Miss Trafton's "His Inheritance."

"HIS INHERITANCE," Miss Trafton's novel, recently completed in its serial form in this magazine, and now published in a handsome volume by Lee & Shepard, is the third book of a writer who has steadily won her way to public favor, and made every step secure by the improvement that comes of conscientious work. "Katherine Earle," though not without some serious faults, was a better book than "The American Girl Abroad," and "His Inheritance" is a much better book than "Katherine Earle." It exhibits higher powers of invention, greater skill in the development of character, and more perfect loyalty to the ideas of harmony and proportion.

Of course, we do not need to sketch a story which our readers already possess in detail and completeness. The strong character of the book is, undoubtedly, Mrs. Stubbs, the sutler's wife. It is well conceived, though not intrinsically interesting, and from the beginning to the end there is not a false touch in its presentation. The woman's ambitious aspirations for her gentle daughter, guarded by an almost insane jealousy of those above her in social position, until they worked out their perfectly natural results in ruin and death, are delineated very skillfully and powerfully. There could have been no other end, save in obedience to the reader's natural wish that, somehow, Captain Elyot should have found his lost wife before her death, and released her from slavery to her ignorant, short-sighted, and overfond mother.

The book has many notable points of excellence in the painting of frontier scenery and society. The camp of the wagoners, when Blossom goes home from her school, with her midnight escape from the Indians, forms a very impressive and memorable sketch. Captain Elyot's long wandering on his way to Fort Atchison as bearer of dispatches, is depicted with a high degree of graphic power. Everywhere the "local color" is marvelously well laid in, especially when we are told that the writer has no practical familiarity with the opening scene of her novel. In thus recording our favorable verdict, we may be permitted to express the regret that the genuine, hearty, racy humor, so evidently a part of the writer's nature, and so naturally revealed in her first book, is not more apparent in her novels. A love of fun—a sense of humor—is one of the choice gifts of God, and it is sometimes pitiful to see how a New England woman, in her terrible dignity and earnestness, neglects this gift when she holds it in possession.

Hunt's "History of Music."*

THIS little work is meant for a text-book and well deserves its name: A Concise History of Music. It is divided into three sections for study, which are followed by questions on the subject matter and complete indexes. The first sixty pages are devoted to a "general review of musical epochs and events," and to biographical sketches of the chief representatives of the various schools of music. For the sake of simplicity, Mr. Hunt recognizes only five distinct schools, the Belgian, Italian, German, French and English. Nearly two hundred and fifty names of composers, with their more important works are included in this first section. Some receive bare mention, while the lives of Bach, Handel, Gluck, Haydn, Mozart, Beethoven, Mendelssohn, and one or two others are treated at greater length. Not a word is wasted. Chronometrical tables of musicians and musical events form the second section. These tables are admirably arranged and a glance makes their use apparent. The seventy-four pages of the third section comprise a short history of music as an art, and treat of the formation and growth of the modern scales, the development of counterpoint and harmony, with examples, the rise of the oratorio, opera, symphony and other forms of musical expression, concluding with a brief description of several important musical instruments. The leading works under each class of vocal or instrumental music are also enumerated, together with their composers, arranged in chronological order. The design of the book is to aid systematic study, and its comprehensiveness and clearness render it valuable to the student of musical history, while its indexes make it a capital manual for reference.

It is noticeable that only one Russian composer, Rubinstein, is mentioned, and no notice is taken of the works of Mr. J. K. Paine, whose masses, oratorio and symphony have gained him considerable reputation in Germany. But in so concise a history, one cannot expect to find every composer; and one looks in vain for the names of Ravina, Saran and Jensen, and other modern composers of some note. The work may also be criticised in its estimate of some of the English composers, but as a whole it is most admirably adapted to its purpose as a hand-book for students.

* A History of Music: Bonavia Hunt. New York: Chas. Scribner's Sons.

THE WORLD'S WORK.

NOTE.—The space devoted to this department being limited, it is important to report only those new appliances and processes that seem of the most value; it may interest readers to know that of 117 new appliances or machines, described in two volumes of the Magazine, 57 are known to have gone into general practical use in business.

Progress in Electric Lighting.

THAT the peculiar manifestation of force called electricity would give light has long been known, and many students of its phenomena have predicted that the light from electricity would ultimately displace gas and oil. Slender sticks of gas carbon

being placed end to end and touching each other in an electric current, will conduct the electricity in silence and darkness; drawn apart a few millemeters, while still in circuit, there springs up between the ends a brilliant flame. The electricity, seeking to pass the gap, raises the ends of the sticks to a white heat, and the flame that seems to bridge the space between the carbons becomes the conductor of the current and it flows over the gap in a fiery arc. In a few seconds the ends of the carbons become destroyed by the heat, the distance between them is increased, the current cannot pass and the flame goes out. To restore the light, the carbons must be pushed together till they nearly touch, when the flame springs up again. This defect, and the fact that a battery must be used, for a long time made the electric light practically valueless. The invention of suitable machinery for holding the carbon pencils, and for keeping them always in the right position, eventually led to a practical electric lamp; but, with all this, the light was expensive, troublesome and unreliable, and thus of no value to the business world. Within the last two years, and notably within a few months, the electric light has attracted renewed attention both in this country and in Europe, and it has now reached a practical commercial position that makes it of use to the navigator, miner and manufacturer. It is no longer a laboratory experiment, but is ready to take its place in the street, the theater and the shop, on board ship, and wherever a cheap and powerful light is needed. It is already the rival of gas, and it is undoubtedly destined to supplant it, to a considerable extent, and in many places to find use where gas is not available.

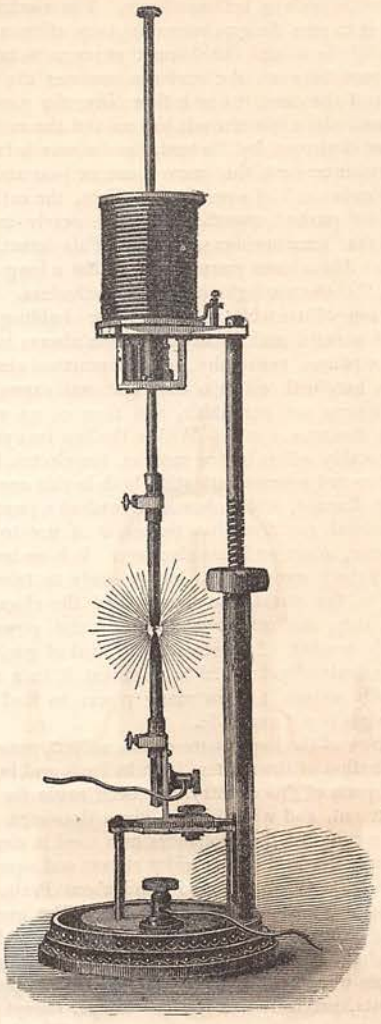
In view of the importance of this subject, personal examination of the matter, both in Paris and in different parts of this country, has been made for this department, and with this are given drawings, and some account of the appliances now used in electric lighting. Several of the wider streets and squares, and about forty workshops in and about Paris, are now regularly lighted by electricity. The avenue leading from the Grand Opera House is lighted throughout its entire length, and presents a good example of street lighting. The lamps are placed on posts, precisely like the gas lamps, except that the posts are taller and wider apart. The lamps are inclosed in large opal glass globes, and beyond this do not differ externally from the gas lamps. As the daylight fades away, there comes, without warning, a sudden flash, and every light in the street is burning with an intense white glare. The effect is like daylight, except in intensity. Every part of the street, the immense traffic in the roadway and the people on the walks, every architectural detail of the buildings to the top of the roofs, every object however minute in the windows, the flowers on the balconies, are plainly visible and in their natural colors. The actinic effect is the same as by day, and all colors, both real and artificial, take their true shades. Every sign on wall or omnibus, the minutest patterns in fabrics and the finest print can plainly be seen. People seated before the cafés read their papers by the aid of lights on the opposite side of the way, and yet the most delicate complexions and softest tints in fabrics do not suffer in the white glare of the lamps. Every stone in the road is plainly visible, and the horses move swiftly along as if confident of their footing. Such illumination is the perfection of street lighting. Neighboring streets, though more brilliantly lighted with gas than any American streets, appear dark and gloomy by contrast. Besides the Avenue de l'Opéra there are a number of theaters, halls and public buildings and shops, lighted without or within, and in each case the electric light has superseded gas or it is used where gas would be too expensive. The appearance of the lamps used in Paris is peculiar. The entire globe seems to be filled with light,—no flame or point of light being visible. The color is intense white, occasionally changing to blue or deep yellow for an instant. In some few cases the light is naked, or is placed in clear glass lamps. In whatever manner used it is impossible to look at the light for more than a few seconds. This intensity, and the occasional flickering of the light, are raised as objections to the electric light. On the other hand, why should any one look at the lamps any more than at the sun, and when not looking directly at the light the flickering is hardly noticeable. In halls and shops the lamps may be placed next the ceiling, or behind screens, so that only the reflected light can be seen, and out-of-doors the lamps may be placed overhead out of the range of the eyes. The flickering comes from a variety of causes, and it is doubtful if it can ever be wholly overcome. The points to secure are a steady motive power (a turbine being best), and good carbons in the lamps. Another objection has been found in the deep shadows cast by opaque objects when lighted by electricity. Careful observations both here and in Paris, in halls, shops and streets, failed to show that this is a serious objection where two or more lamps are used.

From these observations it may be safely stated that the electric light is perfectly reliable, is practical in any position, without or within, wherever a large space is to be lighted, or where an intense light for any reason is desired. It is available for streets, factories, rolling-mills, railway stations, docks, for lighting beaches, gardens, parks and other open spaces. Two improvements made in the electric light have made it possible to remove it from the laboratory to the street,—the substitution of dynamo-electric machines for batteries, and the invention of improved lamps for displaying the light. The dynamo-electro machines are now made in a variety of forms both in this country and in Europe. They are essentially alike, and differ chiefly in the manner in which the parts are put together and in the quantity of light they will give for a horse-power and the kind of current they will produce, some giving an alternating current and others a continuous current. Great difference of opinion has been expressed between the merits of French, English and American machines, and no fair comparison has ever been made between them. Only the foreign machines are shown at the Paris

Exhibition, and in the streets of the city only the Gramme machine is used. The writer examined, as far as could be done without photometric apparatus, the different machines, and it appears that the American machines are as good, if not better, than any French or English machines. Very great attention is being paid to the subject in this country, and five large manufacturers have produced machines of varying merit, and from all that can be learned they are cheaper and quite as efficient as those made in Europe.

On burning carbon pencils in an electric lamp, it is found that one pencil wastes or burns away much faster than the other. The instant they burn away beyond a certain distance, the electric circuit is broken and the light is extinguished; this defect has been overcome by a lamp having clock-work, whereby the two carbons are kept moving at unequal speeds. Thus, the right distance is preserved and the lamp burns steadily. The objections to this lamp have been its cost and the liability of the clock-work to get out of order. Such an affair would be of little use in a rolling-mill or on board ship, where unskilled labor must take care of it. For a long time no better lamp could be found, and this fact alone prevented the general use of electric lights. More recently, this style of lamp has been improved to suit American wants, and to bring it within a reasonable price, and it has been used continuously night after night in exposed situations, and with only the care of a boy for many weeks without failure.

Two years since, the so-called electric candle (already described in this department) was introduced in France, and, since that time, still other improvements have been made in this country, and cheap and simple electric lamps are now made in different places, and the whole subject of electric lighting is now put on a practical business basis. The electric candle is the only apparatus used in lighting the streets of Paris. This candle consists of two slender sticks or pencils of gas carbon placed side by side, with a slip of kaolin between them. A small piece of wire is laid over the top to join the two carbons together, and is kept in place by a strip of paper pasted over the top of the candle. The base of this double-wicked candle is set in a metallic ferrule, so that it may be quickly and firmly connected with the wires of the circuit in the lamp. The lamp consists of four of these candles placed in a ring in a globe of opal glass. The wires enter the bottom of the lantern, and are connected with the candles. The wires may be laid in earthenware pipes under the sidewalks, as in Paris, or stretched from post to post through the air. By means of a switch placed in the lamp-post, the current may be changed at any time from candle to candle. When the dynamo-electric machine is started, the current passes up one carbon of the candle, follows the wire to the other, instantly making the fiery arc over the top. The wire is destroyed, but the current once started, is maintained till the candle is burned away. The insulating kaolin between the carbons is destroyed by the heat, and gives way as fast as the carbons are consumed. When the candle has burned down the current is switched to the next candle, and thus, in turn, the four candles are burned in about six hours. The electric candle is a cheap and

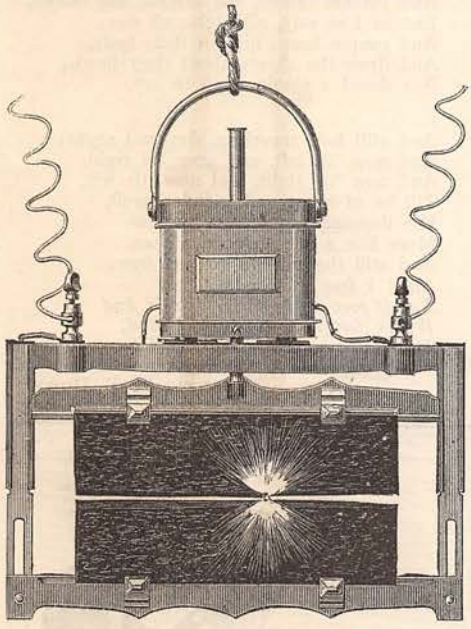


1. ELECTRIC LAMP FOR TABLE.

practical electric lamp, but as now used in Paris it has one serious defect. When one candle is burned out, or for any reason is extinguished, another must be lighted; and this demands constant attention and labor, as a man must go from lamp to lamp every ninety minutes lighting the fresh candles. This defect may, in time, be overcome by some automatic device for switching the current, but it has not yet been done. The unequal wasting of the two carbons is prevented in the candle by employing an alternating current, the polarity of the current being changed many thousand times in a minute, and in this manner the burning away is distributed between the carbons equally.

The electric lamp employing clock-work is so

well known that it needs no description. The improved form of lamp used in this country gives good results at a reasonable cost, and it is said to work steadily with very little attention. A cheaper form of lamp dispensing with clock-work is shown in the cut. Here the two carbons are placed in line, one touching the other. The upper pencil is fastened to the armature of an electro-magnet, and while no current is passing, the armature falls and the two carbons touch. On the passage of the current the magnet is excited and the armature is raised, lifting the carbon and drawing them apart just enough to form the arc. The instant the carbon burns away and the distance becomes too great to maintain the circuit, the armature falls, permitting the pencils to touch. This closes the circuit and the light starts again. These extinguishings and relightings take place every little while, but so quick is the operation that the light is practically continuous. This form of lamp is cheap and simple, and it is reported to give excellent results both in halls and streets.



2.—HANGING ELECTRIC LAMP.

Figure 2 gives a new lamp recently invented in this country. It consists of an iron frame holding two thin plates of carbon. An electro-magnet is placed on top (covered in cut), and the upper plate is connected with the armature. When at rest the two plates touch at the edges, one resting on the other. On passing a current the magnet lifts the upper plate, and the light springs up somewhere between the two plates. In a moment the carbon is burned away just there. The current is not, however, broken, for the arc instantly shifts to another part of the plate, always finding the spot where the right distance is maintained. In this manner the arc burns its way backward and forward till both the plates are consumed. The plates are designed to burn one hundred hours, and unless the current is stopped, the light will be maintained without attention till the carbons are destroyed. This lamp is simple and requires no attention while burning, and when the plates are consumed, new ones may be inserted in a moment. A single light of this pattern will give a light equal to from 2,000 to 3,000 candles, and the cost for carbons will be about one cent an hour.

Another form of lamp recently brought out employs the weights of the carbons and their holders to move a simple train of clock-work that constantly adjusts the position of the pencils. This lamp has also an ingenious appliance for correcting sudden changes in the speed of the works under variations of the current, besides several new devices for adding to the convenience in setting up the lamp. This new style of lamp is made in a variety of forms suited to use as a street light, mast-head light or locomotive head-light.

Concerning the cost of electric lighting as compared with gas, there is much dispute. If a single electric lamp is compared with a common gas lamp, the cost is in favor of the gas, but this is not a fair comparison, for a gas-jet in New York may (perhaps) give a light equal to 22 candles, whereas a single electric lamp can give 15,000 candles. If it is attempted to get as much light out of gas, the cost will be so disproportionate that it would not be considered, to say nothing of the immense number of jets that would be required, and the consequent heat, smoke, and trouble. The parish of Chelsea, London, recently sent an agent to Paris to examine the cost of lighting streets by the electric candle (not the best lamp), and the "Engineer" in commenting on his report, says (we quote with some condensation):

His conclusions seem based upon a comparison of the electric light as used in the Avenue de l'Opéra and the Place de l'Opéra, at Paris, and the gas-lights as used in some of the streets of Chelsea. The comparison is hardly fair, because the latter are not well-lighted. The streets named are Sloane Street, King's Road, Lowndes Square, Cadogan Place, and the Chelsea Embankment. Taking the whole of these, the average distance from lamp to lamp is about forty-five yards, while in the Avenue and Place de l'Opéra the average distance of the gas-lamps if placed in a line would be about five yards only. These are well-lighted streets in Paris, it must be admitted, but then Paris is altogether better lighted than London, and if we are to make a real comparison between gas and electricity, it should be made with the number of gas-lamps per street, giving a reasonable amount of light. Mr. Stayton's report is, of course, relative to things as they exist, and not as they may be. The Avenue de l'Opéra is lighted with the Jablochkoff lamp. Each electric candle costs 7½d., and burns one hour and a half, giving a light equal to 700 wax candles. The cost per light is 1s. 2½d. per hour. The estimate of the first cost for similarly lighting Sloane Street is £3,200, with a working cost of 16s. per hour from the thirty-two electric candles, whilst the existing forty lamps cost 8¼d. an hour. These figures at first sight seem most conclusive. Now let us look a little closer into them. The forty gas-lamps are, on Mr. Stayton's own showing, equivalent at the maximum to 500 wax candles per hour; probably in reality to no more than half that number. The thirty-two electric candles would be equivalent to 22,400 wax candles. In the case of the maximum, the electric light is forty-five times as good as the gas-light; in the more probable case it is ninety times as powerful. Now, 45 times 8¼d. gives us 31s. nearly as the cost of the gas to give an equivalent light, supposing each lamp to equal fifteen candles—with a proportionately greater sum if the gas is not of this maximum quality. The first cost again, we believe, will be found to be equally in favor of electricity.