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Contents.

(Illustrated articles are marked with an asterisk.)

REPORT OF THE COMMISSIONER OF PATENTS.

The annual report for the year 1874, which has recently been published, presents a very satisfactory statement of the transactions of the Office during that time, and of its present condition. There have been 13,599 patents issued, which exceeds the number for any other year except that of 1869. There have been some extraordinary expenditures, but the revenues have been sufficient to meet all these, leaving a balance of $58,989.76.

The *Official Gazette*, which among other things has superseded the annual Patent Office reports, has the advantage over its predecessor of furnishing from week to week a brief description of the patents which have been issued during the week then ended, setting forth at least the titles, claims, and drawings of such patents, instead of delaying till the end of the year, and several months, and sometimes a year or two, longer, before such information used to be communicated to the public. A charge of six dollars a year must, however, be met by those who would avail themselves of this information instead of receiving it gratuitously, as was formerly done through the annual reports.

A very great improvement has recently been introduced by placing the illustrations in each case in immediate proximity with the respective descriptions and claims. This was done in 1853, but for some reason was afterwards discontinued and a different rule substituted. It is much superior in point of convenience.

We are promised a general index of all the patents issued from 1790 to 1873 inclusive. This index is to consist of two sets of three volumes each: the one of these sets containing an alphabetical list of the names of all the patentees, and the other an index of the subject matter of all the patents that have been issued. These will be of great service. The aggregate cost of both sets, being forty dollars, will, however, probably prevent their being widely disseminated except in some of our principal libraries.

The Commissioner suggests the propriety of making the *Official Gazette* to a considerable extent a business paper by rendering it a medium for advertising. If there are no political objections to such a course, we see none other of sufficient importance to prevent its being adopted. The precedent of thus rendering one of the bureaus of the Interior Department not only a publishing house, but also a competitor for advertising patronage, will probably not be long continued without exciting formidable objections to the proposed practice.

In the necessity of a thorough and systematic revision of the patent law, as set forth in the report, we heartily concur, and trust that such a measure will not long escape the attention of Congress. The present law is full of incongruities and imperfections, which loudly call for the hand of thorough reformation. It is in many important respects far more objectionable than the law which it superseded.

But with regard to the Commissioner's idea of providing for an appeal in cases of the allowance of a patent as well as in those of rejections, we see a very grave objection. How would such an arrangement be successfully conducted? The same rule should be made applicable to all cases. Every patent that is allowed by an examiner should be brought before another tribunal for revision. A double examination would thus become necessary in all cases. If the examiners are fit for their positions this is superfluous; and if they are not it would be pernicious. The wrongful granting of a patent is less harmful than the wrongful refusing of one. If it be said that the examiners who review the first decisions should be men of more ability and experience than they who make those decisions, then we say, discontinue the latter and let the better examiners decide in the first instance.

Practically the present arrangement is in substance the same as the Commissioner proposes in all doubtful cases. The first examinations are usually made by the assistant examiners. If there is any doubt as to the patentability of the subject matter of the application, a rejection is usually the result. A second examination is then called for, which brings the matter before the principal examiner. If the Commissioner, will establish the rule that no patent shall be allowed to issue until the matter is presented to the principal examiner for his approval, he will have what he desires, and without any additional complication or expense. No Patent will in that case issue without a review of the decision of the Officer who makes the first examination, whether the patent be allowed or rejected.

The importance of rendering a patent unimpeachable was long since brought to the attention of Congress by a former Commissioner as will be seen by reference to the Patent Office report for the year 1855. Whether any such plan is practicable, without entailing more injury than benefit, is a matter of no little doubt, but one which is well worthy of serious consideration by the law-making power.

As to the wisdom or efficacy of the competitive examination of candidates for appointment or promotion, we have very grave doubts. A man of superficial abilities will generally, on such an examination, far outshine another of far more sterling and useful qualities. A fresh graduate from a college, with no experience and perhaps but little common sense, would often, on such an examination, surpass the most experienced and useful examiner to be found in the Office. Nothing but a thorough trial, or the exercise of a very sound discretion on the part of the appointing power, will lead to a wise conclusion in such cases. We do not think that such a conclusion can generally be reached through a competitive examination.

PROGRESS AND PROSPECTS OF SOLAR CHEMISTRY.

Several important circumstances unite to give unusual interest to the solar eclipse to occur in April next. The progress of solar chemistry has brought investigators face to face with problems of universal reach and significance, for the solution of which the four minutes of obscuration will be more valuable than as many years of laboratory work. A new instrument, the siderostat, destined, it is thought, to effect a great revolution in astronomical observation, will immensely increase the efficiency of spectrum photography; and the conditions under which the eclipse will be visible promise better opportunities for the observation of totality than can be enjoyed again before the close of the current century, or, more precisely, April 16, 1893. In not one of the four total eclipses which occur in the meantime—1878, 1882, 1886, 1887—or in that of 1900, will the duration of totality be so great, or the central line of the eclipse present stations so favorable for observation. A glance at the grander results accomplished during recent eclipses—following chiefly an elaborate review of the work in a late issue of the London *Times*—may help to make clear the grounds on which the expectations of the present are based.

Between the eclipse of 1860—during which photography decided the long vexed question of the origin and place of the strange red prominences seen round the dark body of the moon at the moment that the sun's disk is covered—and the eclipse of 1868, the spectroscope had revealed the approximate composition of the sun's atmosphere, taken as a whole. The great point to be determined in 1868 was not simply the place and shape of the prominences, but their material. The result is well known, namely, that they consisted of glowing gas, or a mixture of such gases, shot to immense hights through the solar atmosphere.

Almost simultaneously with this discovery, it was found that the prominences could be studied spectroscopically independently of eclipses; and observers were not long in finding out that, outside the bright round face of the sun, was an envelope of glowing hydrogen—the chromosphere—into which magnesium and sodium, and, more rarely, iron and other heavy metals, were injected from below, in the form of a vapor. It was further ascertained that the gases and vapors were not all mixed up together, but that the lightest, such as hydrogen, magnesium, and sodium, were generally at top; and that, as the others were shot up from time to time, some more frequently than others, the heavier were, as a rule, located lower down in the solar atmosphere than the other.

During the eclipse of 1869, the results of previous observations were confirmed; the halo of light outside the prominence envelope was photographed, and it was established that an unknown gaseous element extended beyond the hydrogen, hitherto accounted the lightest form of matter. The green line, by which this substance is distinguished, has not as yet been identified with that of any terrestrial element.

Great preparations were made for the observation of the great eclipse, 1870; but the weather was bad, and, though results of considerable value were obtained, nothing strikingly important was decided. Better fortune awaited the observers of the eclipse of 1871. The corona was photographed, under nearly the same instrumental conditions, from three different places, and the similarity of the pictures proved, beyond all doubt, that part of the corona was a solar appendage. Evidence was obtained, making it extremely probable that the light of the outer parts of the true solar corona—the coronal atmosphere, as Janssen proposed to call it—was stronger in the violet and ultra violet parts of the spectrum than elsewhere. And it was further established that, for some distance above the hydrogen envelope, as seen without an eclipse, less bright hydrogen existed. The inference was that the chromosphere—or lower atmosphere of the sun—consisted of brighter hydrogen and other vapors.

Since 1871 the spectroscopic study of the chromosphere has been carried on vigorously under the clear sky of Italy, and the clearer sky of our mountain observatory in the Far West. Through this thin atmosphere, 9,000 feet above the sea, Professor Young has been able to study a much more complicated chromosphere than appears to observers lower down. Among other things, he has found that, along with magnesium, there frequently appears the vapor of the metal calcium, the principal characteristic lines of which can be seen only under the most perfect atmospheric conditions. In the meantime, extensive laboratory researches have been undertaken for the elucidation of the phenomena observed in the chromosphere. It has been proved that, in the case of any one metal present in the sun, the metal behaves exactly the same in the sun's atmosphere as it does when driven into vapor by the passage of the electric current between the carbon poles of an electric lamp, thus making it possible to interpret many appearances in the chromosphere, which would otherwise be inexplicable: as for instance, the almost complete spectra of hydrogen, the metals of the alkalies and alkaline earths, and the metals of the iron class, while such metals as zinc and lead show only a few lines. The metals of the tungsten, antimony, silver, and gold classes show no traces of existence in the sun's atmosphere; nor do the metaloids, such as oxygen, carbon, nitrogen, sulphur, and the like, which make up more than half of the parts of our planet, so far as known. It would appear, however, that the presence of the latter may be inferred. In fact, it has been claimed that we have, in the solar system, exactly such a record as we should expect if this large class of bodies existed in a comparatively cool part of the atmosphere, at a hight above the hotter lower strata. It is also claimed that granting this, it is possible to explain the various classes of stars by supposing that, as a star grows older and colder, the metaloids are enabled to exist lower down in the atmosphere, and thus to change the character of the spectra of stars bright and hot into that associated with those which are dim and possibly colder; until at last the metaloidal rain, so to speak, falling on the metals below, gives the material of a future crust.

Associated with these chemical questions are physical questions of the greatest interest, the solution of which will help to make clear the development of our Universe from nebulæ to suns and worlds. How far the coming eclipse will further the inquiry remains to be seen. It is confidently expected that the result to be accomplished will be the "fruit and crown" of the work begun in 1860, and carried on with so much zeal by all civilized governments since that time.

The course of the central line of this eclipse is mainly a sea track, yet, in its passage from the Nicobar islands, in the Bay of Bengal, to Siam, it crosses several points that will afford good stations for observation. At Kaikul, in the island of Camorta, totality will continue four minutes twenty-seven seconds. On Bentinck Island, the maximum duration of totality will be four minutes seventeen seconds; at Mergui, four minutes six seconds; at Tenasserim, three minutes fifty-seven seconds; near Bangkok, Siam, to which point astronomers have been invited by the King, the total eclipse will last three minutes fifty-four seconds.

AN IMMENSE TELEGRAPHING ESTABLISHMENT.

The Western Union Telegraph Company moved into their new building, at the corner of Broadway and Dey street, in this city, on the first of February. Moving a large business of any kind from one place to another is usually a troublesome affair, but the peculiarities connected with this business rendered the moving a matter of more than ordinary complication. A merchant can send the fixtures and goods to the new store, and only loses the time required for rearranging them. The telegraph company, however, must continue sending messages from one building as long as it is occupied, and on moving to new quarters must find everything ready for carrying on the work. The wires cannot be shifted from the old building to the new, but a new set must be provided, and a considerable number of new instruments must be in position before any of the old ones can be taken down. So we find that the most of the apparatus and arrangements in the new quarters of the company are also new. We made an examination of the building, a few days after its occu