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Further information may be obtained from Herbert Wadsworth, 26 Merchants' Bank Building, 28 State Street, Boston, Mass.

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HOW OUR PATENT LAWS PROMOTE AND IMPROVE AMERICAN INDUSTRIES.

On another page we print in full a most suggestive paper recently read before the Manchester (Eng.) Scientific and Mechanical Society, by Mr. Frederick Smith, a prominent builder of that city, contrasting the qualities, styles, and prices of American and English builders' hardware—a paper which the Ironmonger pronounces one of the most serious indictments yet preferred against British workmanship in that department.

The field covered by the paper—the supplying of house builders' hardware—embraces a multitude of conveniences, but no real necessities. Why is it that America has been prolific in novel devices and clever improvements in this department of manufacture as in so many others, while England has gone on stolidly copying ancient forms, changing only to cheapen by the introduction of poor material and sham construction? Mr. Smith mentions several reasons that English manufacturers have given him for the state of things he, as an Englishman, so greatly deplors; but evidently he is not satisfied with any of them, and very justly; for none of them touches the real cause—the radically different attitude of the public mind toward inventions, characteristic of the two countries.

In England the user of household inconveniences accepts them as matters of fact; or if he grumbles at them he never thinks of trying to change them. It is not his business; and if he should devise an improvement, ten to one he could not get it made. To patent it is practically out of the question, for if it were not condemned off-hand as trivial, the patent fees would make it cost more than it was likely to be worth. The mechanic who makes such things is trained to work to pattern, and not waste his time on experiments. Besides, if he should make a clever invention he would not be able to raise the necessary fees for a patent, or to get any one to help him thereto. The manufacturer "makes what his customers call for." Why should he spend his money and spoil his plant to introduce improvements? So things go, until some pestilent Yankees flood the markets with better articles at a lower price; and British consumers suddenly discover that they want something that the native manufacturer cannot make. The need was there; but invention did not follow. How happened it that the American manufacturer did not pursue the same uninventive course? What produced the radically different attitude of the American mind toward newfangled notions out of which inventions proceeded and flourished?

No doubt several causes have been at work: freedom of thought and action; popular education; a blending of races; and the tide of adventurous spirits naturally resorting to a new and free land. These have had their influence undoubtedly; but all these have existed, more or less completely, in other new lands, without that outburst of creative energy which has made America the nursery of inventions, great and small. The determining cause, the one condition that prevailed here and not elsewhere, was the circumstance that almost from the start new ideas were given a market value in this country. Unlike all others, the American patent law directly encouraged independent thinking in all classes. The fees were low and the protection offered fairly good. Men soon found that it paid to invent; that one of the surest roads to competency was a patented improvement on something of general use. If a household utensil or appliance went wrong or worked badly, every user was directly interested in devising something better; and, more than that, he was interested in making his invention known and in securing its adoption. The workman at his bench had an ever-present inducement to contrive something at once cheaper and better than the article he was hired to make. He could patent his improvement, or the wholly original device he might hit upon, for a few dollars; and his patent would count as capital. It would make him his own master, possibly bring him a fortune. The manufacturer could not rest contented with the thing he set out to make, for the meanest hired man in his employ might suddenly become a competitor. He must be constantly alert for possible improvements, or his rivals would get ahead of him. The result is a nation of inventors, at whose hands the newest of lands has leaped to the leadership in the arts, almost at a bound.

There is talk of changing all this; of emulating the conservative spirit of the Old World; of putting inventors under bonds; of stopping the rush of industrial improvement—to enable a few short-sighted yet grasping corporations to get along without paying license fees for such inventions as they happen to approve of. They profess to want inventors to go on making improvements. They are willing to ascribe all honor to the successful inventor; but they are determined not to pay him for his work. Still more they are determined to change the attitude of the public mind toward inventors and inventions, if such a change can be wrought by plausible misrepresentations. The fact that they were able to inveigle one branch of the American Congress into assenting to their unjust and mischievous scheme is one of the anomalies of our recent history. It should be taken as a timely warning of impending danger to all the industrial interests of the country. It is outrageous that the inventors of the land, after having raised their country to the first rank among industrial nations, should have to defend their constitutional rights against Congressional invasion; but the fact exists; and the defense should be made a matter of personal interest and effort not only by every inventor and manufacturer, but by every honest citizen.

PLEURO-PNEUMONIA.

The cattle plague, which is creating so much anxiety throughout the Eastern States, is a contagious fever, affecting cows chiefly, characterized by extensive exudations into the respiratory organs, and attended by a low typhus inflammation of the lungs, pleura, and bronchia. It has prevailed in Europe for ages, at times developing into wide-spread scourges, causing incalculable loss. It was imported into England in 1839, and again three years later; and it was estimated that within twenty-five years thereafter the losses by deaths alone in England had amounted to \$450,000,000. In 1858 the disease was carried to Australia by an English cow, and, spreading to the cattleranges, almost depopulated them.

In 1843 an infected Dutch cow brought the disease to Brooklyn, where it has since lingered, slowly spreading among the cattle in Kings and Queens counties. In 1847 several heads of infected English cattle were imported into New Jersey, and, spreading among a herd of valuable cattle, made it necessary for them all to be slaughtered, the only certain method of stamping out the disease. In 1859 four infected cows were imported into Massachusetts from Holland; the plague spread rapidly, and was stamped out only by persistent effort, the State paying for over 1,000 slaughtered cattle. Since 1867 the disease has not been known there. Meantime the pest had invaded Eastern Pennsylvania, Delaware, and Maryland, where it has since prevailed in isolated localities. The absence of large herds of moving cattle in these districts, except for speedy slaughter, has prevented the disease from developing into a general plague.

The recent action of the British Council in forbidding the importation of American live cattle is likely to prove of inestimable benefit to this country, in forcibly calling attention to the grave risk that the presence of the disease on Long Island and elsewhere constantly entails. Fortunately the drift of the cattle traffic is eastward, and as yet there has been no propagation of the poison in the great cattleranges of the West. Unless summarily arrested, however, the disease will surely reach those sources of our cattle supply, and occasion losses that can be estimated only in hundreds of millions of dollars.

The experience of all countries into which this disease has gained access appears to prove that there is only one way of getting rid of it—namely, the immediate killing of all infected cattle, and the thorough disinfection of the premises in which they are found.

The disease is purely infectious, and is never found in regions where it has not gained a foothold by importation. Palliative measures have in every instance failed to eradicate the disease, and are only justifiable, as in Australia, after the plague has reached dimensions utterly beyond the reach of any process of extermination.

Professor Law, of Cornell University, one of our best informed veterinary surgeons, most emphatically opposes every attempt to control the disease by quarantining the sick or by the inoculation of the healthy. "We may quarantine the sick," he says, "but we cannot quarantine the air." To establish quarantine yards is simply to maintain prolific manufacturers of the poison, which is given off by the breath of the sick, and by their excretions, to such an extent that no watchfulness can insure against its dissemination. Besides, the expense of thorough quarantining operations would amount to more than the value of the infected animals whose lives might be saved thereby. Inoculation is still less to be tolerated at this stage of the pest.

The Professor says: "Germany, Holland, Belgium, France, and England, have been treating the victims of this plague for nearly half a century, but the result has only been the increase of disease and death. Our own infected States have been treating it for a third of a century, and to-day it exists over a wider area than ever before. Contrast this with the results in Massachusetts and Connecticut, where the disease has been repeatedly crushed out at small expense, and there can be no doubt as to which is the wisest course. As all the plagues are alike in the propagation of the poison in the bodies of the sick, I may be allowed to adduce the experience of two adjacent counties in Scotland when invaded by the rinderpest. Aberdeen raised a fund of £2,000, and though she suffered several successive invasions, she speedily crushed out the poison wherever it appeared by slaughtering the sick beasts and disinfecting the premises. The result was that little more than half the fund was wanted to reimburse the owners for their losses, and the splendid herds of the county were preserved. Forfar, on the other hand, set herself to cure the plague, with the result of a universal infection, the loss of many thousands of cattle, and the ruin of hundreds of farmers. Finally the malady was crushed out in the entire island by the method adopted by Aberdeen and other well advised counties at the outset."

And again, "Cattle have been inoculated by the tens of thousands in Belgium and Holland, and of all Europe these are the countries now most extensively infected. France, Prussia, Italy, Austria, and England have each practiced it on a large scale, and each remains a home of the plague. Australia has followed the practice, and is now and must continue an infected country. Our own infected States have inoculated, and the disease has survived and spread in spite of it, and even by its aid. Whatever country has definitively exterminated the plague (Norway, Sweden, Denmark, Holstein, Mecklenburg, Switzerland, Massachusetts, and Connecticut), that country has prohibited inoculation and all other methods that prevail on the principle of preserving the sick, and has relied on the slaughter of the infected and the thorough disinfection of their surroundings. So will it be

with us. If any State adopts or allows any of these temporizing measures, that State will only repeat the experience of the past alike in the Old World and the New, will perpetuate the disease in the country, will entail great losses on its citizens, will keep up the need for constant watchfulness and great expense by the adjoining States for their own protection, and will indefinitely postpone the resumption of the foreign live stock trade, which, a few months ago, promised to be one of the most valuable branches of our international commerce."

We are persuaded that the position taken by Professor Law, and other similar-minded veterinary surgeons, is the only safe one. The disease can be stamped out now with comparatively small loss. If trifled with, and tolerated, it cannot but result in a great national calamity.

SPAIN A FIELD FOR MACHINERY AND PATENTS.

From a too lengthy communication to admit in full to our columns, a resident of Madrid communicates to the SCIENTIFIC AMERICAN some facts relative to the fertility of the soil of Spain, her necessity for improved agricultural and other implements, and closes with the assertion that it is a good field withal for patents. We cull from the letter as follows:

I have lived, says the writer, for a number of years in this beautiful country, so little understood by foreigners, so little appreciated by its own inhabitants. The Spain of romance, poetry, and song, is the garden as well as the California of Europe. But it stands in great need of the health-giving touch of the North American enterprise. We have here the same mineral treasures, the same unrivaled advantages of climate, that made Spain once the industrial and commercial emporium of the world.

But Spain is awakening. She is endeavoring to shake off her lethargy. The late Exhibition of Paris has proved this; and those who are familiar with the past history and present condition of Spain have been astonished at the result of this effort. A new era has commenced for the country, and it is everywhere evident that a strong current of enterprise and industry has set in. But it is with nations, as with individuals, when they have remained long in complete inaction, brain and muscles are torpid and cannot at first obey the will. Spain needs the assistance of other nations hardened and inured to toil.

The plows now used to till the land are precisely such as were those left by the Moors in the unfinished furrow, when with tears and sighs they bade farewell to their broad fields, their mosques and palaces, whose ideal architecture is still the wonder of the world, to go forth as outcasts and exiles in obedience to the cruel edict that drove them away to the deserts of Africa.

I doubt whether there is an American plow in Spain, much less a steam plow. Sowing and reaping machines are here unknown, and grain is tread out by oxen and mules just as it was in Scripture times, and cleaned by women, who toss it in the air to scatter the chaff. Everything is primitive and Oriental here as yet.

Spain could supply all Europe with butter and cheese, and, on the contrary, these articles are imported in large quantities from England, Holland, and Switzerland. The traveler crosses leagues and leagues of meadow land where not a tree is to be seen, nor one sheep pasture, and which are nevertheless watered by broad rivers that carry away to the ocean the water that would, by irrigation, convert these fields into productive farms. There are many places in Spain where the wine is thrown away for want of purchasers and vats in which to keep it. In the Upper Aragon, the mortar with which the houses are built is made with wine instead of water, the former being the most plentiful. Aragon needs an enterprising American company to convert into wholesome table wine the infinite varieties there produced, and which our neighbors the French buy and carry away to convert into Bordeaux.

We want American enterprise in Galicia and Asturias, where milk is almost given away, to convert it into the best of butter and cheese; and also in those same provinces, where delicious fruit is grown in such abundance that it is left on the ground for the swine.

Spain needs many more railroads and canals, all of which, when constructed, are subsidized by the government; the railroads at the rate of \$12,000 a kilometer, and many more additional advantages are offered for canals.

With regard to commerce with Spain, we have to lament the same indifference on the part of the Americans. I have, for instance, an American double-burner petroleum lamp. All who see it admire and covet it, but they are not to be had here. If we except one American in Madrid, who brings mostly pumps and similar articles on a very small scale, we have no dealers in American goods here. Wooden clothes pins, lemon squeezers, clothes horses, potato peelers, and the hundreds of domestic appliances of American invention, elsewhere considered indispensable, are in Spain unknown.

We had confidently expected that the new Spanish law on patents would draw the attention of American inventors toward this country, that to-day offers a wide field for every new practical invention, but I am sorry to see that, with the exception of Edison and a few others, the Americans have not yet availed themselves of the easy facility for taking patents for Spain, where new inventions and new industries are now eagerly accepted and adopted. And while the Americans are thus careless as to their own interests, the

French take out and negotiate, in Spain, American patents with insignificant variations.

Let American inventors be assured that any new invention, useful and practical, and above all, requiring but little capital to establish it as an industry, will find a ready sale in Spain.

I could enlarge to a much greater extent upon the indifference of American inventors, merchants, manufacturers, and business men, as to the market they have in Spain in their respective lines, and upon the importance of building up a trade with this country, but to do so would require more space than I think you would feel justified in occupying in your columns.

PETER COOPER AS AN INVENTOR.

The successes of Peter Cooper's long and useful life are well known. Not so many are aware of his varied experience in the direction of failure, particularly in the field of invention. More than once he has found his best devices profitless because ahead of his time, or because of conditions, political or otherwise, which no one could foresee. He possessed the rare qualities, however, of pluck and perseverance, and when one thing failed he lost no time in trying something else. Before he was of age he had learned three trades—and he did not make his fortune at either.

In a familiar conversation with a *Herald* writer recently, Mr. Cooper related some of his early experiences, particularly with reference to enterprises which did not succeed. His father was a hatter, and as a boy young Cooper learned how to make a hat in all its parts. The father was not successful in business, and the hatter's trade seems to have offered little encouragement to the son. Accordingly he learned the art of making ale. Why he did not stick to that calling and become a millionaire brewer, Mr. Cooper does not say. Most probably the national taste for stronger tipple could not at that time be overcome, and ale could not compete with New England rum and apple-jack. The young mechanic next essayed the art of coachmaking, at which he served a full apprenticeship. At the end of his time his employer offered to set him up in business, but the offer was not accepted, through fear of losing another's money. He felt that if he took the money and lost it he would have to be a slave for life. So he quit coachmaking and went to work for a man at Hempstead, L. I., making machines for shearing cloth. In three years, on \$1.50 a day, Cooper had saved enough money to buy his employer's patent. Immediately he introduced improvements in the manufacture and in the machine, which the war with England made a great demand for by excluding foreign cloths. At this time Cooper married. In due time the family numbered three, and the young father's inventive faculty was again called upon.

"In those days," said Mr. Cooper to the reporter, smiling as the remembrance came to his mind, "we kept no servants as they do nowadays, and my wife and myself had to do all that was to be done. After our first child was born I used to come into the house and find my wife rocking the cradle, and I relieved her from that while I was there. After doing that for a few days I thought to myself that I could make that thing go of itself. So I went into my shop, and made a pendulous cradle that would rock the child. Then I attached a musical instrument which would sing for it, and at the same time the machine would keep the flies off. The latter was very simple; by hanging something to the cross bar, as the cradle swung under it, backward and forward, it would create wind enough to drive away the flies. The machine was wound up by a weight, and would run for nearly half an hour without stopping. I took out a patent for it, and one day a peddler came along with a horse and wagon, as they do in the country, and saw the cradle. He struck a bargain with me and bought the patent right for the State of Connecticut, giving for it his horse and wagon and all the goods he had with him. They afterward made some there, but nothing like as good as mine. It was a beautiful piece of furniture," said Mr. Cooper regretfully, as he thought of it as a thing of the past. "They afterward substituted springs for the weight movement, but that kind was not so good."

About this time the war with England ended and the market was spoiled for the shearing machines. Then, we believe, Mr. Cooper tried his hand at cabinetmaking, but that failed, and he set up a grocery store where the Bible House now stands. While selling groceries Mr. Cooper made an invention which ought to have made his fortune, but it did not. The story is best told in Mr. Cooper's own words:

"It was just before the Erie Canal was completed, and I conceived a plan by which to tow boats by the use of all the elevated waters on the line of the canal. To demonstrate that that was practicable I made with my own hands a chain two miles long, and placed posts 200 feet apart in the East River from Bellevue dock down town about a mile. These posts supported grooved wheels to lay the chain in, forming an endless chain. The whole was moved by an overshot water-wheel placed at the Bellevue dock. A reservoir twelve feet square and three deep held the water to turn the wheel."

At the suggestion of Governor Clinton Mr. Cooper tightened his chain and pulled up the end post just before the grand trial of his device was to come off. He succeeded in getting stone enough to anchor the post, however, and the experiment went off swimmingly. The boat was hooked on to the chain, and the passage back and forward—two miles—was made in eleven minutes.

"I ran that boat some ten days," says Mr. Cooper, "to let people see what could be done, and carried nearly a thousand people. Part of the time I ran two boats. Once I counted

52 people in one boat. I made the whole chain myself and planted the posts. As I could find no wheels to suit me I made the moulds and cast the wheels myself out of block tin and zinc. It was no small job, I can tell you."

This was unquestionably a grand invention. In itself it was a perfect success; but it was not used. Mr. Cooper tells why:

"It demonstrated completely that the elevated water power along the line of the canal and every lock in the canal could be made use of to drive the boats. Governor Clinton gave me \$800 for the privilege of buying the right to the plan in case he should want to use it on the Erie Canal. In making the canal he had promised the people along the route that as soon as it was finished they could sell their horses to tow the boats, their grain and fodder to feed the horses, and their provisions for the passengers. On reflection he thought that if he took all that away from them he would have to run the gantlet again, and he could not afford to do that. There never was anything done with the plan until a few years ago, when Mr. Welch, president of the Camden and Amboy Railroad and Canal, invented exactly the same thing and put it in practice on his locks on the canal. He found it saved half the time and great expense. He went to Washington to take out a patent for it, and when he got there he found that I had patented the same thing fifty-three years before. My patent had run out, so he could use the plan on his canal. It has also been used on one lock on the Erie Canal. If they could have used that chain on the whole length of the Erie Canal it would have saved many millions of dollars."

This would not be a bad place, were there room for it, to speak of "undeveloped" and therefore worthless inventions; and the assumption that if an inventor does not make his invention immediately profitable it must be good for nothing, and should be dispatented. But the moral goes without telling.

Mr. Cooper's next attempt at invention was made about the same time, but in quite a different direction. It was during the struggle of the Greeks for independence, and wishing to do something for their assistance, Mr. Cooper undertook to make a torpedo boat for them. Mr. Cooper says:

"It was a small one that could be taken on board ship and used to destroy any vessel that came to destroy them. It was fixed with a rotary steam engine and a screw wheel to propel it. It was intended to be guided from the ship or the shore. There were two steel wires fixed to the tiller of the rudder, and the operator could pull on one side or the other and guide the vessel just as a horse is guided with reins. It was so arranged that at night it would carry a light with its dark side toward the object to be destroyed, and by simply keeping the light in range with the vessel it would be sure to hit it. The torpedo was carried on a little iron rod, projecting in front of the torpedo vessel a few inches under water. Contact would discharge the torpedo and bend this iron rod. This would reverse the action of the engine and cause the torpedo vessel to return right back from whence it came, ready to carry another torpedo."

Unfortunately the torpedo boat was not ready in time to go with the ship carrying the contributions for Greece. It was stored in Mr. Cooper's factory (he had then turned his attention to glue) and was destroyed by the burning of the factory. It seems to have been quite a promising affair for the time. Mr. Cooper says:

"I experimented with it at once to see how far it could be guided. I made a steel wire ten miles long and went down to the Narrows to test the matter. I had steel yards fastened to one end of the wire, and to the other end the torpedo vessel was attached. It got about six miles away when a vessel coming into the harbor crossed the wire and broke it. Although the experiment was not complete it showed that for at least six miles I could guide the vessel as easily as I could guide a horse."

Mr. Cooper's work as the pioneer locomotive builder in this country; his later inventions and improvements in the manufacture of railway iron and wrought iron beams for fire-proof buildings; his application of anthracite coal to iron puddling, and his other successes are almost as widely known as his philanthropic efforts for the education and advancement of the industrial classes of this city.

After all, we are not sure but the story of his long and varied and always honorable career, told by himself, would not be worth, to young people who have to make their way in life through many difficulties, more even than the advantages of the noble institution which bears his name.

TASTE FOR READING.—Sir John Herschel has declared that "if he were to pray for a taste which should stand under every variety of circumstance and be a source of happiness and cheerfulness to him through life, it would be a taste for reading." Give a man, he affirms, that taste, and the means of gratifying it, and you cannot fail of making him good and happy; for you bring him in contact with the best society in all ages, with the tenderest, the bravest, and the purest men who have adorned humanity, making him a denizen of all nations, a contemporary of all times, and giving him a practical proof that the world has been created for him, for his solace, and for his enjoyment.

Africa Crossed Again.

Information has been received by way of Lisbon, March 12, that the Portuguese explorer, Pinto, has succeeded in traversing Africa from west to east, and has reached Transvaal. The latitude of his course across is not mentioned.