PROFESSOR PROCTOR'S ASTRONOMICAL LECTURES.

Professor Richard A. Proctor, the distinguished English astronomer, recently delivered a series of lectures in this city. The course began with masterly discourses upon the sun, the planets, and comets and meteors, which were illustrated with photographic views and diagrams thrown upon the screen by the magic lantern, and which consisted in clear explanations of the present state of scientific knowledge regarding these heavenly bodies. As the subjects above noted have, however, already found full and recent elucidation in our columns, notably in the published abstracts of the lectures of Professors Young, Morton, and others, we pass at once to the consideration of the very interesting topic of the fourth discourse—the moon.

The moon's diameter is 2,100 miles, and she is distant 238,828 miles. Her surface is less than our globe in the proportion of 1 to 13½, or, in other words, includes about 14,600,000 square miles, equal to the combined extent of North and South America. The volume of the moon is to that of the earth as 1 to 49½, and the relative masses as 1 to 81.

The speaker had heard that the observatory to be established on the Rocky Mountains will bring the moon within thirty miles of us; but that is impossible. The optical image formed by the object glass of the astronomer has defects, and if you magnify it you magnify the defects. When you get beyond a certain point it is useless to magnify the image as it appears, and there is no hope of any telescope larger than Rosse's to get a close view of the moon. It is hopeless to expect to find signs of life on our satellite, for the moon has no atmosphere. This is shown by the fact that shadows thrown by the lunar mountains are seen black, whereas, did an atmosphere exist, they would vary in intensity. Also, when the moon passes over a star, the latter flashes out suddenly; if there were an atmosphere, the star would be seen precisely as our sun when sinking.

The moon has no water, for if she had, and if even a shallow atmosphere existed, the water would be raised into the latter, and decrease or increase the streaks or markings which appear on the great floors. In answer to the question: Where then has the water gone? four suggestions are made. The first is that a comet carried away the lunar oceans and atmosphere. The second, that the surface is covered with frozen snow. The objection to the latter is that there is no sign of the whiteness which would then appear, for, in fact, the color of the moon is about that of weather-beaten brown sand. The third idea is that the lunar oceans have been withdrawn into the substance of the moon; and the fourth is that the moon is egg-shaped, and that the center of gravity, being displaced on the further side, has carried to that side the oceans and air of the moon, and that the side of the moon never toward us may be a comfortable abode of life.

Several photographic pictures of the moon were then exhibited and commented upon by the speaker. He said the photographic study of our satellite was commenced by Dr. W. H. Draper, in 1840. Mr. De la Rue, of England, subsequently made many lunar photographs, but the best are those of Dr. Henry Draper and Mr. Rutherford, of New York. From the craters called Copernicus, Kepler, and Aristarchus, there is a radiation, and it appears clearly to observers that the strata were upheaved at different times; the later ones seem to break through those of earlier formation. It is hoped that, by this characteristic, we can learn something of the order in which the changes in the moon's surface took place.

Other pictures were shown, to illustrate how far the appearance of the moon may alter from a mere change in the illumination, so that it is difficult to say what changes are going on, from those apparently taking place. The moon changes and shifts not merely with regard to the sun, but to the earth, and Professor Proctor calculates that 1,300 years must elapse before any part would be again presented in precisely the same view. She is unlike our earth in general conditions. The total lunar day lasts 29½ of our days, but the year is very much less than ours, and is only 346 days. This is due to a slow tilting, corresponding to the precession of the equinoxes.

The two engravings which we present herewith show how the earth would look to an observer on the moon's surface, that is, about 13½ times as large as the moon appears to us. In Fig. 1 an earth-light scene is depicted; in Fig. 2 the sun is the direct source of light, the earth showing its dark side. There is a defect in these lunar pictures due to the imagination of the artist in introducing signs of weather.

Fig. 1.—PART OF THE MOON'S SURFACE AS SEEN BY EARTH LIGHT.

As to the cause of the lunar craters, Professor Proctor went on to state that on the moon's surface there is a pounding down of meteoric missiles, not necessarily solid ones, but a falling down of meteors on the plastic surface. At the present day it is estimated that over 400,000,000 meteors fall through the day, but the result is very slight indeed. The speaker found that the earth would require 400,000,000 years to have her diameter increased a single inch by them. While the earth was still in a form of vaporous matter, the moon was rolling on, still plastic, and these meteors, falling down upon her surface, would produce that pitted appearance.

THE STAR DEPTHS

was the title of Professor Proctor's fifth lecture. He said that the problem which astronomers have to solve, in determining the distance of the stars, is one of stupendous difficulty. A change of 383,000,000 miles in the place of observation causes no perceptible alteration in the direction of many stars. *α Centauri* changes its position in a year apparently less than the distance passed over by the minute hand of a watch in $\frac{1}{200}$ of a second. It is 210,000 times further away than our own sun is. The largest star presents no disk to the telescope, hence its light must be measured. The star above named shines three times as brightly, and its surface is five times as large as that of our sun. Sirius is 100 times brighter, and in volume 2,000 times as large. The spectroscope shows that these stars are all suns.

Some stars are found to be double and show very well marked colors, some red, some orange, some blue, and so on. These owe their colors not to the inherent nature of their inner light, but to the qualities of the envelopes that surround them; and the idea is suggested that we have there a process by which these stars are perhaps passing down to a cooler state. Probably Jupiter and Saturn at one time may have been visible as accompanying stars, small complements to our sun, and they at that time may have shown some colors well marked in comparison with his. Compared with the stars' distance, the whole orbit of our earth sinks into insignificance. And remember that the least of these stars—its mere disk—has enormous heating power; then remember how great the distance from star to star; and then consider that the nebulous matter is spread through these stars, and continues from one star to another, and then you have an idea of the wonderful extension of that matter. For a long time the theory was that this nebulous matter was far out in space from the stars, but it is now proved that there is a real connection between the nebulous matter and the stars seen in the same view.

Kepler imagined that the center of the universe was the solar system, and that the light and heat of the sun spread out and was caught by a shell 70 miles in thickness, inclosing the stars. Wright supposed that our starry system was one of several and like a cloven disk.

Professor Proctor stated that he hoped to take one telescope and survey the whole heavens, counting the number of stars in different directions (not a field here and a field there, as Herschel did), little square fields, side by side, in the heavens, counting the number and mapping the results: and then seeing where the stars shown by that telescope are richly or poorly distributed. The stars have a wonderfully rapid motion. The process of change in a block of granite is relatively greater than those processes in the still heavens, yet these stars are every one traveling 20 and 30 miles in a second, and not a star in the heavens but has some motion.

Five of the stars of the Great Bear are traveling in a common direction, and apparently at a common rate. It is a well known fact that if we approached a star or other source of illumination rapidly, the waves of light will be shortened, otherwise they will be lengthened; the lines in the spectrum will be displaced, and we shall know whether the star is approaching or receding. Dr. Huggins found that these stars were receding at the rate of 11 miles in every second of time.

There is another sign of change in the stars; a gathering in a certain region. There is, in point of fact, a vast variety where everything seems so regular. We see streams, and modules, and branches of brightness, and it seems that when the astronomer has penetrated into the recesses of the milky way, he has no more reached the bounds of the universe than he had at the beginning of his research

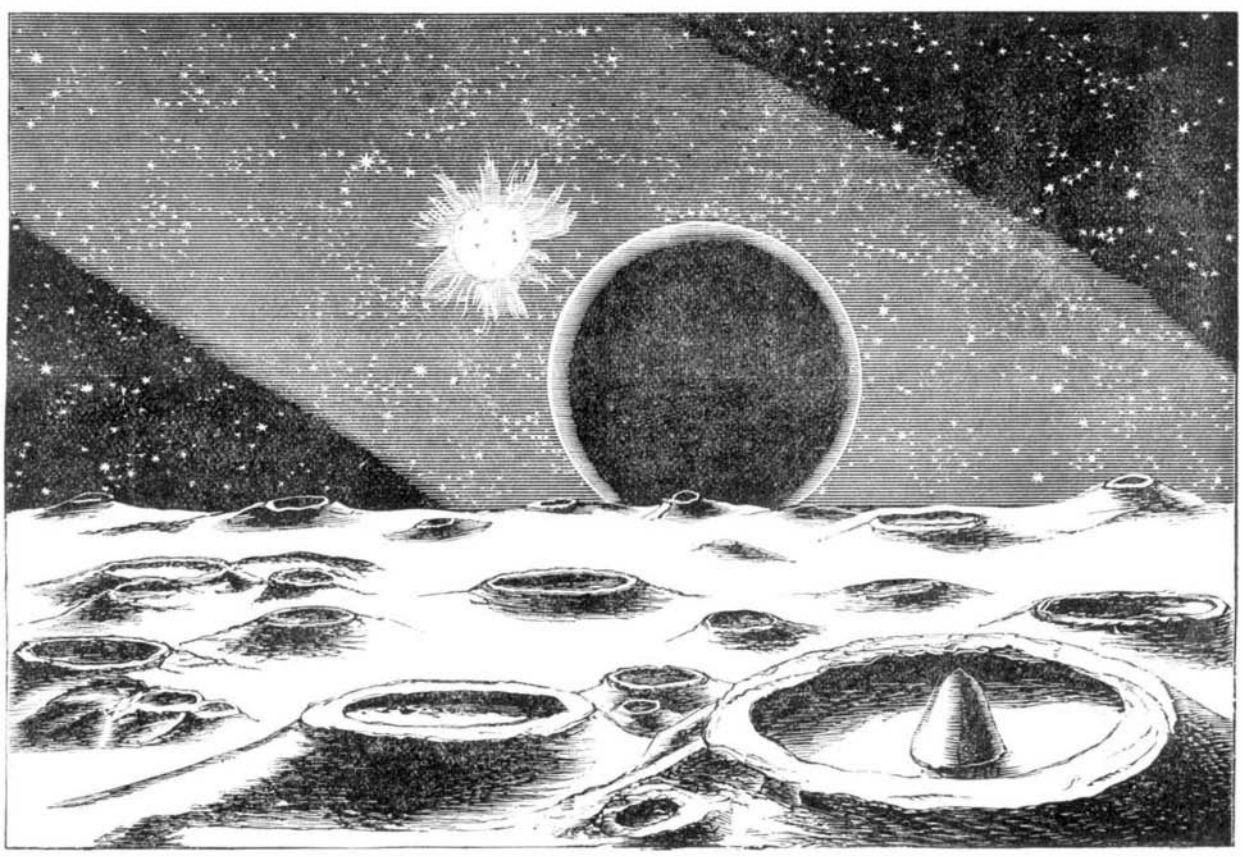

Fig. 2.—PART OF THE MOON'S SURFACE, THE EARTH SHOWING ITS DARK SIDE.

He has only examined more and more minutely a particular corner of the star system. We find a group of suns of which our sun is a single member. Then again we pass to systems brought into view by the telescope, and find that the star system to which our sun belongs is only a part of that one—an atom in space.

The concluding lecture of the course was entitled the

BIRTH AND GROWTH OF THE SOLAR SYSTEM.

If we look around at the condition of the planetary system, we find much to lead us to the belief that it grew to its present state, that there was a process of its development. There are 8 primary planets and 134 asteroids, and all these bodies travel in the same direction around the sun. Then every one of the bodies, whose motion has been determined, turns in the same direction. There are in fact so many similarities that we are bound by the laws of probability to believe in the evolution process, for the chance of 142 planets going round in the same direction is 1 in 2,774,800,000,000,000,000,000,000,000,000,000,000,000,000. Laplace, in his explanation of this motion, had the idea that there was a great nebulous mass having the sun in the center, extending on either side far beyond the present extension of the path of the uttermost planet, that is, a path of 5,000,000,000 miles diameter. That mass was intensely hot and vaporous, and it was rotating; and as the rotating mass contracted and it began to rotate more rapidly, a ring was thrown off, which would gradually break up, its parts would gradually amalgamate; many parts would have different rates of motion, and different parts would encounter each other, and in the course of millions of ages there would be an amalgamation into one mass, having the same direction of motion that the nebulous mass had, and traveling around a center which was the sun. That process would go on until one planet after another was formed. There was no light given by the La Place theory in reference to the questions connected with the asteroids; he simply stated the general facts and left them there. It seemed to the speaker that they were led to another theory, and he would adopt a method of illustrating it which he deemed suitable. If an insect of a few hours' existence endeavored to trace the history of the growth of a tree in which it lived, it could not during its own life arrive at the truth; but by transmissions of slight knowledge, the result of study for ages, the species would eventually arrive at the truth. We know that as one nebulous mass passes into another, by chemical means, light is produced. There is evidence that these nebulæ are gaseous. There would be one center of aggregation which would grow continually in size and power, gradually drawing more and more matter to it; and the more it drew in of these nebulous masses, the greater its power would become. Professor Daniel Kirkwood took the paths of the asteroids, and arranged them in their order of distance, and he found certain places where, for some distances, there were no asteroids. He noted where the gaps occurred, and he found them corresponding to the paths of asteroids having periods commensurate with the period of Jupiter. Jupiter would disturb the motion of the asteroids, if they had a period like his own, and would prevent them from travelling, his mass being so much greater. This supports the theory that the solar system arose from motion and aggregations, not from the contraction of a great nebulous mass. The rings of Saturn give further evidence of the same. In the star clouds we find a multitude of stars discernible with the telescope, and so closely clustered as to be irresolvable; and in these masses or cloudlets we see proof that the sidereal system is not a mere aggregation of stars, but contains all varieties, nebulæ, star cloudlets, and stars of all varieties; and that it resembles the solar system, not in uniformity, but in variety of structure. In studying its laws we have a problem of enormous difficulty, but one which must one day be solved. The lecturer then exhibited numerous beautiful diagrams, illustrating the existence and appearance of nebulous masses and stars under various circumstances around the great luminous bodies, and the immense variety of these nebulous masses. He concluded by portraying the glory of scientific study, which brought man into a nearer and closer knowledge of his Maker. After the conclusion of the lecture, complimentary resolutions were passed, to which Professor Proctor appropriately responded.

A Mexican Motor.

We are indebted to the Hon. Martin F. Hatch, U. S. Consul at Merida, Yucatan, for a copy of a local newspaper—*La Razon del Pueblo*—containing an account of "An Astonishing Motor," the invention of a young Mexican named Gonzalez. The Mexican editor is of opinion that the invention is of such extraordinary value that its mere fame will make Mexico great among the nations. The new motor, he says, enables mankind to navigate the air in the teeth of hurricanes blowing at the rate of three hundred miles an hour. It permits of locomotion over the earth or under the surface of the sea, in all directions, with inconceivable velocity. We regret to say, however, that, after giving us a column and a half upon the various wonderful capabilities of the new invention, the editor fails to present any clue to the principles or construction of the device. The only light given upon this point is that the use of the invention involves no expense, not even the employment of hand power, nor steam, nor air power, nor electricity. The inventor has put into operation an example of the device in the form of a small boat, hermetically sealed, which dives and moves in any desired direction under water, at any desired speed, as if guided by an invisible hand. The editor does not hesitate to say that it is the most astonishing work that, up to the present day, has ever been produced in the world. The many mechanics who have seen it declare themselves utterly unable to explain the phenomena.

Evidently, here is another example of "psychic force." which we hope will be included in the new investigations of Dr. Crookes, of London.

By the soundings of John McKinney, an experienced navigator and old resident in the vicinity of Lake Tahoe, Cal., the greatest depth of that remarkable body of water is found to be 1,645 feet.

PATENT OFFICE DECISIONS.

PATENT VENEER CUTTER EXTENSION.

In the matter of the application of Benjamin F. Sturtevant, for the extension of Letters Patent No. 26,627 granted December 27, 1859, for Improved Lathe attachment for Cutting Veneers.—Decided December 24, 1873.

THACHER, *Acting Commissioner:*

This invention consists in improvements upon machines for cutting veneers. It is designed to cut sheets thicker than common veneers without crippling or splitting them in the operation. It was well known that a thin sheet could be cut from the periphery of a solid cylinder of wood by circumrasion, or shaved from the surface of a plank, without disturbing the texture of its fibers, and that, where the conditions are the same, the danger of splitting or breaking is always increased as the thickness of the sheet is increased.

The applicant wanted to cut sheets thick enough to be used for picture backs and shoe peg blanks, which none of the existing veneer cutters would successfully do. The variation he had to make from existing veneer cutters was apparently slight, taking for comparison the machines of Humphrey, patented in the United States October 26, 1842, and Fontainemoreau, patented in England May 25, 1847, upon which the remonstrants mainly rely as anticipating Sturtevant's invention. It was such, however, as to accomplish the result he had in view, which, it is not satisfactorily shown, was, or could be accomplished before his invention was made. In every veneer cutter there is a knife for cutting the sheet, and a guide or presser bar to impinge against the block a little above the knife edge. In Humphrey's machine the presser guide is a roller, and in Fontainemoreau's it is a casting with a curvilinear face. The applicant simply beveled the front of his presser bar, giving it such a shape that when its working edge was pressed with considerable force against the periphery of the block opposite the cutting edge of the knife, it would slightly bend the wood fiber upward. Then the knife, instead of wedging and bending the sheet sharply at the cutting point, would find it already bent on the block, and would simply sever it and compress it, at and below the cutting point, perpendicularly against the lower face or bevel of the fixed presser bar. By thus bending the sheet on the block, just before the point of severance, by the action of the presser bar, instead of bending it by the wedging action of the knife in the act of severance, it was found that a most useful result was effected. While the latter process, which was that of veneer cutting, would cripple a thick sheet, the former would leave it as perfect as a ribbon unwound from its block. The experiments made at the hearing, as well as the testimony in the case, plainly establish the truth of this theory of construction and operation, and mark this part of the applicant's invention as distinctive and important.

The patented invention has been extensively used, the inventor retaining the business in his own hands, and receiving therefrom a large annual income. Yet the patent, so far as shown, has passed unchallenged. Considering the interests involved, it is incredible that Sturtevant should be left undisturbed in his business if the machine of Humphrey or Fontainemoreau would accomplish the same result; for the invention of the former was public property before the patent was issued to Sturtevant, and there is no evidence that the English invention was ever patented here. Either machine could have been put into operation by any one during the lifetime of this patent without tribute to any one. Yet there is not a particle of evidence that a single machine of either kind has been so used, and not a single specimen is produced of veneers or "peg wood" made by such a machine. This circumstance is significant, and fully as important as the ingenious theories of expert witnesses.

The first claim is not in such form as is required by the present practice of the Office under section 26 of the act of July 8, 1870, but in the light of the specification it would no doubt be held valid by the courts. The second claim covers "the cutters E E′ E″, or their substantial equivalents, for the purpose specified." These cutters are placed above the main cutting knife, to divide the sheet into strips, and one of them, if desired, is placed flush with one end of the knife, to cut the edge of the sheet from the log. I do not see that they have any peculiar function to distinguish them from those shown in the patent of Humphrey, and to entitle the applicant to the broad claim of his patent. I must hold them as covered by the second claim, without discussing the testimony relating to them, to be substantially anticipated.

The question of adequacy of remuneration is the only remaining one. The diligence of the applicant has been exemplary, and his success remarkable. The profit he has derived from this invention is large, even taking it at his own estimate. But nearly doubling it, as the remonstrants do in their estimate, which is not without some reasonable basis, it is unusually large, reaching nearly $130,000. The amount of money, however, which an inventor has received for his invention, has no relation to the question of granting an extension, except as to its correspondence with the labor and expense incurred by him and the ascertained value of the invention to the public. The mere fact that a great profit has been realized is not a sufficient reason for refusing an extension, if the sum is disproportionate to the public benefits derived from the invention through the labors of the inventor. Although the remuneration of this applicant is admitted by him to have been over $30,000, the advantage of his device to the public has been so many times this amount that I should not be warranted in holding him adequately remunerated.

The extension will be granted upon a disclaimer of the second claim and payment of the required fee in accordance with official rules.

DECISIONS OF THE COURTS.

United States Circuit Court---Southern District of New York.

HARVESTER PATENT.—C. AULTMAN *vs.* H. C. HOLLEY AND E. H. FITTZ.

(*In Equity—Before Woodruff, Judge.*)

WOODRUFF, *J.*;

On the 20th of September, 1853, Philo Sylla and Augustus Adams received Letters Patent from the United States for an improvement in harvesters. On or about the 17th of May, 1859, on a surrender of the said patent, new letters were issued to C. Aultman & Co., assignees, intended severally to cover different parts of the same invention, or different devices included in the original machine. These reissues were numbered, respectively, 721, 722, 723, 724, 725, and 726. Thereafter reissue numbered 722 was assigned to the original alleged inventors, was by them surrendered, and on the 14th of May, 1867, new Letters Patent were issued to them, professedly for the same invention, which last named reissue is numbered 2,608. The several reissued patents numbered 2,608, 724, 721, and 726, were, on the 19th of September, 1867, extended for seven years from the expiration of the original terms—namely, to the 20th of September, 1874, and by assignment from the original patentees the title thereto is vested in the complainant in this suit, who charges the defendants with an infringement of these extended reissued patents. The defendants have raised the preliminary objection that the suit is defective for want of necessary parties; and on the merits they insist upon various objections to the relief sought, the chief of which are that the reissued patents are void, because they "are not for the same invention as the original patent from which they have sprung, but claim substantial and material matters not indicated, suggested, or described in that original patent;" that if the reissued patents embrace no devices but such as are shown or suggested in the record of the original, or if they can be sustained so far as to embrace what is shown in such original and nothing more, then the defendants' machine is no infringement; and, finally, that the invention shown or indicated by the original patent, its specification and model, in any particular in which the defendants can be deemed to use any device or devices shown therein, was not new when such original patent was granted.

The court held substantially as follows:

Under an agreement between the owners of conflicting patents, which defined their respective rights and provided a fund for maintaining them and for purchasing as joint property patents deemed necessary for their mutual protection, a patent does not pass which had been previously purchased by one of the parties and was subsequently assigned to the original inventors, and, after having been extended, was reassigned to the same party.

Such an agreement would operate at most as a license to all the parties to use a patent owned by one of the individuals composing one of them; and he alone could maintain a suit at law upon it, and the others need not join.

It is no objection to a suit brought upon an extended patent that the exclusive right under the original term for the territory where the infringements were perpetrated had been assigned to third parties, unless it appears that the extended term was embraced in the assignment.

A claim for "the combination of the finger beam" in a harvester "with the hinges by which it is drawn arranged above the plane of the cutter" is not enlarged because a description of a machine in which that combination is shown to be practicable is interpolated in the specification upon a reissue, neither is the patent invalidated.

A reissued patent is valid although the description of a machine to which the invention may be applied is substituted in the specification for the purpose of illustration instead of the description of another contained in the original, which was so imperfect that it failed to show the application.

Where a reissued patent claimed a feature which was not described in the original specification nor clearly shown in the drawings, and the model was so injured as to furnish no evidence respecting it, it was held on other proof that the model originally contained the disputed feature, and the patent was held valid.

The devices employed in abortive and abandoned experiments do not become public property, and are no bar to a patent embracing them obtained by an independent and successful inventor afterward.

A claim for the combination of a stop to prevent the finger beam of a harvester from falling too low with the mechanism for connecting it with the main frame, and allowing it to rise and fall, is not infringed by a machine so constructed as to require no such stop, and having none.

The gist of Sylla and Adams' invention, patented September 20, 1853, consisted in attaching the finger bar to the frame of a mower and reaper by a coupling bar hinged at one end to the frame at or near the crank shaft by which the sickle bar is operated, so that the end of the pitman attached to the sickle bar oscillates in nearly the same arc of a circle as the inner end of the finger bar; and their reissued patents of May 14, 1867, are infringed by any machine using that construction, however differently formed in other respects.

George Harding, for complainants.

Henry Baldwin Jr., and Benjamin F. Thurston, for defendants.

NEW BOOKS AND PUBLICATIONS.

THE PREPARATION AND MOUNTING OF MICROSCOPIC OBJECTS. By Thomas Davies. Enlarged second edition, edited by Professor John Mathews. New York: G. P. Putnam's Sons, 23d street, corner of Fourth avenue.

Any one who desires to become skillful in this most delicate species of handicraft, will find instructions here that are of undoubted value. The work was originally written for the help of students in microscopy. It contains the concise directions pertaining to every branch of the subject, derived from the experiences of the most eminent practitioners of the art. It shows what substances are to be employed to give transparency to this or that tissue, what coloring material will render desired parts more conspicuous, what will harden the soft membrane, or soften the hard. It describes the various solvents of various objects, shows how to clean them, how to cut, treat, place, and secure. Shows the uses of polarized light, and the changes which the same object, prepared by different methods, exhibits. In short, there is hardly a point in the whole range of the art of microscopic preparation that is not here explained. Not only those who wish to learn, but all who have acquired dexterity in the art, will find useful instruction in this book.

HALF-HOURS WITH THE MICROSCOPE. By Edwin Lankester, M.D. Illustrated by Tuffen West. Explanation of the Polariscope by F. Kitton. New York: G. P. Putnam's Sons, Fourth avenue, corner of 23d street.

This little volume is intended as a popular guide to the microscope, as a means of amusement and instruction. It most admirably fulfils its purpose. It is crowded with useful and practical information. We think it would be difficult to find elsewhere, in the same compass, so much microscopic instruction so clearly set forth. Beginning with an explanation of the construction of the simpler forms of the instruments, it goes on to those of more complicated structure, shows the arrangement of the lenses, the combinations of the binocular attachment, the various diaphragms, *camera lucida* for drawing the magnified objects, with explanations of sundry other tools and devices.

The chapter entitled "A Half-hour with Polarized Light" gives a clear and easy explanation of this curious subject. Instructions are given by which any person of intelligence may construct a practical polariscope of bits of thin glass, at the cost of a few cents. A list of various crystallizations, for the production of the most peculiar forms and gorgeous colors seen under the polariscope, is given, with directions for their preparation—all of comparatively simple nature.

The chapter, "A Half-hour with the Microscope in the Garden," describes some of the extraordinary and magnificent things that may be seen close at home. Plates delineating the forms of some two hundred of these wonderful things are given, including the structure of garden plants, berries, flowers, and vegetables, showing formations of astonishing beauty. Then follow: "A Half-hour with the Microscope in the Country," "A Half-hour at the Pondside," "A Half-hour at the Seaside," "A Half-hour Indoors," each chapter being illustrated with pictures of the many strange and interesting objects that are mentioned. The book closes with an appendix, by Thomas Ketteringham, upon the preparation and mounting of microscopic objects. The frontispiece is a beautifully executed plate, in colors, of splendid polariscope objects. Some ten thousand copies of this little work have been sold in England, which is an indication that its intrinsic merits are equal to any thing that might be said in its praise.

FREE HAND DRAWING: a Guide to Ornamental, Figure, and Landscape Drawing. By an Art Student. 50 cents. New York: D. Van Nostrand.

Recent American and Foreign Patents.

Improved Artificial Stone.

Ernest L. Ransome, 10 Bush street, San Francisco, Cal.—By means of the process described in this patent, it is claimed that much of the chloride of calcium hitherto wasted is collected and saved, and the stone is washed in as many minutes as formerly days. The invention consists in the rapid removal of the calcium chloride from the pores of the stone, by a strong blast of air, followed by a blast of air containing water in a state of fine division. The inventor states that the operation is completed in a few minutes, and that the cost of the apparatus required is but small.

Improved Grain Car Unloader.

Mason W. Bosworth, Binghamton, N. Y.—This invention relates to an apparatus for unloading grain in bulk from railroad cars; and it consists in the employment of a movable endless chain or apron, passing over guide drums, and carrying a projecting gudgeon or arm, which operates in connection with a slotted sliding plate connected indirectly with the scrapers or scoops, arranged within the car. The invention further consists in attaching to the slotted sliding plate a reciprocating rod, traveling between guide pulleys, and connected with the movable unloading scoops or scrapers so as to draw the same to the door of the car for discharging the grain. The invention also consists in connecting the unloading scrapers, by ropes, to the reciprocating rod, said ropes passing over guide rollers, and so arranged that when one of a pair of scrapers is drawn to the door of the car for discharging its load, the draw rope of the other will be slackened for permitting it to be retracted for the purpose of filling it.

Improved Locomotive Furnace.

Andrew J. Stevens, Sacramento, Cal.—This invention is a boiler door provided with a damper on the outside, and an air deflector on the inside. The lining of the fire box door is angular in form, and projects from the inside of the door, the lower portion of the lining being cut away so that an opening is formed. The upper portion of the lining acts as a reflector to throw the air downward to the surface of the fuel, so that it can readily mingle with the gases inclosed, and thereby produce a more perfect combustion of the fuel.

Improved Till Alarm.

Egbert O. Wood, Nashua, N. H.—By suitable construction, when a number of tumblers are all turned forward so that their short arms project upward, the drawer may be moved out and in freely. Should one or more of the tumblers be turned back so that their long arms project upward, the drawer cannot be drawn out without first forcing the said long arm of the tumbler or tumblers downward by operating the keys of the tumbler or tumblers that were turned back. When the key of a tumbler that has been turned forward is operated, the short arm of said tumbler is raised, so as to prevent a lock plate from dropping down and passing out beneath lugs. When an attempt is made to open the drawer with one or more of the tumblers raised, a lug of the lock plate will strike against the lug of a ratchet, and, releasing the lever, will sound the alarm. As the till or drawer is closed, the lugs of the lock plate slide up the inclined rear sides of other lugs, and drop down in front of said lugs, the rear part of the said plate resting upon the upwardly projecting arms of the tumblers. The alarm is set by turning one or more of the tumblers to the rear ward; and the combination is changed by turning one or more of the tumblers forward or back, as may be desired.

Improved Weather Strip.

Oliver A. Vorce, Kentland, Ind.—This invention consists of a weather strip, which is raised or lowered in a groove at the bottom of the door, by being connected to the spindle of the lock by a suitable lever, so that on opening the door the strip is raised and retained in position by a band spring at the top part, which lowers the strip on the closing of the door by being depressed.

Improved Draft Equalizer.

Elias H. Blake, Coatsburg, Ill.—This invention is an improved equalizer which is readily attached to a tongue or plow beam, so adjusted as to allow the horse to walk upon either side of the tongue, and to give an advantage to the single horse or to the pair, as may be desired. The invention consists in a triangular equalizer provided with clamps for securing it to the tongue or beam, and having its forward arm slotted and provided with adjustable perforated plates to receive the hammer or pin by which the tripletree is connected with it.