red hot lead were then poured into the dam surrounding the hub; the hub was expanded, and on raising the shaft the gland dropped off.

An annoying thump in a stationary engine bothered the engineer for days. As time allowed he inspected and repaired, removing and replacing the brasses, opening the cylinder and examining the rings, inspecting the crosshead, and testing every moving part. In vain. But he was not a man to give it up. He sat thinking in the doorway of his engine room one day, when, in the sunlight that gleamed over the crosshead and slides, he saw a spurt of fine mist rise from the brasses next the crosshead, as the piston started on its outward stroke. The shooting mist and the faint thump were synchronous; the logic of cause and effect gave him the clew to the matter. After shutting down at night he removed the brasses and found a very slight indentation on the gib, hardly perceptible. This was filed out, a skein of sheet brass put in, and the thump was gone.

A System of Awards for Workmen.

By his observation and every day experience in the workshop, an intelligent workman will be constantly discovering better ways of doing the ordinary work about his bench or lathe than he was taught to do, or his fellow workmen continue in doing.

It may not reach the dignity of a patentable improvement that he has conceived, but it is a wrinkle which increases the workman's value to his employer and at the same time renders his labor less irksome to himself.

It is not the most original inventions that always pay the best, but it is the little things, the aggregation of useful ideas, like those suggested by the different workmen, that increases the capacity of a machine shop, and gives it a reputation for good work. And it is but right that the workman who suggests these improvements which are beneficial to the manufacturer should be rewarded by his employer; and if it was made the practice in large establishments to thus recognize the merit of the most painstaking and ingenious workmen, we believe the employer would derive much greater benefit than the money outlay; besides, he would have the gratification every one feels in according a helping hand to a worthy person.

To encourage their workmen to be constantly on the watch for any possible improvements, a regular system of awards has been established in a number of English works, and, after five years' trial, has met with a success that has more than justified its adoption.

The ship building firm of Denny & Brothers, at Dumbarton, inaugurated such a system in the summer of 1880; and in recording their very gratifying experience, we do so in the hope that American firms will be prompted to undertake a similar enterprise.

The committee of independent judges who decide upon the awards have now issued their sixth annual report, and placed it in circulation among the workmen, to stimulate them to renewed effort. Originally, the awards varied from ten to fifty dollars, according to the worth of the improvements for which claims were lodged with the committee. After a year's trial, the Messrs. Denny authorized the committee to increase the award where they saw fit, or, if the workman preferred, offered, in addition to the award of fifty dollars, to take out a provisional patent at their own expense, in which case the firm reserved the right to use the improvement at its own works, but left the further disposition of the patent with the inventor. In 1883, the minimum and maximum awards were increased to fifteen and sixty dollars respectively. Still a little later, it was intimated that a premium of one hundred dollars would be paid to each workman when he had received as many as five awards. When he had received ten, this would be increased to one hundred and twenty-five dollars, and so on, twenty-five dollars extra being added to the original premium with each five awards.

The report for the years 1880 to 1884 inclusive shows that about $2,600 was disbursed in this manner, $1,400 being paid out during the latter year. Of this sum, $1,000 went in payment for the regular awards, and $400 as four premiums. Up to this time, four inventions had gained the maximum award. One of these, an improved method of laying the Decauville Railway across the main line, gained an additional reward of fifty dollars from the patentee of the railway. One-half of the rewards given were gained by workmen in the joiners' and carpenters' department. An arrangement was also made with another firm which had adopted a similar system of awards, by which any improvement introduced in either works could be utilized in the other by the payment of a duplicate award to the inventor. During the past year, the scheme has been in vigorous operation, and in spite of the large reduction in the number of men employed, the total of the awards has been greater than before. The minimum award has been reduced again to ten dollars, so as to permit a larger number to be given, but the maximum award has been increased to seventy-five dollars. The system of premiums has also been rearranged on a fairer basis. When a workman has received five awards, his premium is made equal to their total value. The twenty-five dollars, however, is added successively as before.

The decisions of the committee have proved remarkably just, for of the improvements accepted nearly every one has turned out of practical value. They cover a wide range of subjects, from mechanisms of general application to the detailed arrangements on shipboard.

In a number of establishments in this country, the workmen are financially encouraged to make improvements in the machines and processes in use, but in none of them, we believe, has the scheme been so thoroughly systematized as among the English workers. The marked success which has been experienced by the Messrs. Denny commends their system to imitation on this side of the water.

The Education of Gas Managers.

In the course of an address before the S. W. District Association, Mr. G. Garnett said:

Higher education among artisans, foremen, and managers was now regarded as a necessity in all our great industries, and it seemed that the time had come when, in gas manufacture, as in other branches of engineering and applied chemistry, a scientific training must become a factor in the product; and we must look to the combination of science with practical experience for the chief improvements which are to be made in the future. The questions then arise, What course of study is to be pursued? And how is the necessary training to be obtained? As part of the general education of the gas engineer, we may regard French, German, and geology, including the inspection of a few typical mines and coke ovens. The more systematic training should comprise mathematics, elementary mechanics, hydrostatics, hydraulics, graphic statics, including the determination of stresses in framed structures, such as roofs, principals, girders, etc., shearing stress and bending moment in continuously loaded girders, strength of materials, including practical work with testing machine, transmission of power by mechanical means, practical geometry, machine drawing, building construction, heat, light, electricity, and magnetism, including practical laboratory work; chemistry, including a systematic course of lectures and proceeding as far as coal and gas analysis, the elements of the metallurgy of iron and steel, and if use of engineer's [illegible] and a course of instruction in gas manufacture and the chemistry of the coal tar products.

Twenty years ago it would have been impossible for a youth of average education to obtain such a course of instruction; but under the auspices of the City and Guilds of London Institute, evening classes are now being held in mechanical and electrical engineering, wood and metal tools, iron, steel, gas manufactures, and tar products, in most of our principal towns. And these classes, combined with the instruction afforded by the government science classes, afford no mean training to those unable to avail themselves of a more thorough and systematic course. But a higher class of technical and scientific education may be desirable for engineers and managers, and this is now being rapidly provided by the local university colleges in several large towns, especially in the Finsbury Technical College and the Central Institution of the City and Guilds of London Institute, at fees for the complete course ranging from £9 to £31 10s. per annum.

The course at the Finsbury College extends over two years, and includes mathematics, practical geometry, and machine drawing, theoretical and applied mechanics, with laboratory practice; light, heat, and electricity, including practical work in the physical laboratory; chemistry, French, German, and the use of tools. The engineering workshops are provided with a gas engine and steam engine, specially fitted with appliances for experimental testing, shafting, dynamos, and other appliances used in the electric lighting of the college buildings.

The regular course of instruction averages 36 hours per week. Last session there were special courses of lectures on "Gas" and "Gas Engines," and during the present session on "Coal Tar Products." This course may be regarded as sufficient for all except those who wish to fit themselves for the most responsible positions, in which case it should be supplemented by one or two years of study at the Central Institution, South Kensington, or by a complete course in the engineering department of the Institution, extending over three years. The student will not only be provided with the most complete appliances, but, what is more important, will be brought into constant intercourse with some of the most eminent teachers of the day.

In concluding, Mr. Garnett said that if it was not given to all to seek the lofty heights of science or fathom the depth of philosophy, there was much that all could do in grasping the facts of the natural sciences. Let every one get and give what he can, and encourage his brother. In the words of Judge Payne:

Do what you can, be what you are,
Shine like a glow worm, if you cannot be a star;
Work like a pulley, if you cannot as a crane,
Be a wheel greaser, if you cannot drive a train.
Be the pliant oar, if you cannot be the sailor,
Be the little needle, if you cannot be the tailor;
Be the cleaning broom, if you cannot be the sweeper,
Be the sharpened sickle, if you cannot be the reaper.

DECISIONS RELATING TO PATENTS.

Supreme Court of the United States.

PRESTON *v.* MANARD *et al.*

"This was a bill in equity for the infringement of letters patent granted Oct. 10, 1876, and reissued February 28, 1882, for an improved fountain hose carriage.

"The first claim in the original patent was as follows: '1. The hose reel, mounted upon a wheeled carriage, which is provided with a foot or brace, by means of which it may be sustained in an upright vertical position, whereby the device becomes capable of use both as a hose carriage and as a fountain standard, substantially as specified.'" A former suit under the original patent was dismissed for want of novelty. The specification in reissue patent is exactly like that in original, but with different claims, the only material one of which was in these words: "1. The combined hose carriage and fountain standard, consisting in the combination of the following elements, viz.: a wheeled carriage provided with a foot or brace by means of which it may be sustained in an upright vertical position, a nozzle-holding device, and a reel of large diameter to allow the water to flow through the hose when partially wound thereon, substantially as specified." "The hose reel, the standard, the brace, the nozzle holder, and their use in combination being all old, the description of the hose reel in the specification and claim as 'a reel of large diameter to allow the water to pass through the hose when partially wound thereon,' is not sufficient to sustain the patent." "The fact that water will flow through a hose wound on a reel, if the diameter of the reel is large enough and the curves or angles are not too abrupt, is a matter of common knowledge, which no one can appropriate to his own use to the exclusion of the public. In any view of the case, the specification describes nothing that the patentee is entitled to claim, but only what every one has a right to use without his assistance."

"To sustain this patent [illegible] public [illegible] way in which [illegible] accomplished."

Appeal from the Circuit Court of the United States for the Northern District of Illinois.

Mr. Justice Gray delivered the opinion of the court.

U. S. Circuit Court.—Southern District of New York.

ARON *v.* THE MANHATTAN RAILWAY COMPANY.

GATE OPERATING DEVICE.

Wallace, J.:

A device for opening and closing the gates of railway cars, consisting of a link connecting a sliding rod with the gate, and a rod sliding in or on bearings secured to the guard rail, and having a handle located within convenient reach of the attendant, does not possess patentable novelty.

Courts will take judicial notice of mechanical devices of common knowledge.

Although the patentee was the first to conceive of the convenience and utility of a mechanism for opening and closing the gates of railway car platforms, his right to a patent must rest upon the novelty of the means he contrived to carry his ideas into practical application.

It rarely happens that old instrumentalities are so perfectly adapted for a use for which they were not originally intended as not to require alteration or modification for such use; but if the changes involve only the exercise of mechanical skill, they do not sanction a patent.

The mere duplication of a device for operating a gate for the platforms of railway cars, whereby the gates of two adjoining platforms may be operated simultaneously, does not require invention.

The first five claims of letters patent No. 288,494, granted November 13, 1883, to William W. Rosenfield, for an improvement on railway car gates, declared void for want of patentable novelty.

Luminous Printing.

An Italian has, it is alleged, invented a luminous printing ink that renders it possible for newspapers to be read in the dark. What a luxury it will be, when one is restless at night, to be able to take up a book or newspaper and read himself into a somnolent condition, without the trouble or danger attending other lights!

Luminous cards are not unusual, and the reader may not be surprised at some future time to find himself able to read his SCIENTIFIC AMERICAN at night, without other light than its brilliant pages will reflect. Stranger things than this are constantly occurring in the invention line.

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