to crown their efforts. As before stated, unfermented bread is differently made, and although the limits of the present paper do not admit of its treatment, we may point out that it is not so wholesome for every-day use as fermented bread, neither is it so satisfying or economical. There are many varieties, the most common being that made from baking powder; this is useful when bread is wanted in a hurry, or a change required in the shape of fancy bread, including scones, &c. It *must* be made quickly to be worth eating; the actual mixing, shaping, and transference to the oven should not occupy many minutes. Some may say, "Why is this?" Just because the fermentation should not commence until the bread is in the oven; it quickly ferments, and as quickly subsides; small loaves, for this reason, will be more satisfactory than large ones; they require a very sharp oven, and should be left on a sieve to cool—never taken at once into a colder atmosphere.

L. HERITAGE.

*** Our readers are reminded that, according to the curriculum published in December last, February 11 is the day on which the loaves, sent in competition for our prizes, are to reach us.

PASS LISTS. (SECTION I.)

HOUSEHOLD ROUTINE.

The First Prize of One Guinea is awarded to

AMY NEWMAN, 3, Harrow Villas, Harrow Road, Harlesden, N.W.;

and the Second Prize of Half-a-Guinea to

CLARA THORNHAM, Studley House, The Park, Hull.

CERTIFICATES OF HONOUR.

Name.	*Address.*
Cobb, E.	Tunbridge Wells.
Fox, C. E.	Bideford.
Henry, May	West Hampstead, N.W.
Norris, C. M.	Somerset.
Osborne, Annie	Regent's Park, N.W.
Wassell, Rosalie	Bradford.

CERTIFICATES OF MERIT.

Name.	*Address.*
Biggs, Edith J.	Manchester.
Briggs, Lucy H.	Manchester.
Cooper, Miss...	Edinburgh.
Gardiner, Florence M.	Leicester.
Gordon, Laura	Brixton, S.W.
Hedgcock, Emily	Rochester.
Horan, Elizabeth H....	Rathkeale.
Parker, Kate	Glasgow.
Porter, Charlotte A.	Bridlington Quay.
Raper, S. J....	Thirsk.
Robinson, J. A.	Kirkham.
Russell, Gertrude M.	Ipswich.
Stevenson, Ellen	Sheffield.
Thomas, Sarah	Bristol.
Turner, Annie C.	Luton.
Wales, Amy H.	Upper Norwood.
Winter, Julia	Hornsey Lane, N.
Wright, Annie F.	Forest Gate, E.
Yates, Annie	Stockport.

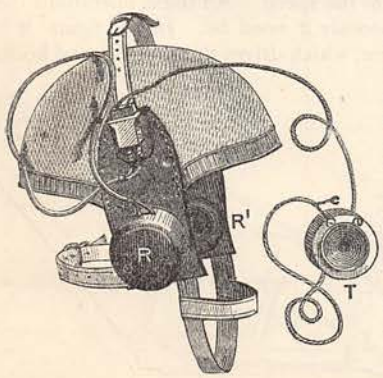
The successful candidates may have their Certificates posted to them, on their sending to the Editor a fully-addressed label, together with two penny postage stamps, to defray cost of postage and roller. The Editor cannot be held responsible for loss or damage to Certificates in the post, nor can he answer inquiries respecting unsuccessful work.

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 Diver's Telephone.



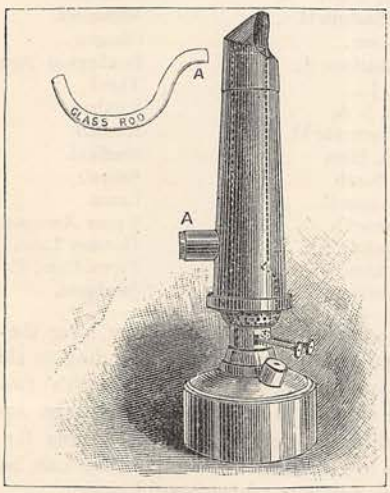
Our illustration shows the form of telephone which is used under a diver's helmet. The transmitter, T, or microphone, to which the diver speaks when he responds to a message, is shown detached from the headpiece, but it can be fitted into a recess in the helmet near his mouth. R and R¹ are two receivers, fitted into the sides of the headpiece at the diver's ears, thus enabling him to hear what is spoken to him without using his hands in the process. The arrangement leaves him free to work or defend himself while under water.

A Chemical Island.

According to Mr. MacIvor, a New Zealand geologist, the White Island, in the Bay of Plenty, is part of the crater of a submerged conical volcano. The whole of it is evidently of volcanic origin, and it contains much sulphur. Curious hollow spheres of gypsum and sulphur are found on the island, and in its midst is a lake whose atmosphere is very irritating through the evolution of hydrochloric acid gas. In connection with this subject it may be stated that a project is "on the cards" to tunnel through the volcanic crater of Popocatepetl in order to reach the stores of sulphur contained in it.

Metallising Wood.

Wood is made to take a hard polish and resemble metal by being steeped in a bath of caustic alkali for two or three days, according to its degree of permeability, at a temperature of between 164° and 197° Fahr. It is then placed in a second bath of hydrosulphide of calcium, to which a concentrated solution of sulphur is added after some twenty-four or thirty-six hours. The third bath is one of acetate of lead at a temperature of from 95° to 120° Fahr., and the wood remains in it for 30 to 50 hours. On being dried, it can be polished with lead, tin, or zinc, and burnished like metal.



Light for the Microscope.

A capital apparatus for microscope lamps has recently been introduced by Mr. Thomas Christy, F.L.S., who seeks to make it generally known for educational purposes, as there is no patent to bar its general use. The device consists of a most useful and simple adaptation for the communication of light for microscopic purposes. Any strong petroleum lamp with a glass chimney is covered with a copper or iron chimney, open at the top to allow of a good current of air passing through it (see illustration, A). Opposite to the flame a hole, from 1 to 1½ inches in diameter, is cut in the outer chimney, and in it is inserted a glass rod, held in position by a washer, and curved so that the opposite end comes under the object on the table of the microscope. A splendid light passes through this rod, and as all light and heat are prevented from passing from the lamp to the face, the greatest comfort is experienced in working with the microscope. If it should be desired to have two or three microscopes working at the same time, several glass rods of the shape shown can easily be inserted into the iron shield, and securely held there by pieces of cork, so that they may transmit the light in any direction required. The arrangement is so simple that any one having a microscope and an ordinary petroleum lamp can readily fit up a complete illuminating apparatus.

A Cure for Cinders or Dust in the Eye.

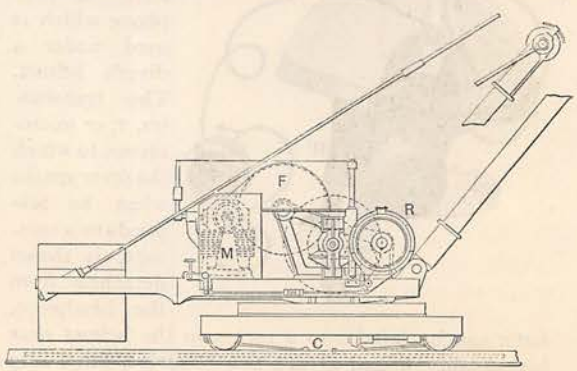
If you get a cinder or particle of dust in your eye, do not rub that one, *but the other one.* Rubbing the injured eye, as a rule, fails to remove the foreign body, but is very successful in setting up inflammation. Rub the uninjured eye very vigorously, however, and the cinder or particle of dust will very soon come out of its own accord. This remedy is said never to fail, unless the intruder is as sharp as a piece of steel, or cuts into the ball of the eye, necessitating an operation to insure removal.

Seamless Tubes.

Tubes of steel and toughened glass are useful in the arts, and by the new Mannesmann process a bar of solid steel or glass can now be turned into such tubes by a mill. The bar at a red heat passes between revolving conoidal rolls, so arranged that the varying velocities of revolution make a hollow in the centre of the bar, which ultimately transforms the bar into a tube. The tubes are very strong; for example, an iron bottle made in this way, and filled with water which was frozen to ice, only bulged out, and did not burst. Tubes can be produced a foot in diameter, and only a quarter-inch thick in the metal. Professor Hele-Shaw suggested that the process would supply stronger iron tubes for containing compressed gases than those now in use.

An Electric Crane.

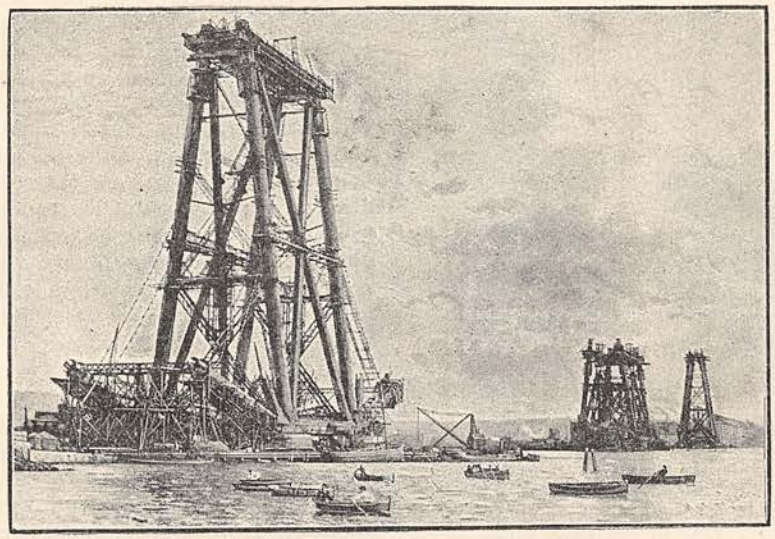
Steam-cranes are dangerous in wood-yards and other places where combustible materials are stored, hence the recent adoption of an electric crane at a well-known timber-yard in Limehouse. The power to make the crane travel on its rails, hoist the load, and slew it round is derived from a dynamo, also used to light a wood-factory. The current is conveyed by copper tubes laid along the tramway on which the crane travels, and it is conducted by contacts to the electric motor attached to the axles of the crane by suitable gearing of the Raworth type. The motor takes a current of fifty amperes to hoist the maximum load of fifteen or eighteen tons; it slews with thirty-five amperes, and travels with twenty-three to thirty-five, according to the speed. All these operations can go on simultaneously if need be. In the figure M is the electric motor, which drives the roller, B, and hoists



the chain, while the contacts with the conductors are shown at C. The total weight of the crane is about four tons. It performs its work well, and has given every satisfaction. The starting, stopping, and working is performed by the man in charge with turning handles, and a mirror is provided to show him what is going on in the barge below from which the timber is hoisted.

The Forth Bridge.

The great girder bridge spanning the Frith of Forth between North and South Queensferry is now advancing rapidly towards completion. The terminal lattice girders are in their places, and the enormous cantilevers which are intended to support the flying girders in mid-stream are nearly erected. Our illustration shows one of these structures in progress. It is that at North Queensferry, on the Fife shore of the river. The size of the cantilever will be gathered from a comparison of it and the neighbouring banks of the river, with other objects in the view. It is some 360 feet in height; and the line of railway is carried through it on lattice girders attached. There are three of these cantilevers in the width of the river—namely, another on the rocky island of Inch Garvie, and a third close to the Midlothian shore at South Queensferry. The extreme ones are founded on caissons sunk into the bed of the river, and the middle one on the rock at Inch Garvie. They spring from granite piers above water, and are being built over the piers by balancing the work done on both sides, so that the entire weight falls evenly downwards on the pier. When they are finished they will be interconnected by lattice girders to complete the bridge. The material of which they are built is Siemens-Martin, or open-hearth, steel. The limbs under compression are tubular in structure, and resemble prodigious quills. The members under tension are either lattice beams or long boxes of angle steel. The figure shows the platforms, cranes, and lifts required for the workmen. All the riveting is done quietly by hydraulic pressure on red-hot rivets, so that there is singularly little clamour heard at the works. Many of the steel pieces, which are all tried beforehand, are floated out on barges and hoisted up to their destination. Over 3,000 workmen are engaged on the bridge, and during the last three months no less than some 5,700 tons of steel were fixed in the work. The width of the channel is about a mile, and the total length of the structure 1⅝ miles. Some notion of its size, as compared with other works of the kind, may be gathered from the fact that it bears the same relation to the Britannia Bridge that a grenadier guard bears to a new-born infant. The railways in conjunction with it are also being pushed on rapidly. When all is finished, travellers to the north of Scotland will be able to go from Edinburgh to Perth in about an hour; and it is expected that many who now go north by Glasgow and the Caledonian Railway route will then proceed by Edinburgh.



THE FORTH BRIDGE.

(From a Photograph by Valentine and Sons, Dundee.)

Bellite.

A new and safe explosive termed "Bellite," and the invention of M. Carl Lamm, a Swedish engineer, was recently tried at Middlesbrough. Bellite consists of dinitro-benzole and nitrate of ammonia, mixed in certain proportions, and under certain conditions; then moulded into cartridges for mining or other purposes. The experiments referred to showed that bellite failed to explode under a severe concussion, or by the application of the heat of a smith's forge, and of burning gunpowder. The disruptive power of the material was greater than that of dynamite, which is an advantage in mining. A land mine of three pounds

of bellite was exploded, and the earth thrown up about 100 feet, leaving a crater 11 feet in diameter, and 9 feet deep. Another mine containing three pounds of gunpowder only made a hole 4 feet in diameter, and 2 feet deep. In actual mining a series of bellite cartridges gave results comparing favourably with compressed gunpowder cartridges of half the size, and the absence of noxious fumes was very marked. It is also claimed that bellite is flameless, and is not affected by atmospheric influences.

A Self-Pouring Tea-Pot.

The figure illustrates a new tea-pot, or coffee-pot, as the case may be, which is caused to pour out a cup of

the beverage by pressing the knob in the manner shown. The lid is in the form of a cylinder, which is raised up, and by a hole in the knob takes in air, that is prevented from escaping by closing the hole with the finger. On pressing the knob downwards, the pneumatic pressure forces the tea out of the spout.

A Large Globe.

In the centre of the Champs de Mars, at the forthcoming Paris Exhibition, there is to be a terrestrial globe about 13 metres in diameter. It will be a representation of the world on a scale of one-millionth — that is to say, a million times smaller than the actual world. To give some idea of the proportion, the city of Paris will barely cover a square centimetre. The globe will turn on its axis like an ordinary school globe, and is certain to form an interesting feature of the Exhibition.

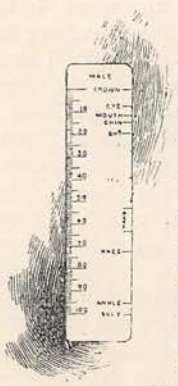
Spectro-telegraphy.

M. Paul la Cour, a Danish inventor, has exhibited at the Copenhagen Industrial Exhibition an experimental apparatus for signalling by light, of which we may hear more, if the inventor succeeds in bringing it into practical use. It is intended to supersede flag-signalling by day, and to signal by night. A beam of white light seen through a prism is broken into red, yellow, green, and violet light. If, therefore, some of these ingredients of white light be cut off at the source, this colour will be absent in the prism. The continuous line of the spectrum from the prism can thus be broken up into a Morse signal; for example, - — (dot, dash), which is the letter A of the alphabet. In this way all the letters of the Morse code can be telegraphed and received through the prism, which can be fitted into a telescopic tube. The suppression of rays can be effected in more ways than one. M. la Cour adopts the plan of scattering them by a prism, so that only certain rays which he chooses shall reach the distant observer through openings provided in a kind of shutter. The new method of telegraphing is applicable to lighthouses or harbour lights, as well as ships at sea.—At a recent meeting of the French Academy of Sciences, M. Ader described a new method of applying the telephone to submarine telegraphy. Positive and negative electric signals are used on cables, and two telephones are used, one for each kind of current. They are applied to the two ears of the receiving clerk. Vibrators interrupt the currents as they come out of the cable, and so cause humming sounds in the telephone; but local currents also interrupted, and of the same strength as the cable currents, traverse the telephones in the contrary direction, so that the positive and negative signals are neutralised in one telephone, while they are enhanced in the other, thus enabling the clerk to understand the message.

Ramie.

The Chinese grass known as Ramie, so valuable as a textile plant, and yielding a fibre as fine as silk, has not hitherto been cultivated to the extent desirable, owing to the lack of machinery suitable for extracting the fibre. In 1869 the Indian Government offered a prize of £5,000 for such a machine, and now the French Ministry of Agriculture offer 6,000 francs in prizes for machines or processes to that end. Ramie is grown near Paris, and some of the stems will be used to try the competing machines. A British agent, Mr. D. Morris, of Kew Gardens, will report upon these trials. Could Ramie be well manufactured, the growth of the plant would probably spread in our tropical colonies.

A Human Scale.



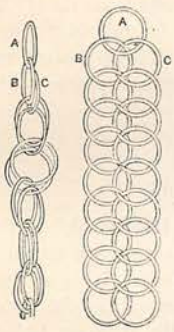
Draughtsmen frequently introduce human figures in their drawings to give the spectator some idea of the size of parts. Unless they have studied figure drawing they are apt to draw these out of proportion. Mr. Stanley, the well-known optician, has therefore devised the scale shown in the accompanying figure to enable them to draw the human figure correctly. It is based on Marshall's work entitled "A Rule of Proportion for the Human Figure." The proportions for males are on one side; for females on the other. If the drawing is large the scale can be held between

it and the eye. When something smaller than the scale has to be measured proportional compasses can be used.

A Substitute for Glass.

The great fault of glass is its fragility, and the "tough" varieties of it have not been quite successful. A substitute for this useful material in windows and roofs has been recently introduced. It is pliant like leather, but translucent, and of an amber tint. The material consists of iron wire netting enclosed in a varnish, of which the base is linseed oil. It is made in sheets ten feet by four feet, thus rendering joints rare. It can be cut with scissors, and no glazier is required to fix it, nails being employed. The material makes a cool awning in summer, as the sun's heat is said to pass through it with difficulty.

The Magic Chain.



The figure shows a ring illusion sometimes offered for sale in the streets. It consists of a chain formed of rings linked in the manner shown. If the chain is held up by the ring A, and the ring B raised while A is dropped, the latter will appear to fall through the ring C, and so down to the end of the chain. The illusion is due to the links in succession dropping so rapidly as to seem one ring all the time.

Peat for Iron Smelting.

It is proposed to apply the heat and gases given off in distilling peat by a "Rose" retort to the smelting of the rich deposits of ironstone in many parts of Ireland close to the peat-beds ; for instance, at Lough Allen and Creevelea in Leitrim. The volatile products of the peat are to be condensed, while the charcoal is compressed into fuel-bricks for smelting the ironstone. Ammonia, acetic acid, naphtha, and paraffin are obtainable from peat, and their production will form part of the process, which, we understand, will soon be put in operation, as a new Irish industry.

A New Gas.

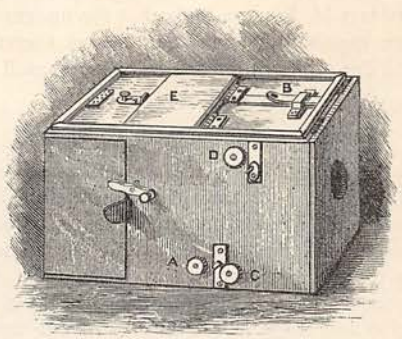
The Lawrence gas apparatus, an American invention, consists of a rectangular case, in which are placed perforated trays, holding wood shavings. Gasoline is allowed to trickle through these trays, and saturate the shavings. Gas, which may be the ordinary gas supplied to houses, ascends through the trays, and is charged with the gasoline vapour. According to recent trials, a No. 6 Bray burner, consuming 9·96 cubic feet of ordinary London gas per hour, gave an illumination approximately equal to a No. 0 Bray burner, consuming only 2 cubic feet of Lawrence gas per hour. The economy of the Lawrence gas is 40 per cent., according to the tests of Dr. J. Hopkinson, F.R.S. The consumption of gasoline is about 1 fluid ounce per cubic foot of gas. Hence, taking gas at 3s. per 1,000 cubic feet, and gasoline at 10d. per gallon, the cost of ordinary city gas, as compared with gas enriched by the Lawrence process, is 0·098d. as against 0·036d. per cubic foot of Lawrence gas. Dr. Hopkinson also says that for the same illumination the products of combustion are less in the case of the new gas ; therefore, it is healthier, and not so injurious to decorations. The system has already been adopted in some mills and country mansions in this country, and is said to have given satisfaction.

A Soap Battery.

Mr. Meserole has given a description of a voltaic battery made from common soap, which has the advantage of not spilling over. The soap is dissolved in boiling water together with a small quantity of brass and caustic soda or potash. The mixture is put into a jar while warm, together with a carbon plate and an amalgamated zinc rod to form the poles. The soap solution when cold forms into a jelly-like mass which does not readily evaporate or jilt over.

A Dressing-Case Camera.

A new detective camera, in the form of a dressing-case or a book, has been brought out by Mr.



McKellen. It is about eleven inches long by six inches square, and the operator can, if he wishes, see the picture he desires to take. The figure shows the apparatus, A being a milled head which is wound up. The aperture in front is opened by placing the eyelet in the strap on the top over the pin, B. The lid, E, is then opened, and the image can be seen on the screen. The focus is obtained by turning the milled head, C. The camera may be used under the arm, or held in the hands. The image being obtained the pin seen near A is pushed upwards, and the exposure made. The dry plates are 4½ by 3¼ inches in size.

The Sultan's Dog-cart.

The Sultan of Turkey has ordered an electric dog-cart, which has been constructed for him at Brighton by the maker of the dog-cart which we recently illustrated. The new vehicle is somewhat similar to the latter, the power being derived from twenty-four accumulators stowed under the seats. An Immisch electric motor, driven by the current, works a chain

passing round projections on the rim of a hind wheel, which is thereby turned. The two front wheels are guided by means of a rack and pinion actuated by a guiding shaft projecting up near one of the front occupants of the car, who can also apply the breaks and control the current. The supply of electricity is sufficient to run the cart for five hours at a speed of ten miles an hour. The weight of the vehicle when complete is about eleven hundredweight. The motor is of one horse-power.

The Duration of Lightning.

It has become important, in connection with the newer ideas on the lightning discharge, to determine whether the flash has a sensible duration or is instantaneous. Accordingly, M. Janssen, the well-known French physicist, has devised a camera for measuring the time occupied by a flash. It is made double ; one half containing a disc of sensitised paper, which is fixed, the other half a similar disc which is rotated round an axis through its centre, and perpendicular to its plane. The velocity of its rotation is known. It follows that when a lightning flash is photographed by this double camera, the two images will not be exactly alike, and capable of being superposed, because one plate is in motion while the other is fixed. But as a matter of fact M. Janssen finds that the images he has taken are capable of superposition, and therefore he infers the duration of the flash to be very small.

From the Conquest to Chaucer.

Professor Henry Morley calls his "English Writers" (Cassell) "An Attempt towards a History of English Literature." We doubt whether the Professor will take us through another period more interesting in many respects than is this, which forms the third volume of his great work. With Chaucer we begin a totally new period and stage in the history of our language. In the old chroniclers, whose work is principally dealt with in this volume, we see the last of an old order that really died with them. But their work left its mark on our language, and what Professor Morley tells us of the influences which acted upon them is therefore of the highest value.

A Novel Diary.

A new diary has recently been introduced by a Glasgow firm, which combines the advantages of the old tablet diary in always presenting the current week's entries on the surface, and yet permits of ready reference to former weeks' entries. Above the top of the tablet is a long slot in the stand, through which each leaf is folded, instead of being torn off and thrown away when filled, and so it may be referred to without the least trouble.

"How to Avoid Law."

This is the apt title of a very practical little work by Mr. A. J. Williams, M.P., published by Messrs. Cassell, in which the writer gives most admirable advice as to the best method of keeping out of the meshes of litigation. Nothing could be sounder than his advice, or more intelligible than the directions he gives, which, however, he says in his preface, "it may be as well to add will be found of service only to honest men."

Four Books for Little Folk.

Little people are always on the look-out for new stories, or, at any rate, their friends are always on the look-out for suitable ones for them. We can recommend two works by Miss Clara L. Matéaux thoroughly. They are "Wee Willie Winkie" and "Ups and Downs of a Donkey's Life," both well told and fully illustrated. Two other stories which, like Miss Matéaux's, are published by Messrs. Cassell, are "The Mystery at Shoncliff School," by the author of "Mr. Burke's Nieces," and "Claimed at Last," by Emilie Searchfield, with which is bound up "Roy's Reward," by Sibella B. Edgcome. These stories are all tastefully got up, and would form acceptable additions to any juvenile library.

An Historical Suburb.

"Kensington, Picturesque and Historical," is the title which Mr. W. J. Loftie gives to his work recently published by Messrs. Field and Tuer. It is a very complete and very interesting history of the old Court suburb, charmingly illustrated by Mr. William Luker, Jun., though we feel bound to complain, in passing, of the somewhat irregular arrangement of the illustrations in the work. The chapter on Kensington Palace and Gardens is perhaps the most interesting in the whole work, though where all are so good it is difficult to single out any particular one. Despite the advance of the building army, much of old Kensington is still left with its quaint work and old-time air, and the new work in the district is evidently of a character which will not destroy the reputation of this interesting district in days to come.

Two Eventful Centuries.

Between the outbreak of the Wars of the Roses and the beginning of the terrible Civil War under Charles I. come some of the most important passages in the history of England. This is the period covered by the second volume of the Jubilee Edition of "Cassell's History of England," which is now before us. The numerous illustrations deserve more than a passing word of mention. The landscapes and architectural drawings, as in the previous volume, call for special praise. Mr. Railton's drawings of the Tower of London are among the finest views of their kind we have ever seen. Special care has been devoted to the reproduction of the portraits, and altogether the work is as complete a history of two troubled but glorious centuries as could be expected in a single volume.