THE GATHERER:

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

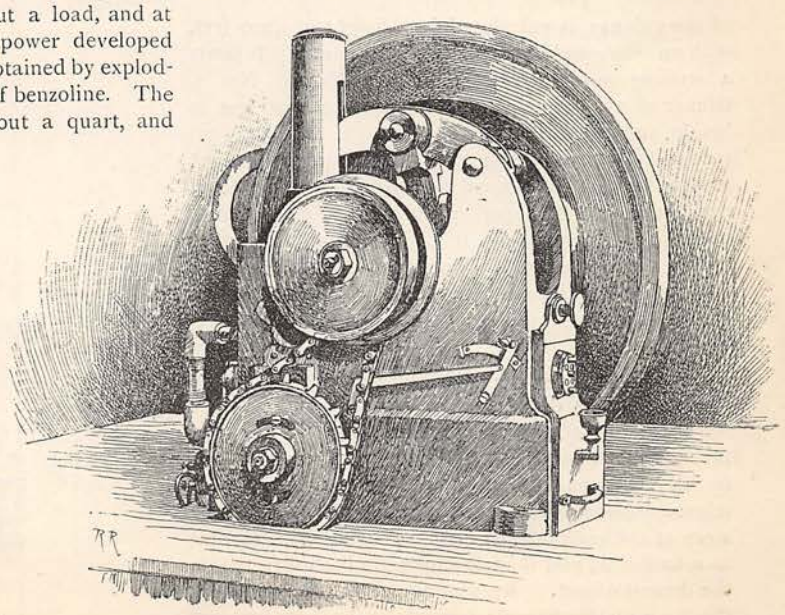
Correspondents are requested, when applying to the Editor for the names and addresses of the persons from whom further particulars respecting the articles in the GATHERER may be obtained, to forward a stamped and addressed envelope for reply, and in the case of inventors submitting specimens for notice, 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.

Breath Figures.

SOME interesting "breath figures" were exhibited by Mr. W. B. Croft at a recent *soirée* of the Royal Society. These figures depend on the fact that polished surfaces are capable of receiving an impression of bodies in low relief, if the latter are pressed against them for a certain time depending upon circumstances. The impression reveals itself when the surface is breathed upon. Thus, if a coin is pressed against a sheet of freshly cloven mica for thirty seconds, then removed, and the surface breathed on, the details of the coin will become visible on the mica. Similarly, a sheet of printed paper, if placed between two plates of glass for ten hours, will leave an impression of the letters on the glass which can be read by breathing on the latter. Sometimes the letters are white, sometimes black, and occasionally they change from white to black. Mr. Croft also shows that if two coins are placed on opposite sides of a plate of glass, and then electrified for two minutes, they will leave a distinct image of their sides upon the glass.

A Domestic Benzoline Motor.

The domestic engine represented in the figure is driven by benzoline, and is very compact in build. It stands on a base a foot long by seven inches broad, and it is sixteen inches high. It runs at a speed of 1,200 revolutions per minute without a load, and at 250 to 800 when doing work. The power developed is one-fifth of a horse-power, and is obtained by exploding a mixture of air and the vapour of benzoline. The reservoir for the latter contains about a quart, and the vapour is mingled with air by means of a small inspirator. The explosions take place in the bottom of the cylinder once in every two revolutions. They are produced by the sparks of an induction coil excited by a small bichromate of potash battery. The cylinder is cooled by circulating water; and the speed is regulated by a throttle valve. It is stated that the quantity of benzoline used is from $\frac{1}{4}$ to $\frac{3}{4}$ of a pint per hour, so that the cost of working does not exceed a penny per hour. Such an engine can be fixed on the kitchen table, the shop counter, the laboratory bench, or the floor, and the water-tank for cooling the cylinder on a shelf above it. The machine is started by giving it a few turns by hand.



A DOMESTIC BENZOLINE MOTOR.

A New Dress-Trunk.

A new trunk has recently been brought out which is fitted with protecting flaps instead of a loose tray. These flaps, made of curved metal plates, hinged to the four sides of the box, are folded outwards while the box is being packed. And when this operation is completed, the flaps may be lightly folded over the dresses, and secured by a connecting strap. There is then no fear of the materials being in any way damaged by the shutting of the lid or fastening of the trunk.

A Thunderstorm Register.

The brontometer of Mr. G. J. Symons, F.R.S., and MM. Richard Frères, of Paris, is intended to give a complete scientific record of the phenomena of a thunderstorm. It consists of a chronograph which propels a travelling band of paper at a speed of six feet per hour, and on this an amenograph traces the varying velocity of the wind, while a barograph also records the pressure of the atmosphere. Keys are also provided which actuate marking pens at the will of the observer, and register the instant of a flash of lightning, the beginning and end of a thunderclap, as well as the intensity and duration of a shower of hail or rain. We may also mention the new hair hygrometer

of MM. Richard Frères, in which a bundle of hairs, by expanding or contracting under the varying humidity of the atmosphere, actuate a delicate pen which traces a line upon a ribbon of travelling paper, and thus register the humidity in a continuous manner. The hair hygrometer is especially useful at lower temperatures, such as those about 32° Fahr., the freezing point of water; for, unlike other hygrometers, they are unaffected by this degree of cold.

The Tower for London.

The prize designs for a London rival to the Eiffel Tower are shown in our engravings. No. 1, the winner

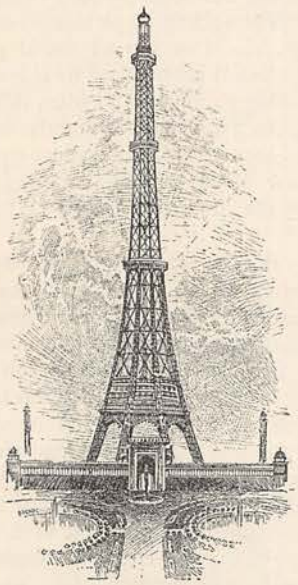


FIG. 1.

of 500 guineas, is calculated for a height of 1,200 feet, with an octagonal base 300 feet in diameter. It bears a striking resemblance to that in Paris. No. 2, winner of 250 guineas, is intended to be 1,300 feet in height, and 470 feet wide at the bottom. No. 3 design received honourable mention. Its prospective height is 1,550 feet. The favoured design is that of Mr. A. D. Stewart, M.I.C.E., together with Mr. J. M. McLaren and Mr. W. Dunn, A.R.I.B.A. The jurors report that on the whole the competition was disappointing, there being no single design which could be recommended for execution as it stands.

An Electric Range-Finder.

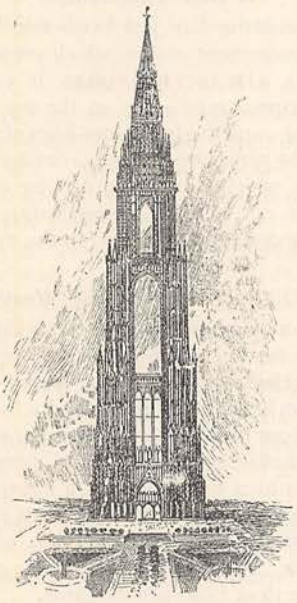
An ingenious device for finding the range for guns on board men-of-war at a moment's notice has been invented by Lieut. B. A. Fiske, and was recently tried by the U.S. naval authorities. It consists of two telescopes, one placed at the bow and the other at the stern of the vessel. The distance between them serves as a base-line, and the telescopes are both directed on the distant object. By trigonometry, if the angles at the base of the triangle formed by the base-line and the object are known, the distance is easily found. Now, the inclination of the telescopes when pointed to the object would give these angles by direct observation: but this plan is discarded in favour of one more accurate and prompt—one, in short, which is adapted to an object whose distance is always varying as the vessel moves. Instead of reading the angles by sight, the positions of the two telescopes are caused to vary the resistance of two branches of the well-known Wheatstone electric balance, and these resistances are proportional to the angles subtended by the telescopes and the base-line. The apparatus is so arranged that the restoration of the balance to equilibrium gives the distance. Recent trials on the s.s. *Chicago* showed that it was accurate to six-tenths per cent. We may also mention that experiments in firing heavy guns at night by means of the electric light were recently made in Toulon harbour. Targets were fixed at a distance of two miles, and the electric light projected on them from the revolving platform which carried the gun. It was found that the accuracy of firing under these conditions was as good as during daylight.

Autographism.

Dr. Mesnet, of Paris, has recently drawn attention to a curious phenomenon which was first observed about ten years ago by M. Dujardin-Beaumetz, who brought before the Société Médicale des Hôpitaux an instance of it in a female patient, who afterwards received the name of the *femme cliché*. It appears that if a moist pencil be lightly drawn over the skin of some persons, their flesh will rise into a weal which follows all the traces of the pencil, so that the handwriting or a drawing appears in relief. The colour of the mark is whiter than the rest of the skin, which usually takes a rosy blush. The relief is quite visible from a distance of ten to twenty yards, and sometimes continues for several hours. A French officer of

TOWER FOR LONDON.—FIG. 2.

artillery reports a case of autographism in a bay horse belonging to the Versailles garrison in 1871–3. If a straw were plucked from its litter and drawn lightly over its flank, the flesh rose almost immediately and showed its course. The soldiers often



TOWER FOR LONDON.—FIG. 3.

amused themselves in doing so; but the animal seemed to be unaware of the experiment, and was in other respects as well and efficient as the rest of the horses. The cause of the phenomenon is unknown; but according to Dr. Mesnet, human subjects are easily hypnotised, and it is probably due to some particular nervous susceptibility.

Malaria Screens.

The experience of Mr. Stanley on his last African expedition is that malaria is borne on the winds far inland, across open plains, or up the course of rivers, but that a belt of trees or high shrubs acts as a screen against its effects. Emin Pasha adopts the plan of sleeping under mosquito curtains, which appear to ward it off; and Mr. Stanley has suggested that veils of some thin material should be worn as respirators in districts affected by malaria. Above the altitude of 5,000 feet in Africa it seems to disappear, or, at all events, is much less observable than in lower regions.

A New Theory of Harmonics.

Professor Koenig, the well-known German physicist, has propounded the theory that "harmonics" in music are tones whose frequencies are integral multiples of their fundamentals. By taking a couple of tuning-forks vibrating 2,048 and 2,304 times per second, or having a ratio of 8 to 9, and sounding them together, he is able to produce the middle C (256 vibrations a second) from the succession of their beats. The same "beat-tone" is obtained by sounding forks having a ratio of 8 to 15. Dr. Koenig has also constructed rods which vibrate at different rates when struck on different sides, and these if struck on the edge give out two different notes and the "beat-tone" resulting from them. Other rods he has constructed emit notes below the limit of the human ear; but two of these can be made to yield a "beat-tone" which is audible. Contrary to the opinion of Helmholtz, Dr. Koenig holds that the *timbre* of musical notes is affected by differences of phase amongst the component tones.

A Brougham Lighted by Electricity.

Mr. J. E. Platt, of Burntwood, Cheadle, has fitted up his brougham with the electric light. The current is derived from an accumulator 15 inches long by 6½ inches wide, and 9 inches deep. The cells contain a supply of current to last eight hours. Not only the outside lamps of the carriage, but an inside ceiling lamp, are fitted with incandescent bulbs, and these are so arranged that candles can be at once substituted should anything go wrong with the battery.

Natural Address Cards.

Some natural address cards have recently been introduced into the German market from the Cameroons on the Western Coast of Africa. They consist of the dried leaves of the silver poplar, which can be written upon with ease. A very pretty visiting card is the result.

The Density of Thunderclouds.

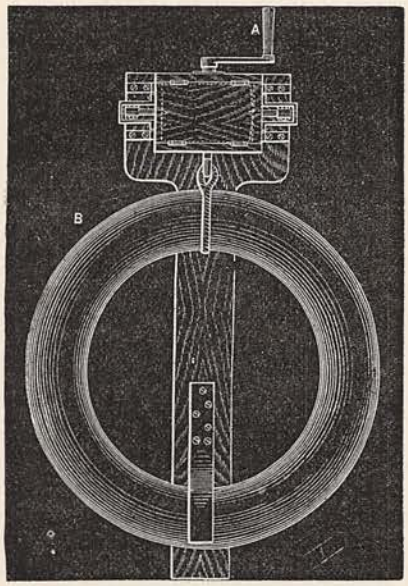
An explanation of the dense character of thunderclouds has been offered by Mr. Shelford Bidwell, F.R.S., who finds that when a jet of steam is electrified, its shadow on a wall instantly grows darker, thereby proving that the density of the jet is increased. It may also be remembered that smoke when electrified tends to condense into soot, and hence perhaps the popular notion that falling "smuts" are a sign of thunder in the air. We may refer in this place to a study which has been made of the statistics of lightning strokes in Germany. From these it appears that lightning storms originate in the mountains and travel over the lower lands. Strokes, it seems, are more frequent in flat, woodless, and low-lying grounds, such as valleys, meadows, and marshes, than in high or wooded hills. The number of strokes a year appears to be on the increase in Germany. They are commonest in July and August, and in the hotter parts of the day.

Preserving Sea Animals.

Mr. A. Haly, Director of the Colombo Museum, has been successful in preserving the delicate and brilliant colours of tropical fishes in a mixture of glycerine and gum. These ingredients are both mixible with alcohol if care is taken in the manipulation. Molluscs, sea anemones, and jelly-fish are also preservable in the solution. We may add that Mr. Haly finds that sea-water saturated with bichromate of potash is good for hardening that exceedingly soft creature, the jelly-fish.

A Prompt Life-Saver.

The "Ready Life-saver," which we illustrate herewith, is designed to obviate the dangerous delay in throwing a life-buoy with its attached signal light. Much time is lost in preparing the canister which



contains the inflammable compound and fixing it to an ordinary buoy. With the new appliance, by the mere turning of the handle, A, which only takes half a second, the canister is punched to let in the water, and the buoy, B, with the canister attached, is thrown into the sea. The buoy has been adopted by the Atlantic Transport line of steamers.

Tempering Steel in Lead.

The Chatillon-Commentry Steel Company of France have lately made a series of experiments which prove that steel is improved in tenacity and elasticity by tempering it in molten lead. The steel is heated red-hot and plunged in the liquid lead, where it is allowed to cool. Armour-plates treated in this way are not so easily penetrated by a projectile.

Telegraphing Across Rivers.

Mr. W. F. Melhuish, of the Indian Telegraph Department, has succeeded in transmitting telegrams across the Hooghly where it is half a mile wide, for instance at Chundernagore, by using bare metal wire. In fact, he employed the outer iron wires which sheathe one of the river cables. Of course, the ordinary telegraph instruments are not sensitive enough for this, as so much of the current escapes to the water, but with the Cardew vibrator, in which the vibratory signal currents are received in a telephone, it was quite practicable to telegraph. It follows that if a river cable should break down, the outer sheathing can be used to keep up the communication until the copper conductor inside has been restored to its old state of insulation. Again, in military operations, a bare wire or wires laid across a river will, at a pinch, serve to convey messages, or if a land wire be torn from the poles and lying on the ground, it will not cause an interruption, through leakage to earth, if the Cardew instrument is used with it.

A New Theodolite.

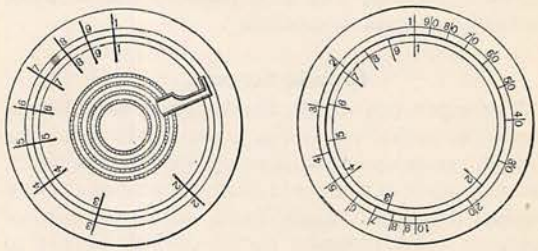
A new theodolite has just been introduced by a well-known instrument maker, which presents several improvements. In the first place, it can be used without the tripod stand—say, on the top of a wall or other building—and the frail cross-lines of spider's web or fibre of the objective are replaced by plantinum-iridium wires, which can be cleaned by a camel-hair pencil, and do not rust. Moreover, adjustable points for measuring distances are fitted to the eye-piece.

An Oil-Shell for Stormy Weather.

An Austrian inventor has designed a shell containing oil to be fired by ships in stormy weather, with a view to calm the billows ahead of them. It consists of a wooden cylinder about a foot and a half in length, containing about two-thirds of a pound of oil, and lined inside with shellac to prevent the oil penetrating the wood. When fired from a mortar, a phosphide of calcium light, carried by the shell, shows its position, and the oil, displaced by the water, spreads over the surface of the sea. A single shell is capable of calming a space of more than 1,000 square yards.

A Calculating Disc.

The calculating disc of Mr. Cuttriss is an improved form of the well-known slide rule, and consists essentially of a thin metal disc having a ring which slides round its circumference. Both of these have two



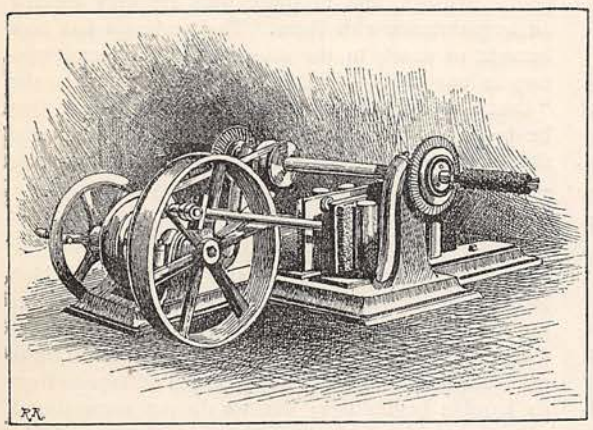
scales engraved upon them, as shown. Multiplication, division, proportion, and fractions, both vulgar and decimal, together with roots, powers, and a variety of other calculations, can be made with it. It is also specially adapted for the use of electrical engineers. Of course, its convenient shape and size is much preferable to that of the ordinary slide rule.

A Simple Cure for Hemorrhage.

It may be useful to mention that ham-fat has been tried with success for stopping bleeding at the nose. Several aggravated cases of this hemorrhage have lately occurred at the Hospital of the University of Pennsylvania, U.S., and as a last resort Dr. D. Hayes plugged the nostrils with cylinders cut from raw bacon. The remedy is very simple, and said to be effective.

Preserving Beams from Insects.

At a recent meeting of the Entomological Society the question of preserving the beams of churches from the ravages of beetles was discussed, and Mr. Whitehouse recommended that the wood should be well soaked in paraffin oil.



A Lamp-Cleaner.

A machine for rapidly cleaning the gauze of miners' safety lamps has been introduced into the Wombwell Collieries at Barnsley. It is driven by a belt and pulley, and the two brushes seen at the ends of a shaft have a reciprocating motion; two other brushes have a circular motion, and are intended to sweep the ends of the gauze, and various parts of the lamp.

A Use for Cotton-Plant Stalks.

Hitherto the stalks of the cotton-plant have found no use, and the planters have regarded them as a nuisance, but recently it has been found that the fibres are eminently suitable for the manufacture of bagging. Much of the bagging now being made from it is used in packing the cotton for transport.

The Tesla Motor.

The electric motor of M. Tesla, which is the only successful motor driven by alternating currents, has been applied to work the Hercules coal-cutter by the Monongahela Gas Coal Company of the United States. By the joint labours of these two machines a floor space of 600 square feet can be cleared in ten hours.

The Vacuum of Electric Lamps.

Mr. F. Higgins, a well-known electrician, finds that the higher the vacuum in the bulb of a glow-lamp, the better the light obtained with the same strength of current. Two apparently similar lamps will give out very different lights from this cause alone; moreover, the ill-exhausted bulb grows hotter than the other. The lamp of high vacuum attains to incandescence slowly, and darkens again at the same rate when the current is cut off; while that having an imperfect vacuum suddenly brightens, and as suddenly cools again.

Seamless Boats.

Mr. Heslop, of Leeds, has devised a method of forming steel boats without a seam by one operation. The metal plate used is one-sixteenth inch thick, and of oval shape. It is heated in a furnace, and then moulded in a die to the required form by hydraulic pressure. Three dies are employed to gain the form by degrees, and thus preserve the metal from cracking or buckling. The boat is then polished, and fitted up with air-tight compartments and other necessaries.

Musical Phantoms.

A correspondent of *Nature* has called attention to the visual images which are seen in the air, by a lady of his acquaintance, when certain musical instruments are played. The sound of the oboe causes her to see a white obelisk, which is more acute the higher the pitch of the note. Sometimes, if the notes are of an intense and yearning character, the figure moves rapidly towards her, point first, as if it would strike her. The sound of the violoncello, the high notes of the bassoon, trumpet, and trombone, and the low notes of the clarionet and viola, make her see a flat undulating ribbon of strong white fibres; and when the violins of an orchestra strike up after the wind instruments have been prominent, she sometimes sees a shower of glistening white dust. These phantoms are usually seen floating in the air half-way between her and the players. The lady is herself an accomplished musician.

A Rival to Jute.

On the Persian shores of the Caspian a plant has been discovered which possesses a splendid fibre, soft and elastic, with a glossy, satin-like texture. It is strong and pliable, and appears to be especially suitable for the manufacture of sacking, ropes, and packthread, so that, being very plentiful, it is likely to become a formidable rival to jute. The discoverer has given the plant the name of Kanoff.

A Laughing Plant.

In Arabia is a plant which has all the properties of laughing gas. It has bright yellow flowers, and seeds like black beans. These last are dried and crushed to powder, and when swallowed in small doses, cause the person taking them to laugh and dance, and behave in the most ridiculous manner, until exhaustion and sleep supervene. The plant is known locally as "the laughing plant."

Wild Animals as Pets.

It is not always cruel to make a pet of a bird or an animal generally considered wild, or that has even been born in the freedom of wild life. Mrs. Brightwen, a vice-president of the Selborne Society, gives us in "Wild Nature Won by Kindness" (T. Fisher Unwin) a series of most interesting pictures of furred and feathered friends of hers who were all by nature wild. It is rarely that one comes across so interesting a book as this unpretentious volume, with its vivid

sketches of animal life, and we almost feel as if we had actually known the ill-fated starling who was named "Richard the Second," and "Frolic," the squirrel—to say nothing of the robins, the jay, and the gerbilles, who *would* eat through the linings of their box home. This does not profess to be a book of instruction, but no one can fail to learn something from its perusal, and it is just the book to read to children.

The Public Libraries Movement.

The advance of the public libraries movement is such as must rejoice the heart of every true friend of education and culture. The third edition of Mr. Thomas Greenwood's "Public Libraries," which has just been published by Messrs. Simpkin Marshall & Co., marks another good step forward in the march. Four years ago only 133 places had availed themselves of the Public Libraries Acts; now they are in operation in 208 places. The year 1887 saw the Acts adopted in no fewer than ten London parishes, another was added to the list in 1888, 1889 found another three recruits, and already one has been enrolled this year. But there are still many places and districts, in and out of the Metropolis, where public libraries are needed, and in such cases Mr. Greenwood's book should serve as a veritable armoury for those who feel this need, and are willing to help in meeting it by securing the formal adoption of the Libraries Acts. And when the Acts have been adopted, inexperienced Commissioners ought to find the book equally valuable to them.

Prose Reading.

We are all of us familiar enough with books of poetical extracts for daily reading. Now we have from Messrs. Longmans a collection of daily readings of prose under the title, "The Steps of the Sun." The field from which the authors are selected is wide enough to meet all tastes, and no one can complain that the prose is *prosy*. We hope that these pleasant and thoughtfully made extracts may serve not only to interest their readers day by day, but may also lead them to the works from which they are taken. In that case they cannot fail to do good, as well as to afford a pleasant few minutes each morning or evening.

A Model Sundial.

An interesting little model, illustrating the principle of the sundial, has just been published by Messrs. G. Philip & Son. On a small scale it reproduces the features of this time-honoured and time-marking apparatus, and has the advantage of being readily adjusted. For teaching the difference between solar and civil time it will be useful, and as its support is so planned as to illustrate the decimal system, it might with advantage be added to our existing school furniture.

Wyclif and Chaucer.

These are the two great names dealt with in the fifth volume of Professor Henry Morley's "English Writers" (Cassell), and they are treated with all the fulness which their work merits. Probably the influence of Wyclif as a Reformer has overshadowed his influence as a writer, despite the fact that it was largely through his writings that he strove to effect his ends. Of Chaucer, Professor Morley gives us a most interesting and careful study that will be welcome alike to those who are already familiar with the poet's writings, and to those who are only seeking an acquaintance with them. The professor has now brought us nearly to the close of the fourteenth century in our study of "English Writers," and in the "Last Leaves" to this present volume he tells us that he hopes in the next to reach the end of the period that closed with the introduction of the printing-press —that best of friends to writers of every nation.

"One and All."

As a Cornishman, proud of the county from which he springs, Mr. Richard Tangye adopts its motto as the title of the autobiography that Messrs. S. W. Partridge & Co. have published. It is always interesting to trace the rise of a great and successful enterprise from its humble beginnings; but we do not remember a more interesting industrial history than this of Mr. Tangye's, in which he sketches the progress of the great business with which his name is connected: from the single workshop to the far-spreading works that are now necessary. The story loses nothing from the good-humoured manner in which it is told. For instance, the fortunes of Mr. Tangye's firm really date from the time that they supplied the "jacks" used for launching the ill-fated *Great Eastern*, and Mr. Tangye tells us in this volume that on one of his first business visits to London, a gentleman introduced him to another with these words: "This is the man who launched the *Great Eastern*." "Now, I am not tall," says the author, "and there was a decidedly sarcastic tone in the factor's voice; but he looked somewhat abashed when I replied, 'Yes, great events from *little* causes spring!'"

Two Books to be Studied.

Two books that well deserve careful attention lie on our table together this month. One is the third volume of Cassell's "New Popular Educator," which seeks to carry on the work begun by its predecessors. No more striking proof of the change brought about by our later educational policy could be found than this work affords in the wide range of subjects which it is found necessary to treat. To all who wish to improve their education this work is a veritable *vade mecum*. The second book we refer to is "Musical Groundwork" (F. Warne & Co.), which covers a good deal of ground in a small space. Considering the multiplicity of subjects dealt with, the author is to be congratulated on a very readable book as well as a useful one. As a first reading-book on the general principles and history of the art of music we do not know a better one, and we cordially commend Mr. Crowest's little book to the notice of those of our readers who desire a brief and popular introduction to this fascinating subject.