

THE GATHERER :

AN ILLUSTRATED RECORD OF INVENTION, DISCOVERY, LITERATURE, AND SCIENCE.

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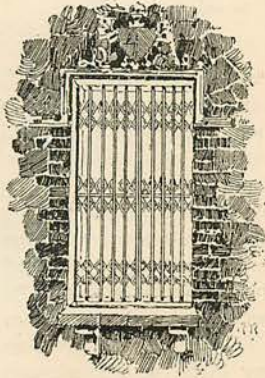
Folding Gates.

FIG. 1.

Our illustrations show a new sort of folding gate and shutter recently introduced. They are made on the principle of the "lazy tongs," and can be closed or opened without altering their height. By this construction gates ten feet wide, when expanded, can be shut into a space of about ten inches wide, and pushed back into recesses provided for them in the door-posts or sides of windows out of sight.

The shutters, being of open work, can also guard the window without excluding light and air. They are made of rolled steel, and of different ornamental patterns. Fig. 1 illustrates a window-shutter closed for the night. Fig. 2 shows a gate for a passage-way—one half expanded, the other shut up in the recess of the pillars.

Making Pipes by Electricity.

Steam-pipes of copper are now made by electro-deposition from sulphate of copper solution. The pipe is formed on an iron core in the depositing bath, and the deposited copper is pressed by a moving tool as it is deposited, so as to give a fibrous strength to the crystalline copper. After the pipe is thus formed, it is subjected to hot steam, which expands the copper shell, or pipe, clear off the iron core, thus separating the two. These pipes have no joint, and are said to be very strong; tests showing that they break with strains of from 27 to 41 tons per square inch.

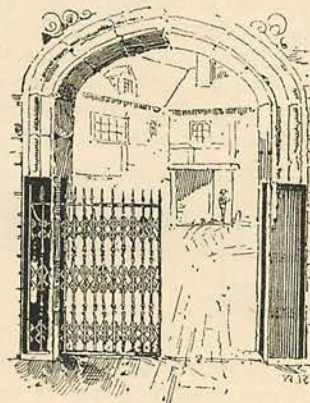
A Red Rainbow.

At a meeting of the Royal Society of Edinburgh on January 30th, Mr. J. Aitken described a monochromatic rainbow seen on Christmas Day, near Falkirk. Its colour was red, and red only; and the circumstances were as follows:—In the eastern sky he saw a curious pillar-like cloud illumined by the setting sun with a vertical glow which he found to be a fragment of rainbow, which gradually became a complete arch spanning the north-eastern heavens. It appeared as a mysterious bow of blood, all the other colours being hidden by the strange red hue. After a time, by careful inspection, he detected traces of yellow, but no other

tint. In place of the other colours he observed a dark band of about the usual breadth of these colours. Outside the rainbow he observed part of a secondary bow, and also several spots of a supernumerary bow. Mr. Aitken remarked that the Ochil hills to the north of where he stood were clad in snow and illumined with a ruddy light from the sun. He therefore supposes that the solar light was robbed of its green and blue rays to a large extent, and hence the natural spectrum of it, which a rainbow is, was deficient in those rays. Had we lived in ancient times, the phenomenon would probably have been considered a portent of a warlike and disastrous character.

A Miniature Railway.

The King of the Belgians has presented to the Sultan of Morocco a miniature portable railway and train, consisting of a locomotive and a carriage capable of seating twelve persons. The line has a gauge of 60 centimetres (about 23½ inches); and a piece of the entire track, 5 metres (5½ yards) long, weighs only 80 kilogrammes (1½ cwt.). The engine develops about 4 horse-power, and draws the car at a speed of about nine miles an hour. The locomotive is constructed of phosphor-bronze and steel to combine strength with lightness. The fuel to be burnt is wood, and an American spark-catcher is provided. The entire weight of the engine with its load of fuel is 1,400 kilogrammes (27 cwt.). It is inscribed the "Occident" in Arabic characters, and the train is designed for the exclusive service of the Sultan, at Morocco.



FOLDING GATES.—FIG. 2.

Chess by Telephone.

Games such as chess and draughts are now played by telephone and telegraph. The telephone exchange

system renders this easy of accomplishment, the two players telephoning their respective moves. It may be added here that Edinburgh, Glasgow, Stirling, Dundee, and Kirkcaldy are now connected by telephone, so that men of business in any one of these towns can talk together without undertaking a railway journey. These advances foreshadow the day when the telephones will be worked by the Post Office as the telegraphs are now, and inter-urban telephony extend throughout the country.

A Home-made Incubator.

With the aid of the following figures, an incubator may easily be constructed by a person used to carpentry. Fig. 1 shows the interior of the incubator,

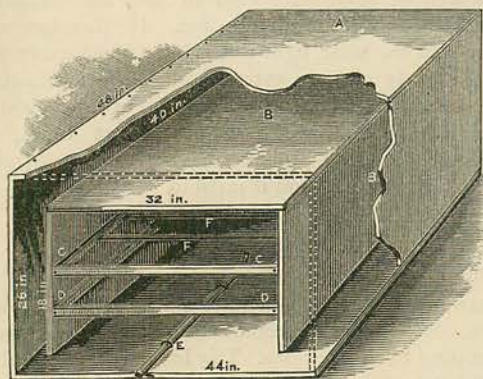


FIG. 1.

the outer box or cover being cut away for this purpose. The outer box, A, is 48 inches long by 44 inches wide, and 26 inches high. The inner box, B, is 40 inches long by 32 inches wide, and 18 inches deep. It holds a tank 32 inches by 36 inches in breadth and length. C C are strips 1 inch wide and 1 inch thick, with iron rods, F F, $\frac{5}{8}$ inch wide, on which the tank rests. D D are similar strips on which the egg-drawer rests. E is a $1\frac{1}{2}$ -inch tin tube, 2 feet long, which admits air to the ventilator, or space under the egg-drawer, which is 5 inches deep, and of the same length and width as the tank. Fig. 2 is a sectional plan, where A is a tube extending through the incubator into the tank: B is a faucet for drawing off water; C is the egg-drawer, and D is the tin tube. Fig. 3 shows the egg-drawer, which is 4 inches deep outside, and made of light

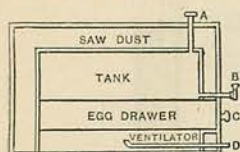


FIG. 2.

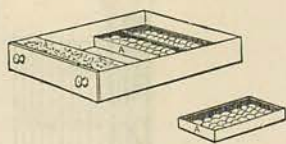


FIG. 3.

material. It is 39 inches long and 30 inches wide, containing three movable trays, $1\frac{1}{2}$ inches deep, and of a size to fit the drawer. The bottoms are thin strips 1 inch wide, and 1 inch apart, to both drawer and trays, over which muslin is tightly drawn and tacked. The tank is 7 inches deep. The faucet is detachable, and screwed in. The tube on the top

is 7 inches high. The space between the outer and inner boxes is filled with chaff or sawdust, and the front of the egg-drawer is also boxed off and filled with sawdust. The cost of this device is about a pound sterling. When completed, it has the appearance shown in Fig. 4. Each of these trays holds 80 eggs, put in promiscuously, as in a nest. The tank is filled with boiling water, which is drawn off if it rises to the tube, so as to prevent over-pressure. It is filled forty-eight hours before the eggs are put in, and the temperature brought to 115° .

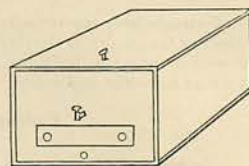


FIG. 4.

The eggs lower this temperature, and after several hours it will have fallen to 103° , at which it should be kept till the end of the hatch. It should be situated in a place where the temperature does not fall below 60° . The temperature is maintained by drawing off and putting in water, and for this a good thermometer among the eggs is essential. The drawers should not be opened while the chicks are hatching. The eggs should be turned twice a day, at 6 a.m. and 6 p.m.; and they should not cool below 70° . They should be given no moisture the first week, very little the second, and plenty the third. This is done by pieces of sponge dipped in hot water and put into the trays. A small glass door in front of the egg-drawer will show the thermometer. The positions of the trays are to be changed when the eggs are turned, the front one being put at the rear. After the fourteenth day, spray the eggs twice a day with water warmed to 100° , using an atomiser, and doing it quickly.

A Sleeve Chart.

The A1 Sleeve Chart is a new aid to dressmaking on scientific principles, thereby combining simplicity with economy of time, trouble, and material. The cardboard chart, with its bordering of inches marked as in a foot rule, is accompanied by a book of minute directions for drafting. This is accompanied by a sleeve diagram worked out to the measures from shoulder to elbow, and elbow to wrist, with widths of armhole, round elbow, and wrist. A man's sleeve is modelled to fit the arm as he carries it, straight down, in walking; a woman on the contrary carries the arm bent at the elbow, the lower arm raised and held across the front of the body; therefore, in taking the measurements, the arm has to be in a horizontal position, with the elbow bent, starting from where the arm separates from the body, over the elbow to the wrist. Having taken these dimensions in the figure, the pattern is marked out on paper by means of the chart, and transferred to the material with the aid of a double tracing wheel. No trying on is necessary, and a good fit is insured.

Dust Particles in Air.

Mr. John Aitken, a well-known investigator of the atmosphere, has recently made a series of experiments on the number of dust particles in ordinary air. So far his results show that outside air, after a wet night,

contained 521,000 dust particles per cubic inch; outside air in fair weather contained 2,119,000 particles in the same space, showing that rain is a great purifier of the atmosphere. The air of a room was found to contain 30,318,000 particles in the same space; that near the ceiling containing 88,346,000 particles per cubic inch. The air collected over a Bunsen flame contained no less than 489,000,000 particles per cubic inch. The numbers for a room were got with gas burning in the room, and at a height of four feet from the floor. These figures, though not absolute, show how important is the influence of a gas-jet on the air we breathe, and the necessity for good ventilation in apartments. Mr. Aitken remarks that there seem to be as many dust particles in a cubic inch of air in a room at night when gas is burning as there are inhabitants in Great Britain, and that in three cubic inches of the gases from a Bunsen flame, there are as many particles as there are people in the world.

A London Meteorite.

During the violent thunderstorm which burst over London on August 17th last, a small mass of meteoric iron or "thunderbolt" was found in a garden at Brixton. It has since been analysed by Mr. J. J. Morgan, of Ebbw Vale, who finds it to consist of silica 0.566, nickel 1.375, iron 40.276, sulphur 46.053, lime 5.478—total 99.748. The deficiency of .252 in the 100 parts is due to some mineral the chemist failed to find, or to experimental error. The "bolt" was in the form of an orange or "oblate spheroid," two inches across the thickest part. It is seldom that meteorites—the "all-dreaded thunderstone" of Shakespeare's *Cymbeline*—are found to fall so near home.

An Electric Travelling Lamp.

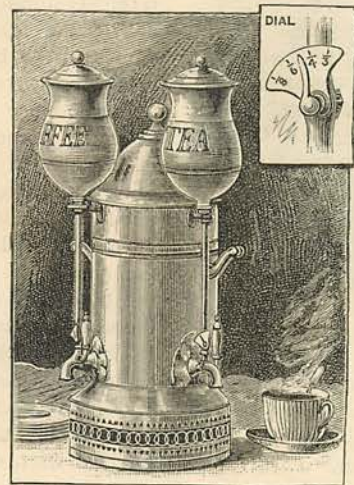
The figure illustrates a neat and portable railway reading lamp, made by a firm of well-known electrical



manufacturers. It consists of a small glow lamp, fixed in a reflecting case, which can be held in the hand or hooked to the dress. The current is supplied to it by means of flexible conductors, as shown; and the battery or accumulator, which weighs about 1½ lbs., is contained in the pocket or bag of the traveller. We may also mention that an electric watch-light, for use at odd times during the night either in a house or in such places as a captain's cabin, has also been introduced; the battery being of Leclanché cells.

A New Coffee Urn.

A new urn for dispensing tea and coffee in coffee taverns and refreshment rooms has been brought out, under the name of the "Willmott" tea and coffee urn.

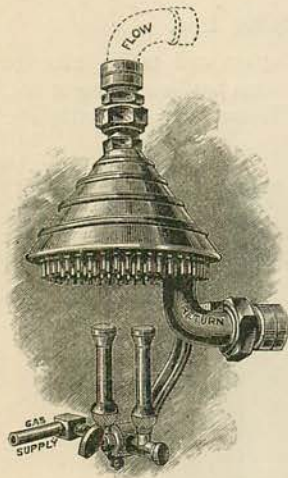


It is novel in principle and ingenious in construction. The aim of the inventor has been to avoid the long steaming and stewing of coffee or tea which is the result of the existing urns, especially at railway stations and coffee taverns, where there is not a very constant and large demand for tea or coffee. Under such conditions the same infusion is kept steaming and simmering for hours, until the aroma and volatile essences are evaporated, and the bitter principle of the infusion remains. The consequence is a very bad cup of tea or coffee. In the new urn the volatile essences are retained, and form part of the beverage; and this result is obtained, not by a fresh infusion each time a cup of tea or coffee is required, which would be out of the question in coffee taverns and railway stations, but by making a strong infusion of the tea or coffee in the first place, and keeping it cold in the reservoirs seen at the top of the urn to right and left. The interior of the urn contains water kept at a constant "head" of pressure, and heated by the usual gas-jets below. When a cup of coffee is required, the proper stopcock is turned, and the strong cold coffee and hot water flow out in a mingled stream, of a strength which is regulated at will by simply turning a pointer which moves round a graduated arc and controls the

outflow of the water. Of course the apparatus is available for other beverages, such as fruit syrups, and so on. It supplies a reliable and grateful cup of coffee with economy as compared with the old urns.

A Gas-circulating Boiler.

The accompanying figure represents a new gas-circulating boiler for greenhouses, introduced by Mr. Fletcher, the well-known practical chemist and inventor. As will be seen, the gas-jets under the boiler are large and powerful; but the novelty consists chiefly in the copper rods with which the bottom of the boiler is thickly studded. These convey the heat of the flames to the bottom of the boiler by conduction, and economise the heat, according to the plan devised by Mr. Fletcher some time ago, and applied to kettles. The pipes attached are for the supply of gas, and the flow and return of the water, as marked in



the figure. Various sizes of this boiler are made, that shown being suitable for a greenhouse. The smallest is only six inches in diameter and five inches high. It is capable of heating forty feet of pipe two inches in diameter. Larger sizes will heat from 60 to 120 feet of two-inch piping. The consumption of gas is given as one cubic foot for every five feet of piping of two-inch diameter; the temperature of the pipes being 80° F. above that of the surrounding air.

"Sunstroke" from a Furnace.

Dr. Defontaine, the medical officer attached to the French foundry at Creuzot, recently cited several cases of "sunstroke" from electric furnaces used at these works to fuse refractory ores and weld metals. The luminosity of the furnace is expressed as of 100,000 candle-power, or more, and though persons standing in this intense glow feel no unusual heat, they become conscious of acute pain, and for an hour or two afterwards experience a burning sensation and pain in the neck, face, and forehead, their skin at the same time turning a coppery red. Although it is customary to protect the eyes with dark glasses, the spectator is blinded for several minutes in broad daylight, and for nearly an hour afterwards the landscape appears of a saffron colour. The eyes feel gritty also, the lachrymal glands are stimulated, and sleeplessness with headache sometimes results. In ordinary sunstroke it is usual to blame the solar heat; but in this case there is little or no heat, and the effect is apparently due to the intensity of the light.

The Welsh Gold-Field.

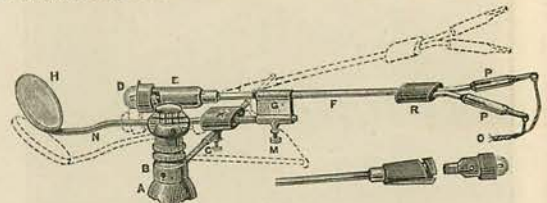
Mr. T. A. Readwin has given a geological account of the new gold-field in Wales, which has been brought before the public of late. The field was worked in a crude way by the ancient Britons; mines were rented by Mr. Thomas Bushell from Charles I.; and a mint was erected at Aberystwith, where £3 gold pieces were coined. Between the years 1631 and 1645, gold to the value of two millions sterling was taken out of the ground there. The field occupies an area of from 50 to 60 square miles in the mountainous part of Merionethshire, on the north bank of the river Mawddach. The rocks consist of slates, flags, grits, and veins of quartz, which contain the gold. These lie chiefly near the junction of the "Lingula flags" and underlying grits, especially in the neighbourhood of greenstone "dykes," that is to say, intrusive walls or partitions of greenstone. The gold occurs in association with ores of copper, silver, lead, and zinc, together with mica, barytes, traces of platinum, and other minerals. There are hundreds of such lodes from a few inches to 46 feet deep, all more or less auriferous. Mr. Readwin has made over 1,600 assays, and only fourteen of these gave no trace of gold. Nevertheless, Mr. Readwin counselled caution in respect of the new field, and said that not more than half to one ounce of gold should be expected from a ton of rock. The gold seems to occur in "pockets" or in irregular distribution, a condition unfavourable to profitable mining. The opening up of the field will, however, afford work to a large number of miners.

A New Safety Lamp.

Mr. Andrew Howat, a mining engineer, has improved the Davy lamp by covering it with an external shield of sheet-iron, which screens the wire gauze from air currents of high velocity, as well as preserving it from injury. An inlet in the shield permits the air to enter to the flame, and a flange or "deflector" inside the shield assists in deflecting the air towards the flame through the gauze. The result is a good light, and a lamp which has stood severe trials. In every case, it is stated, the flame has been extinguished when exposed to a current of explosive mixture, the greatest velocity of the current being thirty-five feet per second.

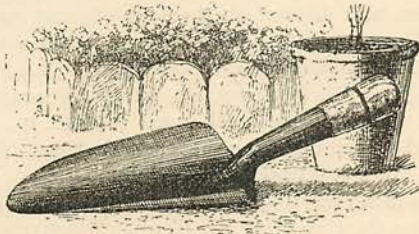
A New Odontoscope.

Mr. Vesey, whose laryngoscope is now used in London hospitals and on the Continent, has devised a



similar apparatus for enabling dentists to examine the teeth. It is illustrated in our figure, where A is an

ordinary dentist's gag, fitted with a spring adjustment for different patients; B is a revolving collar with an arm, C, attached, which carries the odontoscope proper; D is a small incandescent electric lamp to give the light, fitted in a bayonet joint, E, which releases the lamp instantly; F is a German silver tube sliding through a spring clip, G, to shift the light; and H is a mirror, which can be either plain or magnifying, as desired. M is a set screw to clamp G at any point on the stem or sliding rod N, which holds the mirror; O is a flexible conductor to the battery; and PP are spring terminals to this conductor; R is an ebonite socket to receive the tube F, and terminals PP; and K is an ebonite support for the rod N, sliding on the rod C. A four-cell Leclanché battery is used to give the light.



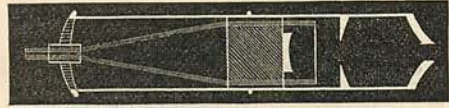
New Garden Tools.

Our figure illustrates a new and improved garden trowel, which has several advantages over the trowel in ordinary use. For instance, the blade and the "tang," or neck, are made in one piece of steel, instead of the blade being rivetted to a small plate on the tang. This makes it much stronger, and as the socket of the neck overlaps the handle, which is rivetted or nailed into it, there is not the same liability of the handle coming off, as in the case of the usual trowel. Another form of this trowel has a hollow, pointed tang, which is driven into the handle and held there by a brass ferrule. The hollow tang, acting like a spring, fastens itself firmly in the wood. A garden-fork for weeds and general purposes, also by the same manufacturers and patentees, is made in one piece of steel, and the flat prongs being twisted a quarter of a revolution, have their edges brought at right angles to the plate. This arrangement produces great strength combined with lightness. The tang, or neck, joining the fork to the handle is fastened in the same way as in the case of the trowel. A strong and light Dutch hoe is also made by the same firm. The old-fashioned hoe is welded where the fork joins the blade, or cutter, and either welded or rivetted where it joins the neck or socket. These two joints, which are sources of weakness, are avoided in the new hoe by making the fork, blade, and socket in one piece of steel. The result is a strong, light, and easily-handled tool. These very serviceable implements are made of different patterns.

A New Radiometer.

The figure illustrates a small and handy instrument for measuring radiation. It consists of a tube of vulcanite, 10 inches long and $2\frac{1}{2}$ inches in diameter,

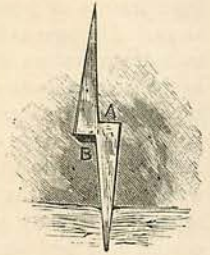
stopped near the middle by a plug of wood. The tube is separable, and the plug serves to unite its halves and support the working parts. Through the plug



pass two small copper rods, projecting about 1 inch above the plug towards the front of the instrument, and passing out through its back, where they serve to attach wires extending to a galvanometer. The thermal junction is made by uniting with hard solder a bit of watch-spring and a bit of flattened copper wire. The whole is then worked to a ribbon 1 millimetre wide, 0.03 millimetre thick, and 25 millimetres long. The two ends of this ribbon are then soldered to the two copper rods, so that the thermo-electric junction may be midway between them. A concave mirror of glass silvered upon the first surface is secured to the plug, so that the junction is exactly at its focus. The front of the tube is provided with an opening of any convenient size, and stops to limit the diameter of the entering ray. The thermo-electric current of electricity set up by the ray falling on the junction is measured by the galvanometer, and indicates the radiation. The device is much more sensitive than an ordinary thermopile arrangement. A lighted match held 6 feet away drives the galvanometer needle against its stops.

A New Double Nail.

The useful double-pointed nail which we illustrate has been invented by a lady, and will recommend itself by its convenience. The nails are made with "hammer heads" and "chisel edges," as shown in the figure, the hammer head A being above, and the chisel edge B below. The reverse sides are parallel to prevent splitting the wood. They are useful for a variety of purposes, such as the top of fences to prevent climbing, or for forming the teeth of rakes, harrows, and so on. Another important use is for invisible nailing in woodwork. The nails are driven into the wood flush with the outside head A, the chisel edge cutting into the wood. The piece to be attached is placed in position and blocked down, the nails securing it invisibly. The nails are made to suit every class of work, even the finest cabinet-making.



Danger in Newly-built Houses.

It has been estimated that the walls of a building in which 50,000 bricks are used require nearly 5,000 gallons of water in the construction, this being stored in the pores and spaces of the bricks and mortar until dispelled in the form of vapour. It cannot be too well known that until this large quantity of water is so dispelled, the house is not habitable. The town of

Basle, in Switzerland, has recently adopted a wise regulation which forbids the occupation of newly-built houses until four months after their completion.



An Electric Night-Light.

The accompanying figure represents a neat device for obtaining a light at night in bed-rooms. It consists of a suspended glow lamp of one candle-power, having a glass shade, and a push-button to make contact and start the current. Terminals are also fitted to the board above to connect it to conductors leading to the source of current. This may be a battery of four Leclanché cells in the absence of a dynamo or accumulator.

An Iron-Framed Chair.

Deck or verandah chairs are now being made with light frames of japanned iron, and detachable canvas seats. The canvas is very easily removed or replaced, so that the frames of the chairs may be left in position in the garden or on deck until their owners are ready to use them. All travellers know what an important gain this will prove on board ship. The frames fold up flat, three-quarters of an inch in thickness, with or without the canvas seat; and the latter, if rolled up separately, is only an inch and a half in diameter. A canopy to guard against the sun's rays can easily be fitted to these chairs.

A Sample Post Box.

The Sample Post has called into existence a new box, which has recently been patented. The box is made of tin, and two tongues of tin are soldered to the inner edge of the box and pass through corresponding slots in the lid, over which they are folded down. An address label, pasted over these tongues, secures the package from disturbance, and makes it perfectly safe.

A Strong Plea.

In the volume of essays edited by Lord Meath, and recently published by Messrs. Longman under the title of "Prosperity or Pauperism," a strong plea

is put forward for improved technical and industrial training. In addition to the Earl of Meath, the list of contributors includes Sir John Lubbock, M.P., Sir Philip Magnus, Professor Huxley, and Mr. Samuel Smith, M.P. There is much in the volume to interest all those who are concerned for the future of our commercial and artisan classes.

The Emperor-King.

"William of Germany" is the title of Mr. Archibald Forbes's life of the first German Emperor, published by Messrs. Cassell four days after the death of the old veteran. From first to last the monarch's long career was strangely chequered; its earlier years were disturbed by the Napoleonic invasion of his father's country of Prussia, his middle life was marked by suspicion and distrust on the part of great numbers of the German people. He was an old man when he succeeded to the crown, and after that he fought two campaigns. His last days, too, were saddened by the critical illness of his much-loved son and successor. Through all the changing scenes of the long life Mr. Forbes takes us, rapidly but vividly painting for us the important scenes, and giving us, withal, such an insight into the growth of the German Empire as only he can give.

Eight Hundred Years Ago.

By a strange coincidence, as we were writing the above note on a book called forth by the death of the Emperor William of Germany, there lay on our table an unpretending volume on the life and work of another William—known to us as "William the Conqueror"—who died almost exactly eight hundred years before his great namesake of modern days. This work, from the pen of Professor Freeman, is not intended to supersede the Professor's well-known larger works on the same subject, but is the first volume of a series of "Twelve English Statesmen" which Messrs. Macmillan are to issue. His very title would seem to deny William the right of admission to the roll of *English* statesmen, but no one can read Professor Freeman's admirable little volume and any longer entertain such a doubt.

Useful in the Family.

A new edition has recently been issued of "The Family Physician" (Cassell), a work which will be found useful in every family. It should be borne in mind that works of this class, like our own doctor's articles, are not intended to supersede medical men. Their aim is to enable any one to detect at once the first symptoms of disease, and so to treat them that the physician shall, at any rate, have no difficulties in his path. This work is most complete, and thoroughly reliable. The twentieth edition is issued, also, by Messrs. Cassell of "The Dictionary of Phrase and Fable," a work which has earned for itself a prescriptive right to a place on our bookshelves. It is always useful, and not infrequently entertaining. The bibliographical portion of the work has been revised with great care.