

er of to-day for doing work that was done largely by hand before the advent of the patent system that this article would be altogether too long if all of even the principal instances were mentioned. While the farmer of the Revolution did most of his work by the unaided use of his hands, the farmer of the present time works by his brain through machinery which he has only to guide and to watch and most of which saves him the trouble even of walking.

This substitution of machinery for hand labor on the farm has relieved the farmer of other burdens than the mere drudgery. The use of hand labor before the patent system compelled the employment of a large force of laborers. Our comparatively short seasons required that the greater part of the force should be gathered in the spring and discharged in the fall to save wages through the long winter. It was with difficulty that men could be found at the desired time, and those of entirely unknown antecedents were gladly hired. This force was idle at intervals and again it required a considerable temporary increase. These men had to be housed and fed, necessitating the employment of female help, which is at all times difficult to secure in the country.

On the other hand, the introduction of farm machinery increased the power of a man to work to about ten times what it had been with hand tools, resulting in a great reduction in the number of hands necessary to operate a farm, and eliminating to a large extent the inconveniences of the larger force. Farm machinery is soon paid for out of the saving in wages and board which results from its use, and the cost of production is thus so greatly lowered that the American farmer is enabled to compete with low-priced hand labor in other parts of the world, while his profits at the same time are much increased.

The case is parallel to that of the shoemaker and the shoe manufacturer. The shoemaker can profitably make expensive shoes to suit fastidious customers, but he cannot compete with the almost equally good machine-made shoes of the manufacturer in supplying the masses. No profits in general agriculture can be made where intelligent American hand-labor is relied upon to the exclusion of machinery. It has been the experience of trades repeatedly that, so long as there is no way to produce an article but by hand, cheap foreign labor supplies our own market; but as soon as we begin to make it by machinery we not only drive out the imported hand-made production, but sell abroad at a lower price than that for which the manually produced article can be offered. In this country, the wages of hand-labor more than eat up the profits. It is only in gardening that such labor can be economically employed by the agriculturist. To make general agriculture lucrative by hand-labor, it is necessary to go where Chinese, negroes and laborers of similar races may be utilized.

We cannot stop with the farm machinery, however, in enumerating the inventions produced since the patent system was introduced which benefit the farmer. When grain is hauled to the railroad, it is deposited in the cars or in the storage bins of the warehouse by a single movement of a lever; and at the great elevators of the large cities an entire train of cars will be loaded or unloaded in a single hour, thus doing in a small part of the time the work of an army of the shovelers of former days.

The modern mills make better flour and make it at a fraction of the cost of the last century; so that, as it is cheaper as well as better, a much enlarged demand is created for the grain from which it is made.

The dairy and canning machinery now in use not only replace an enormous amount of manual labor, but, by quickly converting the perishable milk into cheese and butter and by preserving the fruit and vegetables, they render profitable the raising of these products without reference to the distance from the cities. This was not formerly possible, because such forms of produce as these would spoil while being hauled to the market in wagons. The same advantages have accrued from the slaughtering machinery and refrigerator and stock cars with reference to the raising of live stock for meat.

Modern methods of refining oil and improved lamps have produced a light that is many times more brilliant than the old tallow dip of our forefathers and that is almost as safe.

The railroad is of the greatest service to the farmer, and here, too, the patent system is most intimately connected with its institution and development. The railroad ships live cattle and perishable fruits and vegetables from distances that would be impossible with the old methods of transportation, because such products would perish on the way, and, besides carrying more stable products, it brings the farmer his implements and fertilizers. In fact, if he had to haul all of his products by wagon, many large areas in this country could not be worked, because they are so far from the markets that the cost of shipment in the old way would be prohibitive. The railroad puts the farmer in touch with the consumer, no matter what distance may separate them. Indeed, the railroad and steel steamship open to the American farmer the whole

world as a market. The steel steamer is much more economical than the wooden sailing vessel which it has supplanted, because it is several times larger, much safer, and faster than the sailing ship, and yet it requires a smaller crew and a shorter period of time to make a trip, resulting in a great saving of wages. The farmer gets the benefit of these differences in lower transportation.

Another invention which was developed under the fostering care of the patent system is the telegraph. By its use the farmer is often notified of the failure or probable failure of crops in other parts of the globe in time for him to supply the deficiency. Through the telegraph he is warned of storms which would destroy his herds in time to take them to shelter—a proceeding that requires many hours on the great stock farms of the West—and of frosts, so that he may protect his small fruit. The telegraph, by giving frequent reports of the supply and demand, serves to keep the prices of the farmer's merchandise uniform throughout the entire country, excepting for the cost of transportation. He also knows the daily fluctuations of prices in the markets, so that he may choose the most advantageous time to sell.

These instances of the economy resulting from the use of machinery show that the resources of the farmer of the nineteenth century, compared with the meager earnings of his eighteenth century ancestor, are, to a great extent, due to the machinery which is at his command and which his forefathers did not have.

That this machinery has ever been invented is largely due to our wise patent laws, which will be apparent from the following considerations: The machinery which the farmer now enjoys did not exist before the patent system, but has been devised almost wholly since its establishment. Those who drafted the Constitution, with that foresight that has so many times evoked admiration when viewed in the light of after events, included a clause which was intended to produce just this result. The farmers of no other country are one-half so well provided with labor-saving machinery, and no other country has had, or now has, a patent system equal to ours.

The farmer labored for many centuries without machinery, and the patent system was instituted for the purpose (among others) of supplying him with machinery. Almost immediately after the enactment of our patent laws, agricultural machinery began to be invented and improved, and as this progress has continued and has steadily increased, it is clear that the patent system is the cause of the existence of the farmer's machinery and, through it, of his affluence.

Most of these inventions would not have been made if it had not been for the protection of the patent laws. To bring an invention from the general idea in the inventor's mind to the practical, durable, salable form often requires the expenditure of years of effort and thousands of dollars before any returns are had; so that it is safe to say that very few would expend their energies and resources if it were not for the inducements offered by our patent system.

Congress concluded that the most equitable manner of rewarding the inventor was to give him a monopoly for a limited time of the manufacture, use, and sale of his invention. This monopoly induces him to labor untiringly to create an invention, to put it in the most practical form, and to introduce it as thoroughly as possible in order that he may get the largest possible amount of profit. If the invention is of little practical value, its sales will be small, while from an invention of great utility the inventor may, and probably will, reap large profits; but this is only for a limited time, after which the invention will become public property. The reward is thus in just proportion to the benefit which the public derives from the invention.

The manufacturer of farm implements, on whose head the resentment of the farmer is sometimes showered because of the supposed larger prices of the agricultural machines covered by existing patents, would be glad to be relieved from the danger of strikes to the extent to which the farmer has been emancipated by the machinery furnished by the patent system; for, if the farms of to-day, which are many times larger than those of the last century, were operated with the hand implements of those days, the labor problem would become as serious to the farmer as it is to-day to the manufacturer.

Seeing, therefore, how absolutely necessary is the patent system to the welfare of the farmer and to the country at large, he should instruct his representatives that the patent system is to receive their earnest support, and that time spent in so changing the patent laws and their operation as to give the strongest practical incentive to the inventor which is compatible with the greatest ultimate advantage to the public will be appreciated as highly as any other efforts he can possibly make.

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ABOUT thirteen years ago the first tank steamer was built, and there are now one hundred and eighty tank vessels in existence, nearly all of them being steamers. Their tonnage is 401,024.

DEATH OF JOHN KRUESI.

John Kruesi, the chief mechanical engineer of the General Electric Company, and one of the little band of men who worked with Mr. Thomas A. Edison at Menlo Park, N. J., died at Schenectady, N. Y., on February 25, 1899. He was born in 1843 in Switzerland, and went to work in a machine shop at an early date. He came to the United States in 1870 and was engaged by the Singer Sewing Machine Company. In 1872 he entered the employ of Mr. Edison and became associated with him when he later, in 1875, opened a shop for purely experimental work in Greene Street, New York. Mr. Kruesi became Edison's machine foreman, designing and making special apparatus to fit the conditions. From 1876 to 1881 Mr. Edison was busy with the phonograph, the telephone, incandescent electric lighting, electrical railway experiments, etc. The first phonograph ever constructed was made by Mr. Kruesi from Mr. Edison's rough sketch, and this instrument is now in the Patent Department of South Kensington Museum, at London. Mr. Kruesi made the machine and brought it to Mr. Edison, who set it going and spoke into it the now familiar "Mary Had a Little Lamb." When it started to repeat his words, he was almost awed when the machine actually repeated the rhyme in clear words, when at the best a hoarse murmur was expected. Mr. Kruesi remained with Mr. Edison and became one of his partners and assisted in laying out the conduits for incandescent lighting in New York city. Mr. Kruesi occupied important positions in various of the Edison companies and he was of great assistance in building the Schenectady shops; in fact, as they now stand, they are Mr. Kruesi's monument. He had charge of the Schenectady works from 1892 until 1896, when he was appointed chief mechanical engineer of the company.

DEATH OF LIEUT. DASHIELL.

Lieut. Robert B. Dashiell, Assistant Naval Constructor, United States Navy, who has been for some years in the Bureau of Construction and Repair at Washington, D. C., died at his residence in Washington, March 8, at the age of thirty-eight years. Lieut. Dashiell was a native of Maryland, and was appointed a naval cadet in 1882. His record at the academy was one of the most brilliant in the history of the institution, and the promise which he gave for success in future life was more than fulfilled by his subsequent achievements. Lieut. Dashiell devoted himself to ordnance, and he soon became recognized as one of the brightest men in the service. We have already illustrated some of the important inventions of Lieut. Dashiell, such as the "Dashiell" breech mechanism, his gun mounts, and his ammunition hoist. His exceptional ability was recognized in his selection, while still an ensign, to install the plant at the Indian Head Proving Ground. Here he became exposed to all conditions of weather, and contracted malaria, from which he never fully recovered, and which was the real cause of his death. After completing his work at Indian Head, Lieut. Dashiell was transferred to the construction corps, and here, as elsewhere, he soon became an authority. He devoted himself to the study of dock construction and spent two years in Europe. The report he made has been adopted by the department as the basis for dock construction under his direction. The service has suffered a severe blow in the death of Lieut. Dashiell.

SPORTSMEN'S EXHIBITION.

The fifth annual exhibition of the Sportsmen's Association was formally opened at the Madison Square Garden on Thursday, March 2. The whole Fourth Avenue end of the building was occupied by a drop scene representing a Canadian glacier, which formed an appropriate background. The Indian village at the foot of the glacier added to the realistic effect, which was greatly enhanced by the big game which occupied a large portion of the floor space. Real Indians gathered around the camp fire and seemed to be thoroughly at home. The large central space was taken up by exhibits of various kinds, animals in cages, and the swimming tank, in which aquatic performances were given, including sensational high dives. Various displays occupied the space ordinarily taken up by boxes and arena seats. Here were exhibited guns, ammunition, animals' heads, skins, camping outfits, etc. Several railroads had miniature camps and guides. The live specimens of game were particularly interesting. Two handsome moose and a couple of buffalo were very much admired. From a scientific point of view, various launches and launch engines were the most interesting objects on exhibition.

NAVAL BUREAU CHIEFS.

Under the provisions of the new naval personnel law, the bureau chiefs of the Navy Department, who have heretofore been entitled only to the relative rank and pay of commodores, will have the rank and pay of rear-admirals of the second class, corresponding in grade and pay to brigadier-generals of the army. Chief Constructor Highborn celebrated his advancement and his sixtieth birthday together.