AMERICAN INDUSTRIES.—No. 27.

THE MANUFACTURE OF LEATHER.

The industry which forms the subject of this article is of very ancient origin, and it is doubtful if there exists to-day a line of manufacture whose processes have suffered so little change in the course of time as that of leather making. It cannot be said that the leather of to-day is superior to that of a hundred years ago· it is true the processes have been improved, so that less time is required than formerly, but there is no radical change in the materials or methods of leather making. The machinery used in handling hides during the process of tanning, and the methods and machinery for treating the hides after they become leather, have been greatly improved, so that the manufacture of leather is now conducted in accordance with the spirit of the times.

The leather interest is one of the most important of our day, employing a greater number of hands than any other mechanical industry excepting carpentry and other wood working. The yearly product of the combined leather interest exceeds three hundred millions of dollars ($300,000,000). Agriculture and the railroad interests alone surpass the leather interest in values created and involved.

It is not the purpose of this article to trace the history of leather making, nor to give all of the details of its manufacture, but to briefly describe one of the oldest, largest, and most successful leather manufactories in the country. We refer to the establishment of Messrs. T. P. Howell & Co., of Newark, N. J., whose works we illustrate on our title page.

This house dates its existence from the time when Newark, now a city of 130,000 inhabitants, was but a village of 8,000 inhabitants, and New York city was no larger than Newark is at present. The establishment was then small, and engaged principally in the manufacture of patent leather, then a comparatively new article in this country. In 1848 the buildings of S. M. & T. P. Howell having been destroyed by fire, new ones were built on the site of the present works, and in 1855 the style of the firm was changed to T. P. Howell & Co. Since that date new buildings and improved machinery have been added as required, until the establishment ranks as one of the largest and best appointed in this country, and in the production of patent and enameled leather it is the largest in the world.

The buildings of the Newark tannery cover about four acres, and there is a tannery in Middletown, N. Y., owned by the same firm and doing the same kind of business.

In this establishment none but the choicest hides are used, of which they have a regular daily supply, received by special train, and transferred to the hide house shown in one of the upper views in the engraving, where the horns and tails are removed, and they are trimmed and otherwise prepared for future operations. In preparing a hide for tanning, the first operation is that of soaking in water. For this purpose they are placed in large numbers in pools; from the pools they are taken to the beams, where fatty substances are removed; they are then placed in vats containing a lime solution and allowed to remain for a week. The lime dissolves the hair sheath and combines with the fat of the hide to form an insoluble soap. When the hair and the epidermis yields to the touch the skins are taken out and scraped on the beams, with a curved two-handled scraper called the unhairing knife. After the removal of the hair the flesh is removed by means of a knife similar to the unhairing knife.

After these operations, and before subjecting the hide to the tanning process, the lime as well as dirt and animal impurities must be removed. This is accomplished by first submitting the hide to a process called bating, and then working out the bate by means of washing and by the use of a sort of burnishing tool or rubber that is brought to bear upon the hide as it is laid over a beam. The washing is accomplished by beating the hides in a machine resembling a fulling mill, and tumbling them in huge wooden cylinders supplied with a stream of water. When the hides are removed from these cylinders they appear very clean and white; they are now ready for the process of tanning, and are conveyed to the tan vats, where they are immersed in a strong liquor prepared from the bark of oak and hemlock. Here the hides remain, with the exception of short intervals of handling, for a period varying with the purpose for which the leather is intended—from two weeks to two months.

To hasten the process the liquor in some of the vats is constantly agitated by large paddle wheels, seen in one of the middle views, which not only revolve the liquor but the hides also. After the tanning is completed the hide is transferred to the curriers, who shave it on the rough flesh side, reducing it in thickness, removing irregularities, and making the rough side smooth and even. The skin during this process is supported on a beam, the workman preventing the skin from slipping by pressing his body against the portion hanging over the end of the beam. The knife used for this purpose is wide and straight, having at one end a T-shaped handle, and at the other a straight one. It has a peculiar wire edge, kept in order by a burnisher. After shaving, the skins are thrown into fresh liquor, retanned, and then scoured. For this purpose they are placed upon large tables and worked with a tool called a slicker. The department in which this work is carried on is shown in one of the middle views, and the "slicker" is represented in detail in the upper portion of the view.

The leather made in this establishment is split into three parts. The grain side is enameled in various colors, and is used for carriage tops and upholstering. The middle is japanned for carriage and harness use, and the flesh side is used in shoe manufacture and for other purposes.

The portion of the skin which is japanned is stretched on a wooden frame, and after receiving a black groundwork—which is allowed to dry—a coating of japan varnish is applied and baked on. Patent leather is made in different colors for different purposes, and although this particular article is a specialty with this house, we are informed that with the exception of sole leather, there is nothing in the line of leather that is not made here.

It is gratifying to add that the vast product of this immense concern is not only used in the United States and Canada, but is also shipped to all parts of the world. The firm commands a very large trade in England and her Colonies, South America, and all the principal foreign countries. They are as well acquainted with the demands of the foreign markets as with the requirements of their home trade.

Messrs. T. P. Howell & Co.'s New York house is located at 77 Beekman street.

MECHANICAL INVENTIONS.

A machine for hot-pressing cloth, in which the cloth is made to pass between a hollow press box heated by steam and an adjacent pressing cylinder, has been patented by Mr. Ernst Gessner, of Aue, Saxony, Germany. The improvement consists in the combination, with two or more cylinders and corresponding press boxes arranged to give a repeated pressure upon one side, or successive pressures upon opposite sides of the cloth, of a carrier belt, roller, or equivalent device, adapted to receive the cloth from one press box and prolong its travel in its passage to the next press box, whereby a sufficient time is allowed for the goods to become cooled before receiving the second hot-pressing.

An improved steam generator, patented by Mr. Dan Abell, of Carson City, Nev., consists in combining with a steam generator feed water pipes extending through the flues and projecting through an opening at the front and a cap for covering the ends.

Mr. Rosseel Payne, of Ox Bow, N. Y., has patented a plow that will remove the snow from a railroad track and deposit it either to the right or left of the track, as may be desired, by means of a wheel with cutters revolving in the vertical plane and attached to the forward end of a platform car.

Our Increasing Export Trade.

The following table from the annual report of the Chief of the Bureau of Statistics shows the greatly increased values of the exports of our principal domestic productions during the fiscal year 1879, as compared with the exports of the same articles during 1868 and 1878. It should be remembered that the increase in the value of the exports has been attended by a considerable fall in the market price of certain of the articles named in the table:

Commodities.	Value exported, 1868.	Value exported, 1878.	Value exported, 1879.
Agricultural impl'mnts..	$673,381	$2,575,198	$2,933,388
Animals, living.....	733,395	5.844.653	11,487,754
Bread and breadstuffs..	69,024,659	181,777,841	210,355,528
Coal	1,516,220	2,359,467	2,319,398
Copper and brass, and m'n'f's of, not including copper ore.....	196,329	2,909,357	3.031,924
Cotton, m'n'f's of....	4,871,054	11,438,660	10,853,950
Fruits of all kinds... ..	406,512	1,378,106	1.916,382
Iron and steel and m'n'f's of, exclusive of firearms, but including scales and balances, sewing machines, and fire engin's	5,491,306	13,784,307	12,766,294
Leather of all kinds	607.105	7,093,020	6,800,070
Mineral oil (illuminat'g)	19,752,143	41.513,676	35,999,862
Provisions	30,436,642	123,556,323	116,858,650
Sugar, refined.....	313.378	4,508,148	6.164,924
Tallow.....	2,510,227	6,695,377	6,934,940
Total.....	$136,861,751	$405,433,828	$428,422,164

The total value of domestic exports during 1879 was $698,340,790, making a balauce of trade in our favor of over $269,000,000.

The Ebb of the Chinese.

The Chinese in California have begun to go. The steamer that sailed from San Francisco for Hong Kong on the 15th, took 901 of them to their native land. The port statistics of San Francisco show that the arrivals of Chinese during the year ending November 1, were 6,128, and departures 8,746—of whom 6,229 went to China, and 2,517 to Honolulu—the excess of departures over arrivals being 2,618. It is estimated that there are 62,000 Chinese on the Pacific coast, which shows that this population is decreasing instead of increasing, for when the anti-Chinese agitation was begun, a few years ago, the estimate was 100,000. The total number of Chinese arrivals for the twenty years ending December, 1878, was 230,430, and the departures and deaths 133,491. At this rate the Chinese cheap labor will soon be unknown in California.

Trade Marks.

The Committees of Congress have lately reported in favor of an amendment to the Constitution providing for the legalization of trade mark registrations, and it is expected that the necessary bill will be promptly passed by the required majority—two-thirds in each branch. The constitutional amendment will then be submitted to the consideration of the legislatures of the thirty-eight States, and when adopted by three-fourths of the States, the new provision will form a part of the organic law of the republic. Thereafter Congress will have power to make a general law for the registration of trade marks.

A Proposed New Trade Mark Law.

To the Editor of the Scientific American:

I believe it is admitted that the failure of the trade mark law to give protection is a misfortune to the manufacturing interests of the country.

I suggest that Congress has a right to give incidental protection to trade marks under the power to levy and collect taxes.

Let the Bureau of Internal Revenue print and sell, to every manufacturer who desires it, an internal revenue stamp, bearing the trade mark of that manufacturer, the same as is now done to proprietors of patent medicines. The cost of these stamps should be merely nominal, but their forgery should be visited with all the penalties now inflicted for counterfeiting revenue stamps. Fines could be divided between the owner of the trade mark and the United States, or otherwise, as found best.

This imposition of a tax would be uniform throughout the United States, and therefore conforming to the requirements of the Constitution, but the payment would be optional with those who desired its protection. Such protection could be made almost absolute under the revenue laws.

I would like this idea, which I have here crudely outlined, to be criticised by your readers.

W. A. BARTLETT.

Washington, December, 1879.

The Inspection of Steam Vessels.

In his annual report the Supervising Inspector-General of steam vessels makes the encouraging statement that notwithstanding an increase of 400 vessels to the steam merchant marine of the United States since 1875, and notwithstanding the largely increased passenger capacity of the steamers built since then, there has been a steady falling off in the number of fatal casualties. These were, during the past five years, as follows; 607 in 1875, 398 in 1876, 224 in 1877, 212 in 1878, and 177 in 1879.

Attention is called to the necessity of legislation in the matter of taxation for license fees for small steam pleasure vessels or yachts, which, even though they may be no larger than a common sloop's yawlboat, are compelled to pay the same fees for license as commercial vessels of 100 tons burden, which excessive tax has in many cases actually prohibited their use, as many persons desirous of owning such vessels for their own pleasure feel unwilling to pay a fee of $25 yearly for inspection. In this connection Mr. Dumont says:

While I think it would be improper to exempt such vessels from the general requirements of the steamboat laws, however small they may be or however employed on waters open to competitive navigation, both for their own safety and for other vessels governed by said laws, I think that a fee of $5 for the inspection of such vessels, say of twenty tons burden or under, would be ample, and would encourage the building of many more than are now used, thereby benefiting one of the great industrial interests of the country.

Osage Orange Timber for Railroad Ties.

A correspondent sends a transverse section of Osage orange wood cut from a stick which, to his certain knowledge, had been lying for twelve years partly covered with earth in an old meadow. The heart wood is in perfect preservation. This timber, he says, is a rapid grower, and seems to be nearly imperishable in the ground; and he suggests that it would pay railroad companies to cultivate it for ties. Osage timber large enough for narrow gauge roads would grow, he thinks, in from twelve to fifteen years from planting. Whether it would hold spikes well does not appear

Uranium in California.

A dispatch from Fairplay reports the discovery of uranium in the Sacramento mining district. This mineral is found in Bohemia, but never before has been discovered in this country as far as known. The present discovery was made by H. L. Rice. The ore runs 60 per cent. Uranium is worth $1,000 per ton. One of its principal uses is as a coloring substance in the manufacture of glass.

Chemical Nomenclature.

The reports of the *Berliner Chemische Gesellschaft* of October 13, 1879, contains a note on the production of tetramethyldiamidodiphenylmethan and naphthyldimethylamidophenylsulphon. If the latter is heated with nitric acid pentanitrodimethylanilin and nitronaphthalinsulphite are produced.

Ifthissortofthingiskeptup chemistry willsoonberesolvedintooneword.

Extending its Use.

The flexible shaft, which so much resembles a snake, and which is used for operating drills and other instruments used in dental offices for operations on the teeth, has proved to be capable of doing heavy work, such as the boring of wood and iron. It is used also in the brushing of horses and cattle, cleaning and polishing plate glass, finishing morocco leather, and in boot cleaning. As described by a machinist, it "leads mechanical power into the more intricate ways and remote corners heretofore only approachable by the human arm, and it is apparent that manifold applications of the flexible shaft will be made in the future that are not now thought of."

The Solano—The Largest Ferryboat in the World.

The projection of this great ferryboat for the transportation of passengers and freight across the Straits of Carquinez, from Port Costa to Benicia, California, was noticed in this paper some months ago. Now that it is completed and afloat California may boast of the biggest ferryboat in the world. The dimensions of the Solano are:

Length over all, 424 feet; length on bottom—she has no keel—406 feet; height of sides in center, 18 feet 5 inches; height of sides at each end, from bottom of boat, 15 feet 10 inches; moulded beam, 64 feet; extreme width over guards, 116 feet; width of guards at center of boat, 25 feet 6 inches; reverse shear of deck, 2½ feet. She has two vertical beam engines of 60 inch bore and 11 inch stroke, built at Wilmington, Del. The engines have a nominal horse power of 1,500 horses each, but are capable of being worked up to 2,000 horse power each. Upon the deck of the Solano are four tracks extending her entire length, with a capacity for carrying forty-eight loaded freight cars, or twenty-four passenger-coaches of the largest class. The rudders are worked by hydraulic steering gear, operated by an independent steam pump. These rudders are connected with the ordinary steering gear, so that in case of any disarrangement of the hydraulic apparatus the vessel may be guided by it. The advantage of this improvement is that the immense craft can be handled with ease by one man, whereas, if the ordinary wheel and system of steering were used, six men would be required at the wheel.

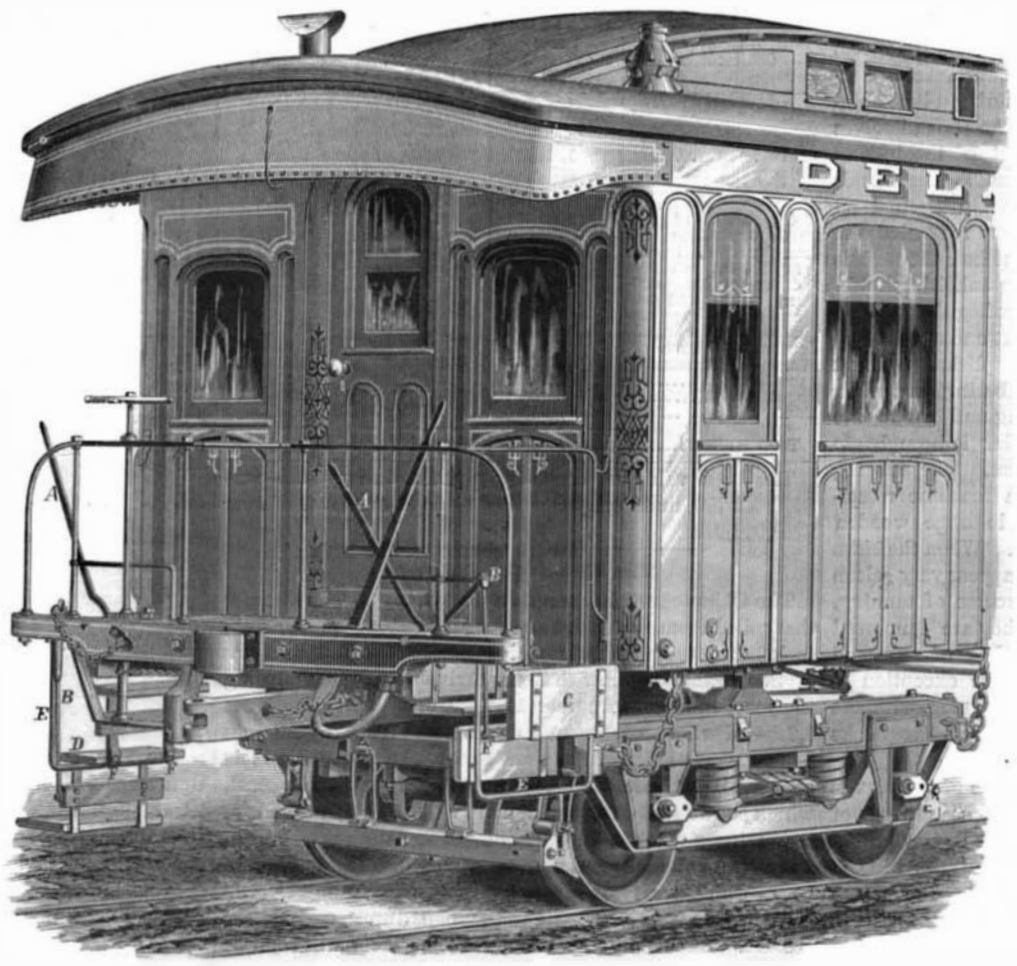
Lake Erie Vineyards.

The islands at the western end of Lake Erie and the neighboring shores of Sandusky Bay are largely devoted to the production of grapes and wine. The Sandusky *Register's* annual report, just published, for 1879, shows that there are in this district 4,000 acres planted with vines, the yield for the year being in round numbers 16,000,000 pounds of grapes. The wine houses report a production of 1,526,400 gallons. Of this by far the greater part is Catawba, which holds its own as the favorite American wine in spite of the efforts to popularize native red wines made from the Concord grape, the Ives seedling, and other varieties.

The *Register* estimates that not more than one million gallons of pure juice has gone with the million and a half gallons of wine. Some of the dealers, it says, make no secret of the fact that they use spirits, sugar, and water largely, and claim that this doctored stuff is more acceptable to their customers than pure wine.

NEW CAR STEP.

The annexed engraving shows an improved folding step applied to passenger cars to facilitate the ascent and descent of passengers from the platform,



IMPROVED CAR STEP.

and to avoid climbing and jumping in getting on and off the cars. The folding step is connected with the lower car step, and when in position for use it is supported, when let down, by a yoke that passes under the fixed step.

The folding step comes within a foot of the ground, and permits of making the risers of all of the steps shorter, and the steps are of course much easier than the ordinary ones. When the train is ready to start the steps are turned up out of the way by means of a lever, which also holds them. In this position the steps cannot be injured or broken off by obstructions on the road or by snow or ice in the winter. Another important feature is that the step when folded up forms an effectual barrier against jumping on or off the train while it is in motion, and prevents a class of accidents that have been alarmingly frequent. Another advantage is that the step may be let down at one end of the car only, thus compelling passengers to enter at that end, and admitting of a more thorough scrutiny of the passengers and a complete inspection of the tickets.

This invention has been thoroughly tested, and the steps are now in use by the Delaware and Hudson Canal Company.

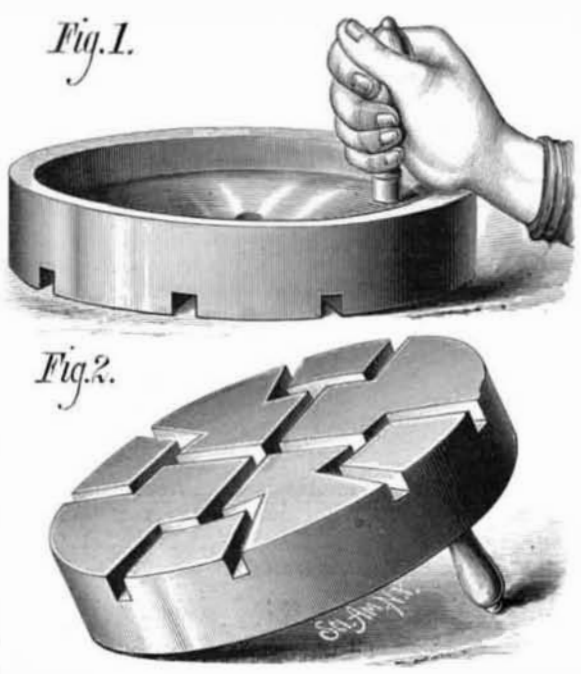
Further information may be obtained by addressing M. E. Skerritt, No. 4 High street Albany, N. Y.

Ballasting for Railways.

With reference to "Roadmaster's Difficulties," a correspondent writes that there is no material for ballasting so good as the screenings of coal from mines or yards, either alone or mixed with some hard stone.

NEW STONE-DRESSING TOOL.

The dressing-tool shown in the accompanying engraving was recently patented by Mr. Louis C. Gilmore, of Shearman, Texas. Fig. 1 represents the upper side, and Fig. 2 the under side of the tool, showing the radial and angled grooves. The tool consists of a circular plate having in its upper surface a cavity or basin communicating with the grooves in its under surface by a central aperture. A handle is fixed to the upper surface of the tool at one side of the center. When the tool is in use the cavity in its upper surface is filled with sand or emery and water, and it is moved



GILMORE'S STONE-DRESSING TOOL.

by the handle in an elliptical path, giving it a gyratory motion. This double motion of the tool greatly facilitates the operations of sand rubbing and polishing, and the grooves are of suitable form to distribute the abrasive material to the best advantage, and to retain it until it is used.

This tool is inexpensive, and may be used for the successive operations of sand rubbing, gritting or honing, and polishing.

Where the Cold Waves Come From.

Meteorological observations have now become so extended that evidence is rapidly accumulating to enable us to determine positively the source of the cold aerial waves which sweep across our country during the winter season. The indications are that we owe them to the great area of high barometer in Northeastern Siberia, where the pressure sometimes exceeds 31·50 inches, and the temperature falls as low as 76° below zero. The pole of greatest cold is in the neighborhood of Yokutsk, on the Lena, where the average thermometric reading in January is 41° below zero, and where the severest cold exceeds by ten degrees that experienced by explorers in high arctic regions. This is also the region of the highest barometric pressure known in winter; and from it, doubtless, proceed the waves of intense cold which play so large a part in our winter experiences.

The International Dairy Fair.

The second international dairy fair was opened in the American Institute building, December 8, with a fine display of dairy products, cattle, and machinery. The exhibits included butter, cheese, dairy cattle, implements and machinery for butter and cheese making, and agricultural designs and models for creameries, cheese factories, dairy buildings and farms.

In his opening address Mr. Francis B. Thurber gave the following facts and statistics collected by him during a recent visit to Europe:

The number of milch cows in Germany, as given by the latest statistics, is	8,961,221
In France	4,513,765
Great Britain and Ireland	3,708,766
Denmark	800,000
Sweden	1,356,576
Norway	741,574
Switzerland	592,463
While in the United States the latest statistics and estimates make the number of milch cows about	13,000,000

The quantity of butter and cheese per cow produced in the different countries varies so largely that no trustworthy average can be made, and the statistics, which embody only the quantities exported and imported, give but little idea of the total production. Some idea of the magnitude of the interest, however, may be formed from the fact that in this country alone, during the year 1878, three hundred and forty million pounds of cheese were produced, and nine hundred and sixty million pounds of butter. Of this but 3·9 per cent of the butter was exported, while of the cheese 41·6 was exported. Denmark, with but sixty million pounds total production of butter, exports thirty millions, or 50 per cent.

These export figures illustrate an important fact—namely that American dairymen have appreciated and catered to the tastes of cheese consumers in the great market of the world, Great Britain, while they have neglected to study the wants of the same consumers of butter. There is undoubtedly a difficulty in transporting butter long distances and delivering in perfect condition, but this is a difficulty which can be overcome, at least in a great degree. The great difficulty has been that so small a proportion of the immense production of butter in the United States has been of good quality, that really fine butter has commanded higher prices at home than abroad, and there is quite a sufficient quantity of poor butter to be found in most of the foreign markets.

Butter makers in other dairy countries have, however, made great progress in improving their product, and the average quality is much better than it was five, or even three years since. Improved dairy appliances and machinery, much of it of American origin, have been extensively introduced both on the Continent and in Great Britain; more attention has been paid to using the best salt; governmental dairy schools have been established in the continental dairy countries, even Russia having the enterprise to take this step, and scientifically educated dairymen are furnished by these schools to the principal dairy districts of their respective countries. Margarine butter, or oleomargarine as it is called here, has also assisted in bringing about this result, as it competed successfully with the poorer grades of ordinary butter, and obliged European butter makers to make an effort to produce a superior article.

In Great Britain, the amount of intelligent effort which is being directed toward the improvement of dairy products, especially butter, is surprising, and if American butter-makers would enlarge their foreign market, they must in the same manner strive to increase the supply of good butter which is produced, and thereby lower prices to a point which will enable us to compete in the principal butter markets in the world. That we have the ability to do this no one can doubt who knows the progressive spirit of the American people. Touching the scope for profitably enlarging the variety of cheese made in this country, Mr. Thurber remarked that a prominent English dairy authority has said that "cheese is made in the dairy," meaning thereby that almost any variety of cheese can be manufactured in countries other than those in which it originated. This has been proved by the successful manufacture in the United States and in France of the Gruyère, which, as we all know,