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THE VALUE OF PATENTS.

A recent number of the *Official Gazette* contains a full report of the address delivered by Mr. J. M. Thacher, our present Assistant Commissioner of Patents, before the so-called Patent Congress, at Vienna, last summer. In this effort, Mr. Thacher begins at the beginning, avers that invention is "the product of the highest faculties given by God Almighty" to man, and therefore ought to be secured to him by letters patent. He declares that man has a more valid right to the exclusive possession of his inventions than even to his landed estates, and perceives no obligation on the part of the inventor or discoverer to disclose new knowledge to others, unless permitted to control and use that knowledge as he would other property. Having strongly insisted upon the correctness of these propositions, which by the way are at variance with the teachings of the wisest philosophers, he next proceeds to show that this inventive property, these natural rights of the inventor, ought by law, to be taken away from the originator after he has for a limited period enjoyed their possession.

In relation to official examinations at the Patent Office, our author is of the opinion that the inventor, whose mental genius and discernment are eloquently lauded throughout the address, is incompetent to examine the novelty of his own invention, and determine for himself whether it is worth his while to pay in the official fees and take out a patent. Nor is the inventor's attorney qualified to solve this momentous question. It should be left, Mr. Thacher says, to a corps of scientific experts; but, as he thinks they may be liable to err, he suggests that there ought to be another set of experts to re-decide the decisions of the first experts. This, in fact, is the way the thing is done at Washington. One hundred of these scientific gentlemen, aided by four hundred clerks and helpers, all of whom are supported at the expense of the inventors, now officiate at the Patent Office, but Mr. Thacher wishes to increase the number. "Unfortunately," he says, "it is the pocket that controls men, more or less, in every station and in every country." It is indeed a misfortune for our inventors that their pockets are obliged to control and supply so large a number of examining officials. Save us, we say, from any increase. We are glad to turn from the mazes of the metaphysical portion of the Assistant Commissioner's address to that branch which relates to the practical results and values of inventions, for here we find information, useful and interesting to everybody. He says:

"The number of patents granted since 1836 is about 140,000. The number of applications for patents has steadily increased from year to year, until it now averages from 20,000 to 21,000 per annum, and the number of patents granted annually is from 13,000 to 15,000. To perform the work of examining this large number of applications, the corps of expert examiners has been increased from time to time, until it now numbers about 100—to wit, 24 principal examiners, and the same number of first, second, and third assistant examiners, together with a special examiner of trade-marks and also of interferences. The clerical force has been correspondingly increased, so that officials of all grades now employed in the Office may be stated in round numbers as about 500.

The bare statement of the number of patents granted since 1836 is sufficient to bear me out in the statement that our system has proved to be a most remarkable stimulant to inventive genius, not only in our own country, but throughout the world. But you will very naturally inquire. How many of these patents are valuable? Of course it is impossible to obtain statistical information that shall be entirely reliable on this point, but my official experience has given me such data that I am enabled to form an opinion approxi-

mately correct. I have discussed the matter with others, and have sought information from manufacturers, patentees and legal gentlemen who have made a specialty of the practice of patent law, and I think I do not exaggerate at all when I say that one half of the patents granted in our country may be considered remunerative. Now I do not wish to be understood by this that one half of these 140,000 patents have brought fortunes to the pockets of the patentees. They have become remunerative to a certain extent—that is, they have paid expenses and something more. A small proportion of them have become largely remunerative, and the patentees, or their representatives, have obtained large fortunes from them. I think, therefore, it may be said that the influence of our system upon inventions and inventors themselves has been beneficial beyond all expectation.

But you will also ask: What has been the influence of our patent system upon the manufacturing interests of our country? I have taken occasion to make some inquiries upon this point also. A short time before I left Washington the Secretary of State sent out, to inventors, manufacturers, and others interested in patents, a series of inquiries, among which were some as to the influence of our patent system upon the manufacturing interests of the country. With scarcely an exception, so many of our manufacturers as responded answered that the patent system was beneficial, beyond all manner of doubt, to the manufacturing interests of the country. It is estimated, both by myself and others who are qualified to judge of this matter, that at the present time from six to seven eighths of our enormous manufacturing capital is based upon patents, either directly or indirectly. In fact, it is almost impossible to organize a company for manufacturing purposes in America without first securing the control of patents for some valuable invention.

I think, then, that we may be said to have reached this conclusion, that our inventors, patentees, and manufacturers have all benefited greatly by our patent system. At the same time the public welfare has been greatly promoted by the general introduction of many valuable inventions, which otherwise would have remained undeveloped, and by the cheapening of many articles by the invention of new and improved modes of manufacture. At the same time we believe the whole world has been benefited by the liberality of our law. We make no distinction between foreign and native applicants, but invite inventors from the whole world to give us the benefit of their inventive genius upon the same liberal terms that we grant to our own citizens, putting upon them no restriction as to time or place of manufacture, or introduction of the invention into public use. * *

Let me express the hope that you will not adjourn without establishing a permanent committee as the representative of this congress, so that an organization may be created by means of which the discussion of this subject may be continued from time to time until, finally, civilized governments shall become convinced of the righteousness and expediency of the principles here advanced, and there shall be universal recognition of the rights belonging to, and the public benefits conferred by, the inventors of the world."

A NEW AND IMPORTANT DISCOVERY RELATING TO THE BEHAVIOR OF METALS UNDER STRESS.

In calling attention recently to the original investigations in progress at the Stevens Institute of Technology, it will be remembered that we referred in some detail to the interesting and valuable experiments which Professor R. H. Thurston is conducting with a view of determining the torsional resistance of various metals. The machine used for this purpose is an apparatus of the Professor's own invention; and although we have already alluded briefly to its construction in another connection, it may be of interest for the reader to review its salient points, in order to understand with clearness the highly important discovery which has just been effected through its aid. A triangular cast iron frame supports two suspended arms which swing about independent axes in the same line; one arm carries a weight, and the other has a handle at its extremity, by which it is moved. Each of the axes has a rectangular recess, in which each end of the test piece, previously squared, is fitted. The frame carries also a guide curve of metal, so constructed that its ordinates are proportional to the twisting moments exerted by the weighted arm while swinging through an arc to which the corresponding abscissas are also proportional. A pencil holder bears against the guide curve; and being carried by the weighted arm, is thrown forward as the latter swings out under the action of the force producing torsion, which force is transmitted through the test piece. The handle arm carries a table upon which a piece of paper is clamped, so that the pencil traces thereon a curve, the ordinates of which are proportional to the torsional movements, while its abscissas represent the relative motion of the two arms and, consequently, the amount of torsion to which the test piece has been subject. This line, therefore, gives a very legible and accurate record of the results of each experiment.

During the recent visit of the members of the Academy of Science to the Stevens Institute, Professor Thurston took occasion to explain his researches and to illustrate the power of his device in exhibiting the action of the molecular forces under stress. After the session had adjourned, a test piece was left in the machine under heavy strain, in order to determine if possible the existence of viscosity, which had been suspected in the metal. On examining the piece twenty-four hours later, the investigator discovered, to his surprise, that not only could no evidence of yielding be detected, but that, on his attempting to produce further distortion, an even greater resistance was offered than when the first stress was applied. The curve traced by the pencil, instead of being coincident with the line previously described, became paral-

lel therewith, and some twenty per cent higher above the axis of abscissas.

Repeated experiment has confirmed this remarkable discovery, and Professor Thurston considers that he has substantiated the fact that metal, strained so far as to take a permanent set and then left under the force producing stress, actually gains in power of resistance up to a limit of time, which in these experiments was about seventy-two hours, and to a limit of increase which has a maximum, in the best irons, of about twenty per cent. We need hardly point out the importance of this conclusion, which, though it has been suspected for some time by many engineers and men of science, is now for the first time definitely proved. The result is of course negative, and necessarily completely upsets the common notion that metal continuously strained beyond its limit of elasticity loses its strength.

We understand that further experiments will be speedily made, so that we hope to be enabled before long to lay before our readers more detailed information, together with copies of curves and other interesting results obtained. We note with pleasure that numbers of specimens of cast, wrought, and malleable iron, steel and many other varieties of metal, are being sent to Professor Thurston by prominent manufacturers in all parts of the country; so that the coming investigations bid fair, not only to add greatly to the already well earned reputation of their author, but largely to the knowledge of the scientific professions.

PATENTS FOR SIMPLE THINGS.

In a recent application for a patent for an improvement in attaching metallic heels to boots, the invention consisted in extending the outsole the whole length of the boot and in fastening the heel upon such outsole. The application was rejected for the reason that it was not new to carry back the outsole as described, nor was the heel new; therefore the attachment of a heel to such sole was not an invention, though the ordinary method was to attach the heel to the insole, the outsole being only extended up to the heel. The applicant appealed to the Assistant Commissioner of Patents, who reversed the decision of the Board of Examiners, and held that, however small or insignificant an invention appeared, it ought to be patented if useful. In this case, the attachment of the heel to the outsole made a firmer fastening for the heel, was better than the common plan, and therefore patentable. This is good doctrine; and if the Patent Office would only stick to it and carry it out into practice with uniformity, the interests of inventors would be greatly promoted. But, unfortunately, the decisions of the Patent Office are irregular. It too often denies on one day what it grants the next day. We cannot always rely upon the Office to issue patents for simple improvements, like roasted persimmon seeds, a knot upon the thread of an envelope, or, as in this case, nailing a heel upon the bottom of a boot. Yet it is for the issuing of patents upon just such simple improvements that 100 principal examiners and their 400 helpers are thought by some people to be necessary, and for whose support inventors are taxed.

BOSTON REBUILT.

Just one year has elapsed since the occurrence of the disastrous conflagration which laid one of the fairest portions of the city of Boston in ashes. Sixty-five acres constituted the extent of the burned district; 776 buildings were consumed, and an aggregate total of \$75,000,000 lost. The destroyed edifices were insured to the amount of \$56,000,000; and of this sum \$34,000,000 has, it is stated, been paid, although twenty-six Massachusetts insurance companies have failed in consequence thereof.

Shortly after the calamity, a building act was passed, which was designed to provide in a measure against similar casualties arising from like causes. This law forbids mansard or other roofs being more than one story high or more than twenty feet above the upper floor of a building, unless fireproof throughout. Bay windows are not to be constructed at a height exceeding three feet above the second story. Exteriors of structures above forty-five feet high must be covered with incombustible material; if over sixty feet, they must be fireproof. The limit of height of buildings is fixed at seventy feet, and party walls bounding lofty roofs must be carried at least two and a half feet above the same, and be corbelled and coped with stone or iron. With these regulations in force, and with the teaching of experience before them, the citizens have proceeded with the rebuilding of their ruined edifices; and as a result, structures have been completed and are still rising which, it is believed, will not succumb even before a repetition of the great fire.

The burnt section included 31 streets, 8 places, 5 squares, and 1 court; in reconstructing which 17 streets have been widened, 4 extended, and a large square laid out, at a total cost to the city of over \$5,000,000. The general plan of the streets is little altered; 365 buildings have been erected or are in progress, of which 115 are finished and occupied, 10 unoccupied, and 240 uncompleted. Among these, there are but 72 mansard roofs against 264 flat roofs, the former being either wholly of brick or iron, or else covered entirely with fireproof material. The majority of the edifices are of four stories, there being but two, one of six and the other of seven stories, exceeding this height. The external and party walls are all 20 inches thick to an elevation of two stories above the street, and 16 inches thence to the roof. The "fire walls" which surmount the party partitions are of the height above noted and 12 inches through. Galvanized iron is largely used for cornices, and, with cast iron, for exterior finish. The total cost of the completed buildings is \$3,762,500 and they cover 1,192,918 superficial feet of ground.

As regards architecture, we learn that many of the edifices