PROPOSED INJUSTICE TO INVENTORS.

In a recent article on Section 11 of the proposed amendment to the patent law we referred to the injustice of compelling inventors to pay a second time fortheir patents at the end of four years, or else forfeit all rights they may have acquired in their inventions. We now propose to show how such a clause might have robbed some of the greatest benefactors of the human race of all means of profiting by their inventions had such a clause been in existence at the time of the granting of their patents.

Take, for instance, the case of Watt. Although he commenced his labors in connection with the improvement of the steam engine in 1763, it was not until 1769 that he obtained his patent, and it was nearly six years after its issue before he succeeded in making a working engine which gave satisfaction, having in the mean time spent all his own means. At the end of this six years his prospects were then so doubtful that although eight years of the life of his patent remained, yet he could find no capitalist who would embark sufficient means to carry on the business of manufacturing until he succeeded by some means in inducing Parliament to extend his grant for an additional ten years. Is it not possible that under the modern English system of fees, which it is now proposed to graft on to our law, the payment of an additional tax at the end of four years, when Watt was discouraged with repeated failures, might have been the "last straw" which we so often hear about?

As another example, take the case of Elias Howe, Jr., the inventor of the sewing machine. His invention was patented in 1846, but it was not until after 1853 that he succeeded in making anything by his invention, and he would not have been able to do so then but from the fact that his father mortgaged his homestead to raise money to begin a law suit against infringers. To give an idea of his poverty previous to this time it may be stated that although his wife was dying of consumption at Cambridgeport he could not go to see her until his father had sent him money to pay his fare from New York to his wife's death bed. He did not even have his patent in his possession at this time, it being pawned for a hundred dollars. And yet under the proposed amendment (?) he would have been called upon at this time to pay $50 or lose his patent. Could anything be more unjust?

Goodyear may be cited as another instance of how such a tax would work. Although he was the owner of a patent on the combination of sulphur with rubber, it was not for many years after that he succeeded in bringing the invention into practical use, after a long series of experiments, which beggared him and brought him so low financially that himself and family were frequently without food. How could a man in this condition pay an additional tax of $50 to keep his patent alive, when he could hardly find food to keep body and soul together?

As another instance of the difficulties inventors have to contend with after their patents are granted, Bessemer's invention may be cited. The foundation of the patent of the Bessemer process was granted in 1856; it was not until 1863 that the process was commercially successful; and it was even then doubtful, and for several years after it was still considered so, for it was not until 1869 that the Hon. A. S. Hewitt, one of the members of Congress who will have to vote on this bill, and a very prominent and intelligent iron master, who had watched the growth of the invention very carefully, considered that it was so far successful as to warrant its introduction into America, although other gentlemen with greater faith in its success had introduced the process here some years earlier. Bessemer was a wealthy man, and had access to the plethoric pocketbooks of some of the richest English capitalists and iron masters, and he was therefore able to keep up his payments on his English patents, so that he and his backers finally reaped an abundant reward. But supposing him to have been a poor man, as the majority of inventors are, and without the aid of the capital which Bessemer's connections gave him, is it not more than probable that the tax on his English patent would have been the cause of his abandoning his invention, thereby cutting off all possibility of his reaping any advantage from it? In this case, not only would he have lost his reward, but the world would have lost the benefit of the Bessemer process of making steel, for without Bessemer's indomitable perseverance the process would have been given up long ago, and we should have to pay $200 per ton for steel instead of about $45 per ton, as at present.

But, it may be objected, these are all supposititious cases. Let us, therefore, cite a case that actually occurred, where one of our benefactors has actually been robbed of his reward because he happened to be poor. The Bessemer process as originally patented was not a practical working success, as above stated, and many difficulties had to be overcome before such practical success was reached. Mr. Robert Mushet, of Cheltenham, England, succeeded in breaking down one of these difficulties by the introduction into the molten Bessemer metal of from one to five per centum of "spiegeleisen," a compound of manganese, iron, and carbon. This he patented in 1856, but from the cost of his experiments he became embarrassed and had to put his patent into the hands of trustees; and the apparent failure of the Bessemer process (upon which his was dependent) led the parties who were holding his patent in trust for him to think it not worth while to pay the additional tax when it became due, and Mushet himself was too poor to do so. Under these circumstances, which will be the case with thousands of struggling and meritorious inventors should the iniquitous Section 11 become law, Mushet's patent became public property, and although every pound of Bessemer steel is made in accordance with Mushet's process he received no reward, having lost it through the imposition of the tax called for under the European system, which it is now proposed to add to ours.

Many other instances could be given where the inventors have had a long struggle with poverty before they succeeded in reaping their desired reward, had we time to hunt up the data and space to print them, but we think sufficient has been stated to show how badly this Section 11 would work in practice. Inventors under the most favorable circumstances, with a very few exceptions, have a hard time of it; and Congress should pass laws that would encourage them, rather than such as would rob them of one of their chances of reward. For even after an inventor has succeeded in benefiting himself as well as the world, and is apparently in the receipt of a good income, litigation steps in, and robs him of the lion's share of his reward, as in the case of Goodyear, who, in the height of his apparent prosperity, was, as the result of litigation to enforce his rights, cast into prison for debt, and while in prison received the mockery of the Cross of the Legion of Honor from the Emperor of the French.

Flour Mill Explosions.

Although theories had been previously constructed to account for the phenomena of flour mill explosions, the subject was first brought into prominence in 1872 by the explosion of the Tradeston Mills, at Glasgow, Scotland. Destructive fires had before that date happened in different parts of Germany, but the appalling magnitude of the disaster that overtook the Tradeston Mills in July, 1872, at once elicited a general discussion and attracted the notice of scientists. The insurance companies at first refused to pay the insurance on the property, but afterwards paid the full amount, as it was known that the causes leading to the explosion were not within the control of the owners of the mill. A similar explosion occurred at the City Mills, at Port Dundas, Scotland, on September 15, 1874, attended with less disastrous results; but it served to keep fresh in the minds of the British people the possibility of explosions taking place, even in such peaceful establishments as flour mills. The first opinion as to the cause of these phenomena which we shall notice is that of Dr. W. Smith, of Manchester, England, who gave considerable attention to the subject. He relates how an explosion was produced in the Ofen-Pesth steam mill at Budapest, Hungary, which blew off the roof of the building and caused other damage, by workmen mixing some fine varieties of flour. The door of the mixing room was left open, and a thick cloud of dust became ignited from a light. A similar explosion took place at Friedict, Germany.

Dr. Smith states his opinion as follows: "It has been demonstrated that flour and bran intimately mixed, and in a fine state of division, gives off a gas at 450° Fah., which, when mixed with nine volumes of air, forms an explosive mixture, liable at any time to be fired by a spark or flame." He recommends that the use of exposed portable lights in mills should be prohibited.

Wiebe, a German chemist, has advanced the theory that grain in the form of impalpable flour undergoes rapid combustion when ignited, and that during the process of combustion a highly explosive hydrocarbon gas is generated, which, when mixed with air, becomes highly explosive. We shall notice this opinion further on.

Perhaps the most generally received opinion is that advanced by Professor Stevenson Macadam. When the Tradeston Mill explosion took place, Professors Macadam and Rankine were requested to take an active part in investigating the causes that led to the explosion. Professor Macadam published his views in *Iron*, an English periodical, from which we extract the following:

"The chemistry of grain and flour may assist us in arriving at an understanding regarding these fire explosions. The chemical components are principally starch and gluten, with small proportions of gum, sugar, oil, woody fiber, and ash. The starch and woody fiber are composed of carbon, hydrogen and oxygen ($C_6H_{10}O_5$); so are also the gum, sugar, and oil; and the gluten contains these elements, accompanied by nitrogen, sulphur and phosphorus. All these proximate constituents are combustible when burned in the ordinary way, and are consumed with greater rapidity when diffused as a cloud through the air.

"When the flour is showered from a sieve placed some distance above a gas flame, rapid combustion takes place; indeed the flour burns with explosive rapidity, and the flame licks up the flour shower somewhat in the same way that it flashes through a mixture of gas and air, or that it travels along a train of gunpowder. Similarly, the flour, blown into a cloud by a pair of bellows, at once takes fire and burns with a sudden and vivid flash. The smut taken from the grain during cleansing, and the shorts separated from the flour, burn with equal readiness.

"Probably the best way of showing the explosive combustibility of flour particles is to place some flour in a box lying inverted on its lid, introduce a light, and blow the flour into a cloud by bellows, when instantly the box is lifted from its lid and much flame rushes out. The fine division of the flour has necessarily much to do with the rapid combustion; and, indeed, coarse gunpowder can be passed through a flame without burning, while iron filings cannot fall through the same flame without being set fire to.

"When bruised, the flour resolves itself into gases. The carbon, by uniting with the oxygen of the air, becomes carbonic oxide (CO), or carbonic acid (CO_2), and the hydrogen and oxygen become water, vapor or steam (H_2O). The volume of these gases is much increased by their high temperatures at the moment of combustion.

"The conditions required to bring about a flour explosion are somewhat similar to those which cause a gas explosion. Coal gas is combustible and not explosive when unmixed with air, and it only becomes explosive when it is mixed with sufficient air to burn it. This proportion is obtained in the most powerful degree when one volume of gas is mingled in ten parts of air. A lesser or larger proportion of air lessens the power of the explosion by causing the gas to burn less quickly, and consequently with less explosive force, and thus tending more to ordinary combustion.

"In order to bring about the explosion it is necessary also that the flour-air mixture be confined within a given space; hence, if the flour be incased in a box with the lid fastened down, and the bellows be brought into play to produce a cloud while a light is introduced, the box will be forced open with a loud explosive noise, and the side be split up, while weights placed on the box are thrown off."

Such is the theory of Professor Macadam, whose eminence as a scientist entitles it to the highest consideration. It is certainly very plausible and has many facts in support of it. —*American Miller*.

HYDROBROMIC ACID.

The success which seems to have followed the experiments with this new remedy warrants the belief that it is destined to assume a permanent place in the Materia Medica.

This acid is a sedative neurotic, and now comes into use as an occasional substitute or alternate for the bromides of potassium, sodium, and ammonium, when the influence of bromine, the active medicinal agent of these salts, is sought.

The well known fact that these alkaline bases, and especially potassium, when given for a long time are liable to enfeeble muscular tissues and produce other undesirable changes through undue alkalinity of the blood, is a sufficient reason for seeking a substitute which shall be free from these defects, without suspending the action of bromine, the continuous sedative action of which is often very important. It should be understood, however, that this remedy is not well adapted for prolonged use, for, like the other mineral acids, it would be likely to interfere fully as much with the animal economy as the alkaline bromine salts; it must, for the present, be regarded simply as an alternate for the latter rather than for general use. In hospitals for the insane, especially in epileptic wards, it will be found very useful both in effect and ease of administration, since it can be given in the form of a lemonade, if moderate or small doses should prove effective. It has been highly spoken of as a corrective and preventive remedy for the headache, ringing of the ears, and the general cerebral distress which often follows on the use of salts of quinine. Another important application of this remedy will be found in its occasional substitution for the salines in chronic affections of the nervous systems, where, from long continued use, the patient has acquired a disgust for the alkaline bromides.

Hydrobromic acid—which is really hydrogen bromide—is a gaseous substance containing 98·76 per cent of bromine. The solution of the gas in water, which constitutes the liquid commonly known as hydrobromic acid, is limpid, colorless, and odorless, and has a strongly acid taste. As the strength of the liquid depends on the quantity of gas held in solution it is difficult to state the proper dose without knowing the formula used by each manufacturer, no fixed standard of strength having yet been agreed upon. Dr. Squibb, in a valuable paper on the subject read before the Medical Society of the State of New York, proposes a formula and process for making the acid of a definite strength; and this process being simple and easy, and as good as any that can be devised, will probably be adopted.

The Belcher Springs.

One of the attractions of St. Louis, and where flocks of people go for health, is the Artesian well, known as the Belcher Springs, on O'Fallon street, by the Belcher Sugar Refinery. This well is one of the most noted in the United States, and owes its existence entirely to Mr. William H. Belcher of St. Louis. An interesting account of its boring is given by A. Litton, M. D., in the *Transactions of the Academy of Science of St. Louis*. The boring of this well was begun from the bottom of an old well, 30 feet deep, in the spring of 1849, and the work was stopped in the spring of 1854. The bore to the depth of 219 feet was 9 inches in diameter, then 5½ inches for 731 feet further, and continued at 3¼ inches till the full depth of 2,199 feet was reached. At 550 feet, the top of a limestone layer, the water became salty; 200 feet below this, in a layer of shale, it contained 1⅞ per cent of salt; and at 965 feet, below a bed of bituminous marl, 2½ per cent. At the depth of 1,179 feet the hardest rock was encountered, being a bed of chert 62 feet thick. The water is discharged through a 20 inch pipe at the rate of 75 gallons a minute. It is used for medicinal purposes, having a strong odor of sulphureted hydrogen, and contains over 8 per cent of mineral matter, including 6 per cent of salt. Its temperature is even at about 73° Fah. The total cost of the work exceeded $10,000, and is located within the premises of the Belcher Sugar Refinery, and is called "Belcher Water." It is free to all comers.—*St. Louis Review*.