depth and concealed with stones, turf, or brushwood, in order to injure an advancing enemy.

#### A Pigmy Locomotive.

The smallest locomotive probably ever built for regular work has just been made by Messrs. Buck and Co., of St. Louis, Missouri, and shipped to the Edmee Plantation, Louisiana. The gauge of the line is  $21\frac{1}{2}$  inches, the weight of the engine 5,250 lbs., its height 4 feet 7 inches, and the diameter of the driving wheel 24 inches. The little motor is very perfect in construction and designed for general plantation use.

#### Kelway's Telemeter.

The telemeter which we illustrate is an ingenious device for enabling a mariner to calculate his distance from a light or landmark on shore. It is of course also useful for "folks on shore." It consists of a base-



line, *A B*, and two arms, *C D*, each of which is graduated to inches and tenths of an inch. These arms are pivoted at *E* and *E'*, and can be freely moved over the

"protractors," or graduated arcs, *F F'*. These arcs are graduated in both directions from  $0^\circ$  to  $90^\circ$ , and also in  $\frac{1}{4}$  points of the compass. The right-hand protractor and arm can be moved along the base-line, *A*, and clamped in any position. In using the instrument, the operations are as follows:— (1) Take a bearing of the light, or other distant object, noting the exact time. (2) Place the left-hand arm to the bearing found and clamp it. (3) Let the vessel run for a given time on the same course, and take a second bearing. (4) With these data, and the speed of the ship, a printed table accompanying the instrument gives the distance run in knots and fractions of a knot. (5) On the base-line, *A B*, set the protractor, *F'*, to the distance thus found; place the arm, *D*, to the second bearing, and the graduation at which the arm, *D*, is cut will be the distance from the object at the time of the second bearing. The instrument is of course also applicable to surveying and military operations.

#### How the Electric Light Affects Health.

There is no doubt about the electric light being superior to every other known kind of illumination in point of healthiness. Some facts recently published show this very clearly. An electric light, either arc or incandescent, of 100-candle power, burning for an hour, was

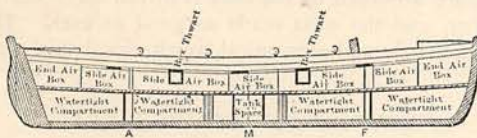
found to give no water or carbonic acid, whereas the quantities for other illuminants were considerable. Thus the water in kilogrammes per hour for 100-candle lights was as follows :—For an argand gas-burner, 0.86 kilos. ; a flat-flame petroleum lamp, 0.80 ; colza oil lamp, 0.85 ; paraffine candle, 0.99 ; tallow candle, 1.05. The corresponding products in carbonic acid were 0.46, 0.95, 1.00, 1.45. The tallow candle is, therefore, the most unhealthy form of light in use in civilised countries. Again, as regards heating, the electric arc light produced from 57 to 158 calories per hour ; the incandescent, 290 to 536 ; gas, 4,860 ; petroleum, 7,200 ; colza oil, 6,800 ; paraffine candle, 9,200 ; and tallow candle, 9,700. It is believed that one gas-jet in a room or hall vitiates as much air as six human beings. According to other experiments made in a theatre at Munich, gas-lighting developed ten times the heat of incandescent lights. We may add, however, that the electric arc light produces a small quantity of cyanogen, and it is therefore better adapted for out of doors ; while the incandescent, being entirely excluded from the air by the vacuum bulb, is absolutely healthy, and therefore best suited for houses, hospitals, offices, and such-like places.

**Soap Varnish.**

This varnish, owing to its cheapness, complete resistance to water, and elastic nature, is valuable for many purposes. To make it, boil good tallow with soft water until dissolved, and filter while hot through cloths ; heat again, add an equal volume of water, and a boiling solution of alumina as long as an alumina salt is precipitated. Let the stearate of ammonia settle from off the water, and wash the precipitate thoroughly, then dry and heat on a water-bath until transparent. Finally, stir the preparation into turpentine heated nearly to boiling until a solution is made of the consistency of thick varnish, which can afterwards be thinned with more turpentine if required.

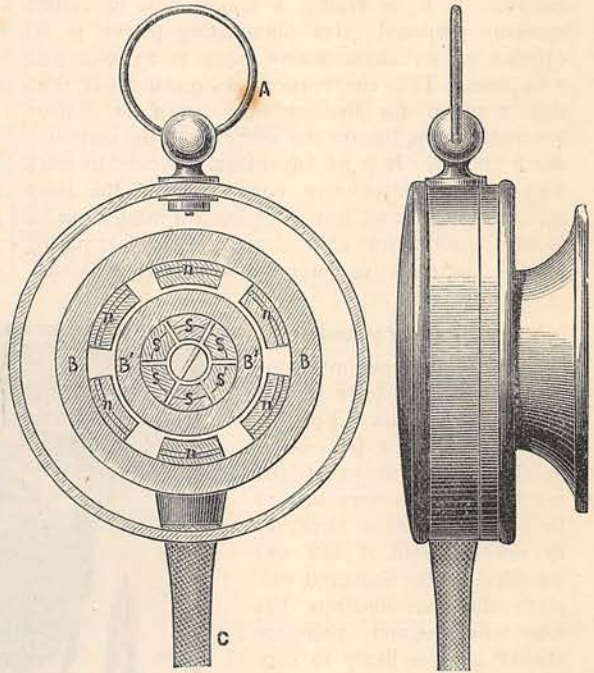
**An Unsinkable Boat.**

A new life-boat, held to be unsinkable, attracted considerable notice at the Fisheries Exhibition. It is constructed by Messrs. Baharie and Adamson, of Sunderland. The figure exposes the internal structure, which consists of air-boxes and water-tight compartments, the latter being underneath. The air-boxes are fitted round the sides of the hull, which is made of larch and lined with cork. The whole interior is further



lined with india-rubber to make it water-tight in all weather. Pipes are fitted through the deck and bottom of the boat with self-acting valves, so constructed that water shipped by the craft runs out by these pipes to sea, while none can come in by them. A twenty-four feet boat on this plan is now doing service on the China

coast. Her weight is eighteen hundredweight, and with thirty men on board she only draws fifteen inches of water.



**A New Telephone.**

A telephone, which bears a singular resemblance to a watch, has been invented by M. Testu, of the French telegraph service. As shown in the illustration, it consists of a circular box, of a watch shape and size, and the front fitted with an ear-piece to put the ear to in listening. The interior consists of two circular coils of fine insulated wire, B B'. These coils are concentric with two rings of magnet poles, n and s, all the poles of one ring being of north polarity, and all those of the other ring being of south polarity. These coils and poles are covered by a thin iron plate, or diaphragm, free to vibrate over them, and placed between them and the ear-piece. A ring, A, serves to hang the telephone on a peg ; and the cable, C, conveys the current in wires to the coils. On listening in the ear-piece, the vibrations of the iron plate, set up by the telephonic currents, are plainly heard.

**A New Quinine.**

*Cinchona ledgeriana* is a new species of cinchonacree which promises very well. The bark is said to yield from 10 to 13 per cent. of quinine. Hitherto the difficulty has been to obtain seeds, but Mr. T. Christy, F.L.S., an authority on these matters, has now succeeded in getting them, and raising seedlings for those interested in the culture of the plant.

**The Bernstein Electric Lamp.**

The Bernstein incandescence lamp, as exhibited at the Vienna Electrical Exhibition, is in some respects a great advance on the older forms, especially in economy

of lighting. The carbon filament within the vacuum bulb of glass, instead of being solid and very slender as in those of Swan, Edison, and others, is made hollow. It is, in reality, a hollow tube of carbon specially prepared. Its illuminating power is 65 candles for an electromotive force of 23 volts and 7 amperes. This electromotive is much lower than that required for the ordinary Swan or Edison 20-candle lamp, but on the other hand, the current is much greater. It is an advantage, however, to work with a low electromotive force, because the lamp endures longer, and, moreover, several lamps can be strung in series one after another, without requiring a high electromotive force dynamo to light them.

#### A Steering Perambulator.

The ordinary perambulator is well known to have several serious drawbacks. For example, it cannot be steered in the proper sense of the word, and it is very apt to be tilted over on a slope, or to run downhill if left unattended. The improved carriage which we illustrate has four wheels, and therefore should be less likely to capsize. Moreover, it can be readily steered, without raising any wheel, by moving the right of the two pushing handles (seen behind) in the direction the vehicle is desired to turn.

#### Light and Anthracene.

M. Tommasi, a French chemist, has observed the curious fact that clear cold anthracene liquid contained in a glass phial becomes turbid with crystals on exposure to light, without the liquid undergoing any chemical change. This new observation will probably find its use ere long.

#### Phosphor-Copper.

Dr. G. Otto, of Darmstadt, has brought out a new alloy of phosphorus and copper, containing 15 per cent. of the former substance, and intended for mixture with other metals. The action of phosphorus on copper is to produce a looseness of grain, combined with great elasticity. It reduces the oxygen which copper and copper alloys hold. The new alloy is cast in bricks, and may be added to copper alloys of all kinds free from tin—such as brass, German silver, and so on. It can also be used in refining copper. Phosphor-nickel is another useful alloy, prepared by

M. J. Garnier, and utilised in forming alloys of iron, zinc, and copper.

#### Palm-Paper.

The dwarf palm, or palmetto, which grows wild on the hill-sides of Algeria, is now being used for manufacturing paper. The fibre is remarkably strong, and every part, from the stalk to the topmost leaves, yields fibre. The plants are placed in a kind of cage, which is immersed in a boiler filled with a special lye, and heated. The fibre can then be separated from the softened skin and tissues. After being washed, rolled, and combed repeatedly, according to the fineness of quality required, the fibre is at last steeped in pure water, and made into bundles for transport. The vegetable hair thus made is finer than any other known, and readily takes all dyes without requiring to be bleached. As the whole of the tannin is not extracted from the fibre in the above process, it does not readily decay, while it is at the same time aromatic and antiseptic in its nature.



A STEERING PERAMBULATOR.

#### Caustic Soda Fuel for Engines.

A German engineer, M. Moritz, has invented a traction engine for use in streets, or wherever absence of smoke, steam, and noise is desirable, and employs caustic soda to absorb the exhausted steam, and liberate part of its latent heat to produce additional steam to drive the engine. If exhaust-steam at a temperature of 212° F. be injected into a solution of caustic soda of a specific gravity of 1.7, the temperature of the mixture rises to about 374°, while the vapour tension does not exceed one atmosphere. This hot solution is made by M. Moritz to replace the fire in the boiler. The soda acts in a double way: it condenses the exhaust-steam and produces the pressure-steam. For this purpose the boiler is surrounded with a reservoir of caustic soda. The moisture absorbed by the soda is driven off again by heating, and the soda made as good as ever. The engine is light and economical, weighing only five tons.

#### PRIZE STORY COMPETITION.

*Notwithstanding the unusually large number of MSS. received for this competition, the Editor hopes to be able to publish the award of the Adjudicators in an early issue of the Magazine.*