drogen escape, for instance, by taking in the atmospheric air and compressing it in a reservoir or by using a rudder placed in the horizontal sense.

INCOMES OF SUCCESSFUL INVENTORS.

BY ANSLEY IRVINE.

It is generally believed that inventors are an unfortunate class of individuals who struggle through life surrounded by an unsurmountable barrier of penury and misfortune. This, doubtless, is true of many cases, but the obverse of the picture is gratifying and full of encouragement. Innumerable instances could be given where comparatively large fortunes have been made out of a simple article, which necessitated neither elaborate design nor great initial expenditure, and, when judged from a strictly utilitarian point of view, did not possess any practical value.

Some of the largest fortunes appear to have been derived from the invention of trivialities and novelties, such as the once popular toy known as "Dancing Jim-crow," which for several years is said to have yielded its patentee an annual income of upward of $75,000. The sale of another toy—"John Gilpin"—enriched its lucky inventor to the extent of $100,000 a year as long as it continued to enjoy the unexpected popularity that greeted it when first placed upon the market. Mr. Plimpton, the inventor of the roller skate, made $1,000,000 out of his idea, and the gentleman who first thought of placing a rubber tip at the end of lead pencils made quite $100,000 a year by means of his simple improvement.

When Harvey Kennedy introduced the shoe-lace he made $2,500,000, and the ordinary umbrella benefited six people by as much as $10,000,000. The Howard patent for boiling sugar *in vacuo* proved a lucrative investment for the capitalists, who were able to remunerate the inventor on a colossal scale. It is estimated that his income averaged between $200,000 and $250,000 per annum. At first the process proved an entire failure and had to be laid aside as useless. It was not until an old German workman casually made a suggestion for a possible improvement that it was once more tried. The suggestion was improved upon and the invention rendered successful. All sugar refiners who used the new method allowed Mr. Howard a royalty of twenty-four cents per hundredweight on the raw material passing through the process.

Sir Josiah Mason, the inventor of the improved steel pen, made an enormous fortune, and on his death English charities benefited by many millions of dollars. He was one of the most generous of men, and during his life gave enormous sums to hospitals and industrial schools. The patentee of the pen for shading in different colors derived a yearly income of about $200,000 from this ingenious contrivance. It is stated that the wooden ball with an elastic attached yielded over $50,000 a year. Many readers will remember a legal action which took place some years ago, when in the course of the evidence it transpired that the inventor of the metal plates used for protecting the soles and heels of shoes from wear sold 12,000,000 plates in 1879, and in 1887 the number reached a total of 143,000,000, which realized profits of $1,150,000 for the year.

Women seem also to possess the inventive faculty, and, indeed, they must find plenty of scope for new ideas, as there are hundreds of little things waiting to be superseded by simple appliances that will minimize handwork and obviate the necessity of so much toil being daily expended in the household. The lady who invented the modern baby carriage enriched herself to the extent of $50,000; and a young lady living at Port Elizabeth, South Africa, devised the simple toilet requisite, known as the "Mary Anderson" curling iron, from which she derives royalties amounting to $500 a year. It was the wife of a clergyman who designed an improvement for the corset and made a fortune out of it. Instances of ladies bringing forward inventions which have added to personal comfort and general utility could be given *ad infinitum*. They occupy all ranks of society, from the poor struggling seamstress to the Empress of France, who, by the way, invented a dress improver, which years ago developed into the then fashionable crinoline. The gimlet-pointed screw, the idea of a little girl, brought many millions of dollars to the clever inventor. Miss Knight, a young lady of exceptional talents, was gifted with wonderful mechanical powers, as will be seen by the complicated mechanism of her machine for making paper bags. We are told she refused $50,000 for it shortly after taking out the patent.

The history of the wire-wound gun, which was invented by Mr. J. Longridge, the famous engineer, throws some light on the *insouciance* and apathy that formerly enveloped the British War Office. Longridge invented the gun in 1854, and did all in his power to place it before the authorities, but they would have nothing to do with it. Thirty years afterward, however, the Ordnance Department at Woolwich subjected one of the guns to exhaustive tests, and so satisfactory were the results that they declared that nothing could equal it for heavy ordnance. Unfortunately, the inventor died from a broken heart before this end was attained. Another case illustrating the treatment sometimes meted out to inventors by the English War Office is that of Dr. Conan Doyle, the popular author of "Sherlock Holmes," who recently discovered a way to insure approximate accuracy in high-angle or dropping rifle fire, the need of which has so often been felt in the present war in the Transvaal. The inventor states that the apparatus would be fitted to the rifle and would weigh comparatively nothing, cost but a few cents, take up very little space, and interfere in no way with the present sights. The novelist communicated with the officials in London and received the following reply: "With reference to your letter concerning an appliance for adapting rifles to high-angle fire, I am directed by the Secretary of State to inform you that he will not trouble you in the matter." As Dr. Doyle remarks, the invention might be absolute rubbish or it might be epoch-making, but he has been given no chance of either explaining or illustrating it.

The machine with which the Brothers Morley, in the latter years of the eighteenth century, made their enormous fortune was the stocking loom, invented three generations earlier by the Rev. William Lee, a Fellow of St. John's College, Cambridge, England. Lee's life-story is full of sadness. According to one account Lee, falling in love with and marrying an innkeeper's daughter, lost his Fellowship, and was consequently reduced to extreme poverty. The wife knitted stockings for a living, and the husband, sitting by her side as she worked, watched the intricate movements of her hands, and was thereby led to speculate on the possibility of constructing a machine that would do the work more expeditiously. Lee came to grief, because his machine was believed to be a device for throwing people out of employment. He went ultimately to France, where he died poor and friendless, a disappointed man. Many years afterward English legislators so appreciated the value of the stocking loom that they prohibited its exportation; and so jealous was Parliament of foreign competition that it seems to have been doubtful, even as late as the middle of the eighteenth century, whether it was lawful even to publish a technical description of the apparatus. When the frame was introduced it completely revolutionized the stocking trade, producing fifteen hundred loops per minute as against the hundred loops in skilled hand-knitting.

It is difficult to realize that the art of perforating paper was unknown fifty years ago. Prior to 1854 postage stamps were issued in sheets, the purchaser having to cut them up in the way he found most convenient. In 1848 an Irishman named Archer introduced a machine for cutting small slits round each stamp. This was tried by the English postal authorities, but for some unexplained reason it did not work to their satisfaction, and, notwithstanding that Archer went to great trouble and expense in altering the machine so as to meet the objections, it was refused by the government. Archer then constructed an entirely new machine which cut out circular holes. He received sufficient encouragement to induce him to still improve his invention, when, in 1851, after three years' continual labor, the Treasury proposed to buy the patent rights for $3,000. This parsimonious offer was, of course, refused, as Archer had spent considerably more than this on his various experimental machines. Eventually the matter was placed before the Select Committee of the House of Commons, and the pertinacious inventor was awarded $20,000, which, considering his apparatus in a few years saved the government many thousands of dollars, was not excessive.

Liverpool, England.

LEAD MINING IN WISCONSIN.

About the year 1824, some thirty-six years before the coming of the first pioneers, lead was first mined in Wisconsin. Although the original lead miners were chiefly Americans, Cornishmen, driven out of England by low wages, soon entered the field. Reports which they sent home to their relatives and friends of the richness of the American lead-mining district soon brought an army of Cornishmen to Wisconsin. Skilled in deep mining as they were, these men from Cornwall were a valuable acquisition to the newly-opened region. Americans engaged chiefly in superficial mining, and when the results were not equal to their expectations, proceeded elsewhere. The Cornishmen, on the other hand, appropriated the claims left by their predecessors, worked them, and found ore enough to give work to many men.

In southwestern Wisconsin lead mining differs much from that in other parts of the State, since the lead was found nearer the surface. For that reason the work has received the name of "diggings" to distinguish them from the mines. The diggings were not worked deeply enough. Two men, whenever they opened a pit, would find "pay" almost immediately. A pit once exhausted or difficult to follow, because the vein led back too far, was abandoned. So numerous and so certain and immediate were the results of working these diggings that few of the men labored for wages.

The Cornishmen who emigrated to Wisconsin were not prospectors in the American acceptation of that term. Accustomed as they were to working for wages in their own country, they lacked the enterprise and energy so characteristic of the American miner. But they were steadier and more pertinacious in their work. Rarely indeed could an American be induced to work a claim after he had reached hard rock. But the Cornishman worked the abandoned rock until the mineral was exhausted, and thus earned for himself the title of a "hard-rock miner."

SCIENCE NOTES.

E. Bourquelot recommends, as a test for the presence of cane sugar, the use of the invertin of yeast, which doubles cane-sugar. It has also the same effect on gentianose and raffinose; but these carbohydrates are rare in plants. By this means he has determined the presence of cane-sugar in the rhizome of *Scrophularia nodosa*, in the succulent pericarp of *Cocos yatai* (25 gm. per kilo.), and in the horny endosperm of *Asparagus officinalis* (15 gm. per kilo.). In neither of the two latter plants was the reaction with emulsin obtained, showing the absence, in these organs, of a glucoside which is doubled by that ferment.—Comptes Rendus.

Writing from Sierra Leone, under date of November 26, 1901, Consul Williams says: "The superintendent of Mahometan education for British West Africa—whose work extends from the hinterlands of Sierra Leone to the Niger—visited this consulate recently and requested that I procure from American publishers catalogues and specimen pages of common-school textbooks in the English language for his examination, with a view to their introduction and use in the schools under his supervision, if satisfactory. Much interest is being manifested by the colonial government at present in Moslem education. This being, perhaps, the first opportunity for the introduction of American text-books into this country, it is very important that those concerned respond promptly. Literature may be sent to this consulate."

Prof. Alexander Agassiz is in charge of an expedition to the Maldive Islands in the Indian Ocean which has recently been sent from the Agassiz Museum at Harvard. Prof. Agassiz fitted out the expedition and is assisted by W. McM. Woodworth. They expect to find rare and beautiful coral formations and will gather as exhaustive a collection as possible. A steamer was chartered at Colombo, Ceylon, from the British India Company, to transport the expedition to the southern part of the Indian Ocean, where the Maldive Islands lie. The islands of the Indian Ocean are the only group remaining which Mr. Agassiz has not examined in his explorations for the study of coral. The islands are remote and unfrequented, and it is expected that the expedition will prove fruitful. The work will occupy about two months.

Leather, even when soft, does not present itself to the mind as a particularly good filtering medium; indeed, it might seem just the reverse; so one must commend Mr. W. G. Stratton for noting his experience with it in the Chemist and Druggist. The so-called chamois skin is there recommended as an excellent medium for the clarification of thick liquids. The leather is to be well rinsed in cold water, he says, and after being wrung to express the excess of moisture it should be affixed to the top of the funnel so as not to hang down very deeply. Small clothes-line pegs are useful for this purpose. Immediately after use, the chamois should be well washed and carefully dried. The same piece may thus be kept serviceable for a large number of filtrations.

In a reply to a letter, asking the cause of autumn haze, the Chief of the United States Weather Bureau recently prepared a letter, part of which is quoted in what follows: The dry haze is undoubtedly due to fine particles of dust. The finest dust is composed of one or all of the following substances, namely, fine particles of soil or the dead leaves of plants, smoke or ashes from wood fires, salt from ocean spray, the shells or scales of microscopic silicious diatoms, germs of fungi, spores of ferns, pollen of flowers, etc. In the still air of the damp nights these dust particles settle slowly down, and the morning air is comparatively clear. During the daylight the sun warms the soil, which heats the adjacent air, and the rising air currents carry up the dust as high as they go. Under certain conditions which are named in the letter the layer of dust reaches higher and higher every successive day. During long, dry summers in India it reaches to 7,000 feet with a well-defined upper surface that is higher in the daytime than at nighttime. This is a general explanation of dry haze weather and applies to Indian summer also. The reason why we have more of such weather in the autumn is because there is then less horizontal wind and less rising air.