

farmers to destroy the fundamental basis of the patent system is ungrateful, if it is not also suicidal.

"But," the agricultural classes may argue, "grant that the patent system has been of great use in helping us to gain our present commanding position, we do not need it any longer; we have paid roundly for the benefits received; and may now do away with it, as one removes the scaffolding from around a completed house. It has served its purpose, well or ill; from thistime forward it must be more an inconvenience than a benefit. Let it go."

Could not the same have been said as truly last year, two years ago, or five years ago? And has not the cost of production been reduced, or the scope of production increased, by inventions made since then?

A correspondent engaged in developing the transportation of Western products to Eastern markets in refrigerator cars, thus points out some facts bearing upon this question:

"Within your recollection and mine, butter made in the West did not command as good a price in Boston and New York markets as when made in the immediate vicinity of New York, or as Vermont butter in Boston. In the year 1878-79 a Western maker of creamery butter took the prize in New York at the national dairy fair for creamery butter. The next season the same party said to me: 'It is of little use for me or my neighbor to make the superior quality of butter, or to gather our eggs in summer, for we find it impossible to place them in good order in Eastern markets and command the price their quality should give us.'

"Referring to the fact that last year and the year before one-fifth of the butter that left Chicago for Eastern markets was carried in our cars, although we had only the Boston outlet for them at that time, you can see that the obstacle which had hindered Western butter makers from securing a good price for their article was largely overcome. This is specially apparent from the fact that our heaviest shipments were in the hottest months, and that in the wholesale markets at Boston this same Western butter was commanding a better price than Vermont butter from one to two cents per pound. The agent for this particular creamery said to me in Boston last week: 'Our fine grades of Western butter are sold ahead, and prices are very firm for such goods,' thirty-nine cents being the wholesale price that day.

"In view of these facts, have the patents which we have introduced for refrigerator cars done anything for the Western farmers? The butter that took the prize at the last international dairy fair in New York had been made the previous June, and kept in one of our cold storage houses for six or eight months. Eight years ago, the state of the art would have made this thing impossible. There have been, from parties not thoroughly posted in the matter, some severe attacks upon dealers in large cities who have bought, during the season when the market was overstocked with butter, eggs and such articles, and placed them in cold storage houses at the distributing points to be sold during the winter when it was impossible to get fresh made stock. I saw some eggs candled from cold storage houses in Boston, where they had been for nearly nine months, and to the case of forty-nine dozen one-half dozen to the case were all that were thrown out, and a portion of these were cracked from handling. This would make the percentage of shrinkage very small indeed. The eggs were selling for twenty-seven cents per dozen. How much could the farmer have realized from these eggs, if he had been obliged to sell them when gathered, with no chances for storage?

"The *Western Rural* might say that the middleman made this profit between the spring and fall market; but that is only the superficial view. The farmer has the same opportunity to hire storage in any of the large cities that the commission merchant has, and the same opportunity to get full price for his eggs, in the winter, and he does secure an advantage when he makes his sale at a proportionally higher price for his eggs from the fact that they can be stored until they become somewhat scarce. The new papers have had considerable to say about shipments of dressed beef from the West, and you were kind enough to say in a recent article that our cars have had something to do with that business. An owner in the largest herd of cattle in the West tells me that the loss from cripples now made in shipping in stock cars would pay the freight from the extreme West to market on the hides, tallow, and bones of the whole shipment, if the shipments were to be made dressed. In this way it looks to us as if we had brought the market for Western products very near to the door of the farmer and producer.

"These things would not have been done without some object for parties to introduce improved refrigeration."

The influence of improved transportation in bringing the market nearer and nearer the farmer's door is shown not alone in connection with minor products. In 1878 the difference between the average price of wheat throughout Iowa and in New York is given by a Western writer as a fraction over 65 cents a bushel. By 1880 this difference had been reduced to a fraction under 40 cents. On a crop of 33,000,000 bushels and more, the difference meant something over eight million dollars to the profit of Iowa farmers. The benefits received by other farmers in the far West were proportionally great, and this is only one of the advantages reaped by the farming interests in recent years by virtue of improvements brought about mainly through the agency of the patent system.

Is there any farmer so ignorant as to suppose that an end has been reached in improvements of this nature? or that the improvements will go on in the absence of all inducements in the way of protection and profit to inventors?

SERIOUS HURTS THAT FAIL TO KILL.

A short time ago a shoemaker of Astoria, N. Y., shot himself twice with a heavy pistol, once in the ear and once in the mouth. He was brought to the Roosevelt Hospital, in this city, where it was discovered that the first ball glanced from the skull. The other is thought to be somewhere in the head, perhaps in the brain. Speedy death was expected; but the next day the patient walked away from the hospital, saying that he was sorry for the attempt on his life, but appeared to be in no immediate danger of dying.

With this case as a text, a writer in a morning paper reviews a large number of more or less marvelous cases of recovery from grievous hurts, showing that serious injuries to the main organs of the body are not always followed by death. Men persist in living, not only with bullets in their brain, holes in their stomach, dislocated vertebrae, and wounds in the heart, but even with open wounds clear through the body. During the civil war, General H. A. Barnum, of Brooklyn, received in battle a wound which still remains an open passage through the body. For years the treatment of this wound has been simply to wear in it a roll of prepared lint, which is renewed daily. The suppuration of the wound is constant though variable.

General Shields, of Missouri, had a similar wound extending through his body, and open in front and behind. His wound, it is said, was received in the Mexican war, and he wore, not lint, but a silk handkerchief in it. This he could draw directly through his body.

ALCOHOL SUGAR AND PAPER PULP FROM WOOD.

Braconnot's process, as described in an Austrian paper, consists in mixing sawdust carefully with an equal weight of sulphuric acid, not allowing the mixture to get hot; and after a while diluting the paste mass with water and heating to boiling. When decomposition is complete, the acid is neutralized with carbonate of lime, and the glucose thus obtained is fermented in the usual manner by adding yeast to it. Owing to the large amount of sulphuric acid required, the results hitherto obtained do not favor its introduction on a large scale. But, on the other hand, the manufacture of spirits may perhaps be profitably combined with paper making.

Very satisfactory results were obtained by Bochet and Machard by treating wood shavings with hydrochloric acid under pressure. They treated 4,000 pounds of wood with 8,000 pounds of water containing 800 pounds of hydrochloric acid for ten or twelve hours in wooden vats, the mass being kept boiling by live steam. The hot acid dissolves off the incrusting material from the wood, which is thereby converted into a dry mass that is easily converted into paper after being washed with water. The acid liquid contains from 20 to 22 per cent of grape sugar to 100 parts of the dry wood. The liquid is then saturated with chalk, and fermented at 24° to 25° C. (75° to 77° Fahr.). One cubic meter of pine wood weighing 435 to 440 kilos is said to yield 780 to 790 liter per cent of alcohol (equal to 39 or 40 liters of 50 per cent spirits), which is worthy of consideration.

CONDENSED WHEY.—A NEW INDUSTRY AND A NEW FOOD PRODUCT.*

BY PROF. ALEXANDER MUELLER.

Whey, which is a by-product in the manufacture of cheese, contains about an equal quantity of milk, sugar, and albumen, as well as a considerable quantity of salts and particles of caseine and butter fat that have escaped being made into cheese. Only a very small percentage of all the whey produced in Germany is utilized directly for human nutriment, either as drink or as an addition to food and pastry, nor is much used for making milk-sugar. The greatest part of it is fed to animals—hogs, calves, cows, and even horses—at least among country cheese makers. Where large cheese factories are situated in cities, a considerable quantity runs off in the gutters and sewers!

The value of whey for feeding cattle and hogs is scarcely higher as an average than half a cent per gallon; its value as human food, on the other hand, is at least six times as high. This disproportion between supply and demand has frequently attracted the attention of milk producers and economists generally, without, as yet, however, having met with any satisfactory solution.

The chief difficulty lies in the great dilution of nutriment in the whey, and the consequent tendency to sour or putrefy. The first step toward a better utilization of whey must be taken in the direction of concentration. As in the case of most other kinds of food, concentration will improve its keeping qualities.

It is a fact that the small dairymen of Norway have been wont, from time immemorial, to boil down the greater part of their whey, sweet as well as sour, more or less, to a "mesost" or "prim," sometimes alone, sometimes with the addition of buttermilk, or even of cream. The boiling down in open vessels over an open fire of course demands the most painful attention to prevent burning, which would spoil the taste of the whole lot, and make it uneatable, for us at least. Then, too, the consumption of coal is so great as to make the product unreasonably costly. The use of a water or steam bath would overcome the former of these objections, but not the latter. A solution of the problem must be sought in the use of a vacuum apparatus, which, assuming the operations

* Read before the fifty-fifth meeting of German Naturalists, etc., in Eisenach, in 1882.

to be conducted on a large scale, guarantees at once the cheapest and best preparation.

After many fruitless attempts, an opportunity was afforded me last autumn, at the Cismar condensed milk factory in Eastern Holstein, to evaporate whey in a vacuum. But before the experiment had been made there, the firm of Heckmann, in Berlin, kindly placed at my disposal a suitable vacuum apparatus with an arrangement to prevent foaming over, and all its attachments and service. I first made use of it last January. Part of the whey was evaporated until it just began to crystallize when cold; another part to a stiff dough, which in a few days hardened to a solid cake.

In both cases, but especially in the latter case, a very permanent product was obtained, which could be kept for months in pure dry air without spoiling or moulding. Whey condensed *in vacuo* is better for making milk-sugar than any other preparation.

For daily use in the household it is capable of the greatest variety of uses for food and drink, the most important of which, it seems to me, is in making different kinds of pastry, for which purpose its milk-sugar and milk salts especially fit it, and this is the easiest way to utilize them in nourishing and sustaining large classes of the people. C. Becker made experiments on baking with whey concentrated on a water bath, while Bolle used a portion of the whey extracts obtained by me in Heckmann's factory here. These bakery experiments were so satisfactory that Bolle decided to have a vacuum apparatus set up in his own place, and to offer his whey to the Berlin public in the form of bread or cake.

In the course of the following winter and spring Bolle put up the necessary apparatus, and having secured regularity in working the process, he began the regular manufacture of whey-rye bread, and of two kinds of wheat bread, one a fine article in rolls, made of the best wheat flour, with the addition of milk, butter, eggs, etc., the other plain bread in round loaves for daily use, without the addition of the more expensive ingredients. The public seems to have a taste for this new form of bread, and the example is worthy of imitation in other places.

By careful treatment of the whey, and if the bakery were properly conducted, I have not the slightest doubt that all large cheese factories which are situated in towns, could make a profitable use of their now worthless whey by evaporating and baking it, and at the same time contribute to the sustenance of the people.

Besides this, cooks and housekeepers would soon learn to use extract of whey in the preparation of their daily food, both to improve the flavor and render it more digestible.

The fear that there will soon be too much whey-extract made and offered to the public is met by the idea that the larger cheese factories will, in time, cease to make use of thin or skimmed milk, but to sell it as condensed skimmed milk, as this would be more profitable than condensing the whey.—*Chemiker Zeitung*.

Facts about Stoves.

In the manufacture of stoves the patterns cut a very important figure in the column of expenses. The wood and iron patterns cost about the same; and the total cost of a wood and an iron pattern for a stove of any one size is about \$1,000. Sometimes they cost a good deal less, and sometimes more. One manufacturer in this city, says *The Age of Steel*, published at St. Louis, has a set of patterns for a stove of three sizes which cost him \$6,000. The "life" of a pattern used to be longer than it is now. Twenty-five years ago a certain style or make would last about ten or fifteen years before it became obsolete; now styles change more frequently, and the life of a pattern is, accordingly, much shorter. The desire of customers for stoves of new styles and bright and fancy finish has necessitated a greater expenditure for patterns larger stocks of them, and a more profuse use of nickel plate. The result of all this has been disastrous to large profits. A quarter of a century ago, sixty and seventy per cent profits were as easily realized by the manufacturer as thirty and thirty five per cent are now. Then a comparatively small number of patterns would answer for the largest establishment; now several hundred are required.

Stoves turned out by Western works are heavier by some fifty pounds than Eastern stoves, owing to their having larger flues and thicker plates. Flues are made large in the Western stove on account of the general use of bituminous coal in the West. A small flue would soon choke up, and the stove would be unserviceable. In the East, anthracite coal is largely used, for which reason the flues are made small. The advantage claimed by Western stove manufacturers in making thicker plates is that the percentage of those spoiled in the mould is not so large as when the plates are made thin. Thus, of each day's total melt of iron in a Western stove foundry, about fifty-five or sixty per cent is saved in good plates, the remainder, in the shape of defective plates, sprues, gates, etc., going back to the furnace to be remelted. In the East, fifty-two per cent saved is considered a high average. The result is, Western stove makers save more time and more iron in the furnace and the mould than Eastern manufacturers. Stoves made in the East for the Western trade are called "staddles" from the fact that the flues are made with a view to burning either anthracite or bituminous coal in the stoves.

ELECTRIC lights have been largely introduced in the government establishments at Yokohama, Japan.