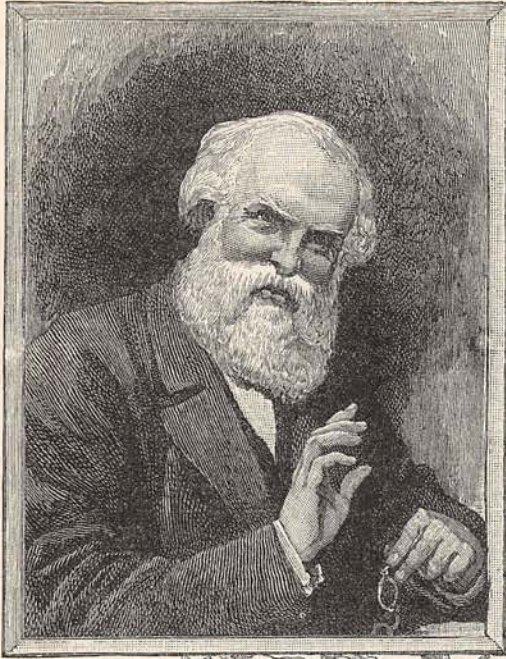


HOUSEHOLD SKETCHES.



XI.—OUR SAGE.

WHEN one who all the storms of life
Has battled through, and kept his truth,
Will give his wisdom's gathered pearls—
How rich a gift to ardent youth !

So, oft the listening circle bends
At twilight round the glowing hearth,
To hear our white-haired sage recount
His life-tales, with their moan and mirth.

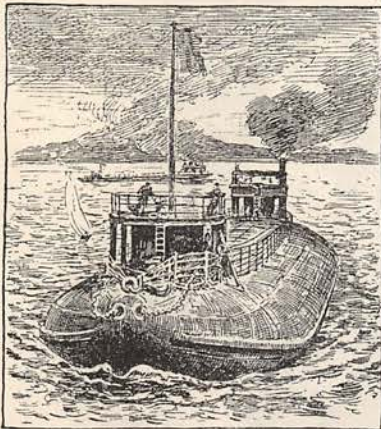


THE GATHERER :

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

Correspondents are requested, when applying to the Editor for the names and addresses of the persons from whom further particulars respecting the articles in the GATHERER may be obtained, to forward a stamped and addressed envelope for reply, and in the case of inventors submitting specimens for notice, to prepay the carriage. The Editor cannot in any case guarantee absolute certainty of information, nor can he pledge himself to notice every article or work submitted.

The Whale-back Ship.



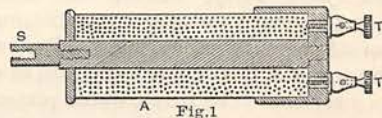
is the product of American lake and canal navigation, and has a light draught for its size ; but it is capable

The new type of vessel called the "Whale-back" (which we illustrate herewith) is built of steel throughout, and resembles a whale in shape; the bottom being flat, the back round, and the ends pointed. It

of crossing the ocean, as has been demonstrated by the dispatch of one to Liverpool and another to Vancouver Island. Some of these vessels are towed, others are propelled by steam power. The *Colgate Hoyt*, for example, is of 3,000 tons, and has a speed of fifteen knots.

Extracting Iron from the Eyes.

The magnet has long been used for extracting chips of iron from the eyeballs; but the apparatus has

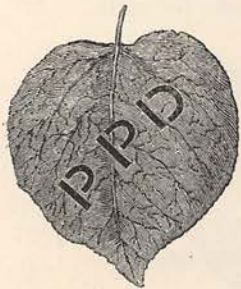


recently been given a very handy form by Dr. Thompson of Cardiff. Fig. 1 represents a section through



this instrument where A is an electro-magnet, consisting of a soft iron core, surrounded by a coil of insulated copper wire, and fitted with terminals, T T, to convey the current to the coil. In a prolongation of the core is a female screw, into which are fitted the special probes or points shown in Fig. 2. These are of soft iron and when screwed into position form part of the core. When the current is sent through the coil the core becomes a magnet, and so does the projecting point, which being applied to the iron chip imbedded in the flesh attracts it, and enables the operator to draw it out.

Starch in Leaves.



It is now proved beyond a doubt that starch is formed in the leaves of plants by the action of chlorophyl, the green colouring matter, and probably of light. A simple experiment for showing this has been devised by M. Deherain, a French chemist, and it is based on the well-known fact that starch forms a blue pigment with iodine.

As the starch which is made in the leaves by day is removed to the interior parts of the plant during the night, the experiment should be made in the early morning before sunrise. A leaf on a growing plant, by preference the *Aristolochia Siphon*, is placed between two sheets of black paper which are quite opaque and fixed there by gum arabic. The upper foil should have letters or a figure cut in it by way of a stencil, so that the parts of the leaf thus uncovered may be exposed to the daylight. After several hours of this exposure the leaf is culled, the foils removed by warm water, and the leaf bleached by steeping it in boiling alcohol, which takes away the chlorophyl. If now the leaf be dipped in tincture of iodine, the starch formed in it will show itself by marking the letters or figure of the stencil in blue. Our figure shows a leaf with the letters PPD brought out in this way by the union of the iodine and starch.

A New Engine Indicator.

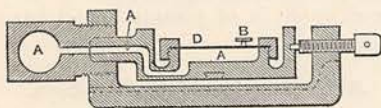


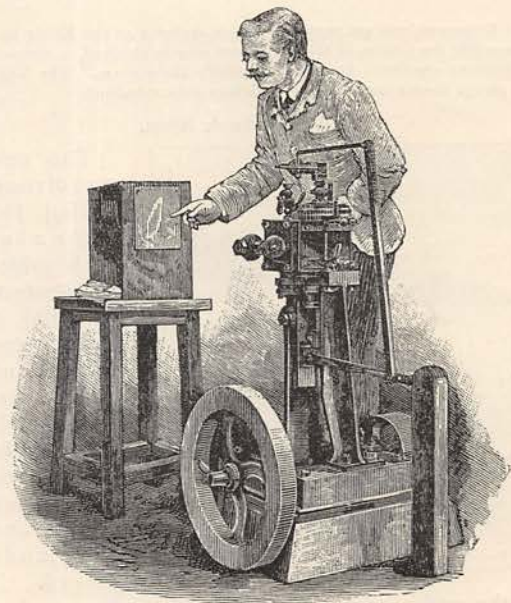
Fig. 1.

Professor John Perry, F.R.S., the well-known engineer, has invented an ingenious indicator of the pressure of steam in engine cylinders. Figure 1 will explain the action of this simple apparatus, of which it represents a section. The steam, whose pressure is to be measured, is admitted by the passage A A A to the back of a thin steel diaphragm, or drum-head, D, like that of an aneroid barometer, and bulges it out. A small round mirror, B, like a sixpence, is fixed on the diaphragm about half-way between its edge and centre.

On this mirror a ray of light falls, and is reflected to a screen of ground glass, where it traces out the diagram of the pressure, as shown in Figure 2. The apparatus can readily be applied to existing engines.

The Progress of the Electric Light.

We are apparently on the eve of a great extension of electric lighting in the United Kingdom. The work of supplying it has fairly begun in the Metropolis and other large towns, and is being pushed steadily forward. Thousands of lamps are added weekly to the district installations and the new illuminant has become a serious rival to the old. This result is due to the great improvements which have been effected in the apparatus for producing and supplying the light, and to the public becoming better acquainted with its advantages, not only in point of look but of healthiness. The improved means of supply have now brought the price of the arc light a good deal below that of gas, while the cost of the incandescent light is now about the same as gas, or just a little more. For example, the returns from nine of the chief towns in this country, where gas and electricity are both used, show that nine shillings per burner is paid for gas in a year, whereas ten shillings is paid for an equivalent glow-light in the same time. Most people have an impression that the glow-lamp costs very much more than the gas-jet. Some of the London companies only charge eight shillings and sixpence for a glow-lamp in a year. As regards the future, it can be shown theoretically, as was recently done by Mr. Preece, F.R.S., Chief Electrician to the Post Office, in his address to the municipal engineers, that electricity can be produced at one-third penny per Board of Trade unit (1,000 watts for an hour), which is equivalent to gas at 3d. per 1,000 cubic feet; but although gas might in some cases



A NEW ENGINE INDICATOR.—FIG. 2.

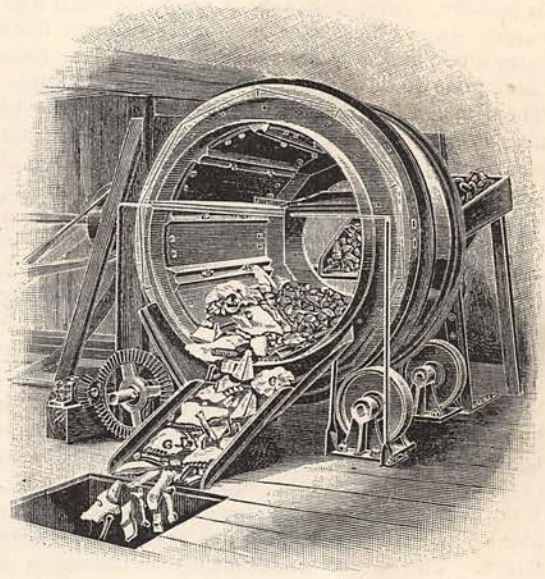
be supplied at one shilling or even tenpence per 1,000 cubic feet, it is not easy to see how the cost can be reduced to 3d. for a like quantity. Be this as it may, we are face to face with the fact that the electric light is no longer the "luxury of the rich," as Sir William Siemens justly termed it in its babyhood. It is now in reality the handmaid of the poor, for it is precisely in the foul and ill-ventilated tenements of the slums, or the crowded work-rooms of the artisan, that it is most required, and will prove most beneficial from a sanitary point of view. The superior healthiness of the glow-light requires no demonstration, because from its very nature it cannot affect the atmosphere, the vacuum bulb which encloses it effectually isolating it from the air we breathe. A single gas-jet, on the other hand, consumes and vitiates as much air as five or six persons in a room. The light has been introduced lately into the General Post Office, St. Martin's-le-Grand, and in the Sorting Department alone the Chief Controller estimates its sanitary value over gas as equivalent to 200 men. Again, in the Post Office Savings Bank, London, the new light has reduced the sick leave by two days per head per annum, and this, at the overtime rate of 10d. an hour, means a saving of £680 a year. As the light itself only costs £700 a year, it is practically paid for by the better service of the staff. While upon this subject, we may mention that a "solid accumulator," or electric storage battery, has recently been introduced by Mr. Niblett. The solution with which it is filled is either solid or jelly-like, so as to render it very portable and suited for ships, carriages, and so on. It is of the well-known Planté type, but instead of dilute sulphuric acid pure and simple, the electrolyte between the plates is formed of wood sawdust and plaster-of-Paris moistened with dilute sulphuric acid.

A Pneumatic Sheep-Shearer.



The shears for cutting fleeces which we illustrate is worked by compressed air, and is the invention of

Mr. Michael Ford of the Australian Shearer Company of Sydney, New South Wales. The shears are grasped in the hand, as shown in Fig. 1, and applied to the dead or living fleece, as will be seen in Fig. 2. The apparatus works something like a clipping machine, the triple blades, B, traversing the guard, G. Power is derived from an air compressor by means of a flexible tube, T, and works the small engine, E, of the cutter by means of a double piston, which moves the blades to and fro. No shafting or pulleys are required, and the sheep is in no way injured. The wool has a longer staple than that cut by the hand shears, and is worth $\frac{1}{2}$ d. to 1d. a pound more.



A Rotary Magnetic Separator.

Our illustration shows a new form of magnetic separator designed to abstract iron bolts, nails, horse-shoes, and such articles from bones, oil cake, or minerals, before these enter the crushing machine. It consists of a hollow, truncated cone having ten electromagnetic holes arranged around it, and revolving on outside runners. The material to be cleaned is fed into it from behind by a shoot, and travels forward. Each pole is magnetised when at its lowest position as the cone revolves and attracts the iron; holding it till the pole reaches its uppermost position, where, the pole being demagnetised, the iron drops into a tray. This action is controlled by a commutator, placed behind the cone. The electric power required to excite the magnets is 600 watts for the largest size of the machine, which is capable of cleaning four tons of bones per hour.

Uranium Steel.

It has long been known that a proportion of manganese improves steel, and it has recently been discovered that aluminium also increases its tenacity, while rendering the castings freer from flaws. Uranium is also known to increase the strength of steel, but the rareness of this metal has prevented its use for this

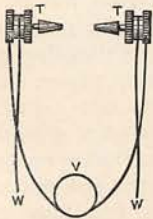
purpose. We learn from America, however, that extensive deposits of uranium have now been found in the Black Hills, near the upper reaches of the Missouri, and it is probable that we shall hear more of uranium steel.

Tests of Mind.

Professor Jastrow, of the University of Wisconsin, U.S., recently compared the masculine with the feminine mind through the literary faculty, and obtained some interesting results. He arranged for 50 students of his psychological class, 25 men and 25 women, to each write 100 words at random as quickly as possible. An examination of the 5,000 words thus written showed that only 2,024 were different from every other, and only 1,266 occurred once in the lists. Some 3,000 words were simply repetitions of 758 words. These facts show that there is a wide community of thought amongst men and women in general, but that men seem to have a wider range and originality of ideas, and are less apt to repeat each other. Thus, while the women only wrote 520 words which occurred but once in the lists, the men wrote 746. Articles of dress supplied the women with 224 words, and the men 129. Owing probably to the share which cooking occupies in a woman's thoughts, articles of food suggested 179 words on the feminine, and only 53 on the masculine lists. The latter showed a taste for animals, tools, and abstract terms. While on this subject, we may mention that Professor Mosso, an Italian physiologist, has proved by experiment that the flow of blood to the head varies with the nature of intellectual work. By delicately balancing his friend and subject, he was able to tell when the latter was reading Italian or Greek. The harder task produced an accession of blood to the head, and upset the balance, causing the subject's head to sink and his feet to rise. In the same way, he showed that dreams, or a disturbance during sleep, caused a rush of blood to the sleeper's head.

A Small Telephone.

The expiry of the telephone patents has given rise to a crop of more or less improved forms, one of which we illustrate because of its smallness. It is the invention of M. Mercadier, a well-known French electrician, and was described to the Académie des Sciences, Paris, of which body he is a correspondent. The receiver, T T, is made double, one half for each ear into which the points are inserted, and these are connected by a spring, V, of steel wire two millimètres in diameter, which goes round the head and keeps the halves, T T, pressed into the ears. The insulated connecting wires which convey the current to the receiver are shown at w w. This receiver weighs only 50 grammes, or about one-eighth of the ordinary telephone receiver, and can be fixed to the head for as long as may be desirable.

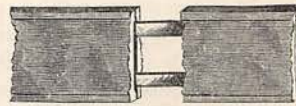


Luminous Night Clouds.

Every summer, both in the southern and northern hemispheres, and more especially a few weeks after or before the Solstice, luminous clouds can be seen in the night-sky, before and after midnight. They are very high, about fifty miles up, and they are generally seen to move from the north-east towards the south-west or thereabout. Their origin is a mystery, but recent observations on the Continent, and chiefly in Germany, have demonstrated that they appear to shine by reflecting the light of the sun while it is far below the horizon. Some suppose that electricity has to do with their brightness. They seem to follow a spiral course round the earth from the north pole to the south, and back again; and it is conjectured, from their great altitude, that they must consist of exceedingly light vesicles of water vapour. More observations on them are required, and especially photographs.

A Safety Strap.

A belt or strap for travelling bags and satchels which cannot be cut by a thief is illustrated in our



woodcut. It consists of two bands of leather sewn together at the margins over two thin slips of steel like crinoline spring, but only 3 millimètres wide and half a millimètre thick. The steel not only arrests the knife of a thief but also warns the wearer of the strap.

A Whistling Egg Saucepan.

A saucepan for the boiling of eggs has just been patented which is so arranged that when the eggs are sufficiently cooked, the surplus steam blows a whistle in the lid of the saucepan and so calls the attention of the cook. A stand for the eggs is provided in the saucepan, and they are to be placed in this and just covered with cold water before the pan is set upon the stove or fire. The whistle sounds at the instant when, according to calculations, the white of the egg should be set and the yoke left fluid. Of course, if harder boiled eggs are desired the warning whistle is still useful.

The Growth of Children.

Observations made on school children in different parts of the United States, Germany, Sweden, Denmark, and Italy have shown important differences in their rate of growth. A new England child, for instance, develops in a different way from one in Kentucky, certain of its organs growing more quickly than others. In Sweden, it is found that children grow less rapidly in winter than in summer, hence it is thought that in such northern countries the school vacation ought to be longer than in the warmer countries of the south, where the difference between summer and winter growth is less marked. The statistics of a large tailoring firm in America also

show that the average sizes of hats, coats, and other garments differ widely in different sections of the United States. These facts appear to show that blood alone is not the cause of racial diversities, but that soil and climate, as has been suspected, are also factors in the problem. Of course, the United States is a vast country, and comprises great differences of climate and soil, and it is probable that only such will tell to a noticeable degree. A great deal of historical and political capital has been made on the assumption that what has been reported of a race or people under one condition of life must necessarily be true of them under other circumstances; and the observations in question tend to show that such an assumption is by no means well founded.

New Carts.

The vehicle shown in Fig. 1 is a cart which is provided with a steelyard so as to weigh goods of itself.

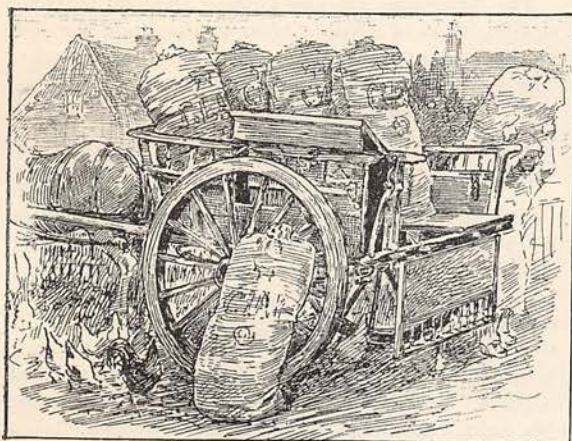


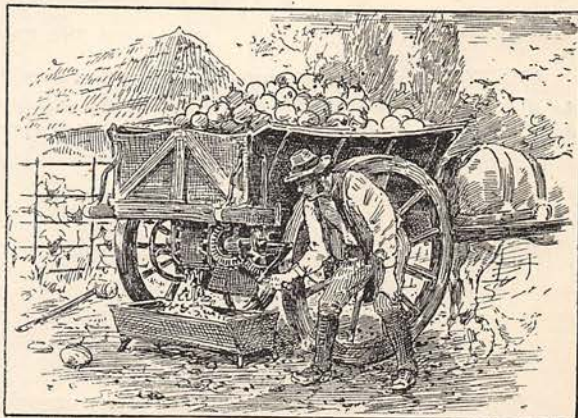
FIG. 1.

Part of the bottom, or if need be the whole bottom, is the platform of the weigher, and the balance with its accessories is mounted at the side just behind a wheel, as will be understood. The goods to be weighed may either be packed in sacks or boxes, and provision is also made for weighing hops and other bulky materials. Another new cart is that illustrated in Fig. 2, which cuts and strews turnips or mangolds in traversing the ground; and is therefore convenient for feeding sheep. The roots are simply filled into the cart, and the machine placed underneath it, working by the motion of the wheels, cuts them into finger pieces and drops them on the ground in much less time than they could be distributed in the ordinary way. If desired the roots can also be cut by hand-power, and dropped into ordinary feeding troughs.

The Phosphorescence of Gems.

The phosphorescence of gems under the electric discharge in a high vacuum which Mr. Crookes, the famous chemist, exhibited at the recent *soirée* of the Royal Society evoked much admiration. Cape diamonds phosphoresce blue; Brazilian ones red, orange, blue, and yellow; Australian ones

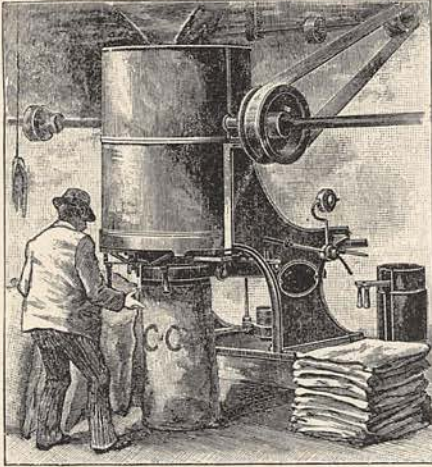
yellow, blue, and green. Crystallised alumina, that is to say, ruby, sapphire, and corundum phosphoresce a deep red, and give a spectrum of a single sharp crimson line. One of the Burmah rubies exhibited was a plate $1\frac{1}{4}$ inch long by 1 inch wide which had been cut by Mr. Streeter from one crystal. Yellow sapphire glows with a delicate lilac colour. Two uncut specimens of phenakite in Mr. Crookes's tubes showed a yellow and blue phosphorescence; and a green emerald from Ireland glowed with a deep red lustre like that of the ruby, but did not give the crimson spectrum of the ruby. Two pieces of crystalline corundum from South Mirzapur, India, when rubbed or struck together in the dark, show a fine crimson phosphorescence with occasional yellow sparks resembling those from flint and steel. This light, in fact, might be useful as a rough test for the mineral in the field. Zinc sulphide or Sidot's hexagonal blende is the most brightly phosphorescent substance which Mr. Crookes has yet discovered. In the vacuum it glows with a green light, changing to blue as the exhaustion of the tube is increased. Should the electricity be cut off, the blue colour dies out immediately, but the green continues for an hour or more. Nevertheless, there are parts of the crystals which grow quite dark as soon as the discharge is stopped. We may also mention in this place that Mr. Crookes has made a number of new experiments on what he calls "electric evaporation." Foils of gold, silver, platinum, and other metals are dissipated in an invisible vapour, when they are subjected to the electrical excitement inside his vacuum tubes. This metallic vapour can be caught and condensed in films upon the surface of glass plates within the tubes, and these films show all the colours of the soap-bubble or the films of scum on tarry water. The beautiful new purple alloy recently made by Professor Roberts-Austen, C.B., the Chemist to the Mint, behaves in a curious way under such circumstances. This alloy is the only purple metal yet discovered, and exhibits crimson shades when light is reflected from one of its surfaces to another. It consists of 78.4 per cent. of gold and 21.6 per cent. of aluminium and corresponds to the chemical formula



NEW CARTS.—FIG. 2.

Al_2Au . When undergoing electrical evaporation, the gold alone proves volatile, and it forsakes the aluminium with which it has become united in the crucible. The gold is deposited on the glass plates, and the surface of the alloy exhibits the silvery lustre of aluminium. Both the alloy and the method of evaporation will doubtless be useful in the arts.

A Self-acting Flour Weigher.



A scale for weighing flour or other powdered material into bags is illustrated in the accompanying woodcut. The machine has an ordinary scale beam, to one end of which the sack is attached and immediately expanded. The material from above enters the sack, which becomes the scale pan, and its inflow is twice checked, to allow the final trickle which is necessary for accurate weighing. With the quarter size of this machine an operator can, it is stated, weigh and fold 240 bags of material in an hour.

Electric Railways and Observatories.

For months past peculiar perturbations have been observed on the magnetic needles in the Greenwich Observatory, and careful observations reduced them to a system. They began at a certain hour of the morning and ended at a certain time of night. They might have been due to "magnetic storms" in the terrestrial magnetism, or the solar atmosphere; but a more commonplace origin has been found for them. It appears that they exactly correspond in point of time with the starting and stopping of the electrical railway from the Monument to Clapham. The electricity used in the working of the line goes to earth, and although the Observatory is several miles distant, the delicate apparatus was sensibly affected. There is a warning in this experience which may be useful in connection with other observatories.

Elephant Leather.

The Americans are now tanning elephant hides by steeping them in a bath similar to that used for cow hide, but extending the time of exposure to six months. The leather is $1\frac{1}{2}$ inch thick, and is made into floor-mats, pocket-books, satchels, card-cases, and so on; but it is very expensive, a small case costing from £5 to £20.

Arcturus.

This well-known star has recently been the subject of careful observations by Dr. Elkin, Astronomer of Yale University, United States, and from its parallax he concludes that it is moving through space at the extraordinary speed of 381 miles a second. If this be true, Arcturus would accomplish the distance between London and Edinburgh between two ticks of a watch. Arcturus is so far away from the earth that his light, travelling 190,000 miles a second, takes 181 years to reach us. We see the star, in fact, by means of light which left it in the days of Queen Anne.

SHORT STORY COMPETITION.

AWARD OF THE PRIZES.—FIRST LIST.

AFTER careful consideration of the 236 stories submitted in competition for the Prizes offered in our February number, the Editor is at length able to award the Prizes. The average of excellence was very high, and many stories had to be read and compared several times before the final Award was made.

The First Prize of £10 is awarded to—

ANNIE E. WICKHAM,
Raleigh,
Bideford Devon;

The Second Prize of £8 to—

L. FROST RATTRAY,
Auckland,
New Zealand;

And Two Third Prizes of £5 each to—

EDITH E. CUTHELL,
Oak Lawn,
Wootton, I. of W.;

and

ADA M. NEWTON,
Killedmond,
Kilkenny, Ireland.

Extra Prizes and Honourable Mention are awarded to several other Competitors, whose names will be announced in a subsequent issue of the MAGAZINE, after further consideration.