straight stem, thus elevating the fruit from the ground into the cool moist touches of the fogs, at times; while letting the vines run caused them to spread out flat on the ground, and the grapes lying immediately upon the warm earth, and in contact with it, are thus sheltered from the adverse influences operating higher above, and were thus fully developed and ripened.

Citric Acid Again.

It never rains but it pours, seems specially true of inventions and discoveries. Several inventors will produce the same instrument simultaneously, each ignorant of what the other has done. Three or four chemists discovered chloroform independently of each other nearly half a century ago. This seems to be the year for citric acid. In a recent number we described the synthesis of citric acid by Grimaux and Adam, from dichlorhydrine. On the 15th of August Kekulé presented a paper to the Berlin Chemical Society, in which he described a totally different synthesis of the same acid. He set out from malic acid, the acid of unripe apples, but one that has been made artificially too. In 1834, Wislicenus had converted it into acetyl-malic acid by treating diethyl-malate with acetyl chloride. The following formulæ will explain this:

Malic acid.	Diethyl-malate.	Acetyl-malic ether.
$COOH$	$COO(C_2H_5)$	$COO(C_2H_5)$
CH_2	CH_2	CH_2
$CHOH$	$CHOH$	$CHO(C_2H_3O)$
$COOH$	$COO(C_2H_5)$	$COO(C_2H_5)$

The last named ether was dissolved in ordinary ether, and, treated with metallic sodium and monobromo-acetic acid, was allowed to act upon the product. Of course the bromide in the latter combined with the sodium in the former to form bromide of sodium, which separated because it was not soluble in ether. The other product was boiled with alcoholic potash, an operation known as saponification. This formed a potash salt insoluble in ether. From this he made the lead salt, and then set the acid free by passing sulphydric acid into its solution. At the time of his making this communication he had not purified the acid, but its reactions with lime salts were such as to satisfy him that it was in reality citric acid which he had obtained.

Andreoni, an Italian, has also given notice that he is trying to make citric acid from the triethylic ether of malic acid by means of sodium and bromo-acetic ether; a method quite similar to that of Kekulé.

It is somewhat interesting to know that Germany, Italy, and France have each solved this problem together, yet independently. England and America must look to their laurels.

Farming in Japan.

Milton S. Vail, a missionary in Japan, gives, in the *Methodist*, the following account of Japanese farming:

"The farmers in Japan seem to operate on a small scale. All the land belongs to government, and all have to pay a ground rent. Wheat, barley, rye, and buckwheat are grown in rows, the weeds being kept out by hoeing. It seems strange to see all their grain growing in rows, but no doubt good crops are thus produced. Rice is the chief product of Japan. The earth nearly everywhere is black, and the black soil of the valleys, when well cultivated and made to hold the water from the neighboring hills, makes good rice fields. The soil is broken by manual labor. Men go in to the mud up to their knees, and with a long-bladed hoe turn the earth over. Horses are used to harrow it down, and when ready, the rice plants are set out by hand. The rice of Japan is very fine, and the Japanese know how to cook it. With them it is the principal article of food—a little rice, with pickles and tea, often constitutes the meal. The people do not know how to make bread, but seem to be very fond of it when they can get it of foreigners. They have flour which they use in various ways in the simplest kind of cookery. I noticed in coming to this place (Hakone, a mountain town forty-five miles from Yokohama) that at some of the inns, instead of tea, they gave us a drink made of pounded wheat. Potatoes, sweet potatoes, egg plants, corn, melons, cabbages, onions, and turnips are also grown, and other vegetables, the names of which I do not know, and never saw in America. I think all the vegetables grown in New York can be cultivated here. Of fruits, we have peaches, plums, oranges, strawberries, pears, and persimmons, also figs."

The Inventor of the Bell Rope on Trains.

Captain Ayres, whose death at a great age was noted recently, was the inventor of the present bell rope system on railroads. When he commenced running on the New York and Erie Railroad the locomotive had no cab for the engineer—nothing but a framework. There was no way to go over the cars nor for the engineer to communicate with the conductor when the train was in motion. In those days, instead of the conductor running the train, as at present, the engineer had entire charge, and the conductor was a mere collector of fares and tickets. In 1842 Ayres inaugurated a system of signals by a cord running over the cars to the engine, where it was attached to a stick of wood. Ayres' engineer, a Dutchman named Hamill, resented the innovation, cut the stick loose, and the conductor and engineer had a fight at Turner's over the matter, Ayres whipping his engineer badly, and thereafter conductors, and not engineers, have had charge of trains. Soon after the bell rope and gong went into general use.—*Paterson (N. J.) Press.*

THE FAN AS AN OBJECT OF HYGIENE.

Says a French exchange—the *Journal d'Hygiène*—the fan, which is used by women of all countries as an ornamental as well as useful article, has also its utility from a hygienic point of view. This can best be shown by giving a brief *résumé* of the history of fans from remote ages up to the present time. We shall find that, dating from most ancient times, the most diverse nations and races have used them; and that the caprices of fashion, while varying their forms and materials, have never succeeded at any period in throwing them out of universal use.

The papyrus, whose large leaves so long served as a writing material, was one of the first plants from which fans were made. It was in Egypt especially that its leaves were used for this purpose. It is said that the daughter of Pharaoh, who saved Moses from the waters of the Nile, held in her hand, during her walk along the banks of the river, a fan made of this very sedge. We find that in ancient Greece the first fans used were made of branches of myrtle, acacia, and plane tree. On the bass-reliefs and ancient monuments of this country we frequently see processions of bacchants bearing thyrses surrounded with ivy and vine leaves, and which, in addition to their ceremonial character, were designed to fan and shade from the sun the heated votaries of the god Bacchus. It was not till the fifth century before Christ that the peacock was known in Greece. From this epoch dates the use among Grecian ladies of the peacock's tail as a new and elegant kind of fan imported from the shores of Asia Minor, and especially from Phrygia. Euripides, in one of his tragedies, recounts how a Phrygian eunich cooled, according to the custom of his country, the tresses and cheeks of Helen, with a peacock's tail with all its feathers outspread. Dating from that epoch, whenever mention is made of the attire of women, in Greek or Roman authors, fans or peacocks' tails are spoken of. As the art of the fan makers arose the use of feathers alone came to be discarded, as they were found to be too pliable; and hence the artist conceived the happy idea of placing between each feather a thin strip of wood, which not only gave the fans a greater amount of resistance, but also made them more durable.

We frequently find in ancient pictures and on antique vases representations of this very sort of fans; and they are also mentioned in the writings of Ovid and Propertius. The female slaves who were specially employed to carry parasols and fans to shade and drive away the flies from ladies of antiquity when they appeared in public are called by Plautus *flabelliferæ*. In this respect our own modern ladies are much more modest, since they carry their own parasols and suspend their fans by a chain at their side. Fans made of peacock's feathers remained in fashion through the middle ages and up to the seventeenth century, not only in Italy, but also in England and France; but they were rather bouquets of feathers than the fans of our day, although they subserved the same end. In those times, then, peacock's feathers must have been an important article of commerce. In fact, Alexandria and other maritime ports of the Levant shipped to Venice, as well as to other commercial cities of Italy, large quantities of peacock and ostrich feathers, which were prepared in the most ingenious manner and in all possible styles. Soon, however, ostrich feathers came more in favor in fan manufacture, to the exclusion of those of the peacock. Fans of this kind, in all styles, such as were used by Italian ladies of the twelfth, thirteenth, and fourteenth centuries, are to be seen in the pictures of Titian and his brother. Toward the fourteenth or fifteenth century ladies began to wear girdles in the form of golden chains, from which were suspended their keys and other objects. From this arose the fashion still in vogue at the present day, of suspending fans from the belt by means of a small chain. This explains the object of the large ring at the end of the fan handle, which has been handed down from the past. There is a fan in the Museum of the Louvre which once belonged to Catharine de Medicis, that has one of these large rings in the handle.

The inhabitants of Africa and the savages of the shores of the Atlantic make their fans from the leaves of palm trees. In the Dutch possessions of Oceanica, the Malay women make use of the leaves of cocoa palm, pisong, and reeds, instead of fans. In the Indies fans are, as in many other Oriental lands, suspended over the bed, and moved to and fro by means of a cord, by slaves, during the repose of the master or mistress. It is from the East that come those fans made of odoriferous woods, which are calculated to render the air of an apartment oppressive and give one the headache, rather than to make the atmosphere refreshing.

Nowhere has the art of the fan maker been brought to such perfection as at Paris, where the most elegant paintings on tissues of the utmost delicacy give these objects an enormous value, such value being often further enhanced by golden ornaments and settings of precious stones. The present style of folding fan, which is such an improvement over the ancient stiff outspread fan, arose in France.

From what has been said, it will appear that if the fan—even such as it was before modern improvements were made on it—had not been a true article of hygiene it could not have resisted the everchanging caprices of fashion for so many centuries.

ENGINEERING INVENTIONS.

Mr. Burpee R. Starratt, of Truro, Nova Scotia, has patented an improved railroad frog. The absence of the ordinary heavy plates, which compose part of the frogs in common use, gives this frog great advantage, both in weight and cost, and makes it more elastic.

An improvement in high and low water indicators for boilers has been patented by Mr. Florent Ladry, of Brussels, Belgium. The invention consists in a float having only one small pipe extending close to the bottom of float and boiler, to allow the air and steam to circulate freely between the float and boiler, in order to maintain the same pressure on the inside and outside of the float.

Mr. Henry A. Ridley, of Jacksonport, Ark., has patented a spark arrester, which consists of a cone of wire gauze projecting into the smokestack and supported so as to leave an annular space between it and the stack for the escape of cinders, which are received by a cylindrical jacket surrounding the upper end of the stack.

An improvement in paddle-wheels has been patented by Mr. Theodore G. Stritter, of Batesville, Ark. The object of this invention is to lessen the time, labor, and cost in constructing and repairing paddle-wheels, while producing stronger and better wheels. The invention consists in securing the circle braces to the arms of a paddle-wheel by placing metal sockets upon the ends of the braces and attaching the sockets to the arms of the wheel.

Dr. Edward Seguin.

Probably no man ever did so much to put the work of elementary education upon a reasonable and thoroughly scientific basis as Dr. Edward Seguin, who died in this city October 27, in the sixty-ninth year of his age. This, however, without directly attacking the traditional methods of teaching.

Dr. Seguin was educated at the colleges of Auxerre and St. Louis, Paris, and early turned his attention to the education of idiots by physiological training. He established in 1838 the first school for this sort of work, achieving by his marvelous skill and patience results which won him a place in the front rank of the world's benefactors. His school became a model after which seventy-five similar institutions have organized in various countries. The French Revolution of 1848 obliged Dr. Seguin to take refuge in this country, where he spent the next ten years practicing medicine in Ohio. Subsequently he revisited France and then returned to this city. Among his more important works are "Hygiène et Education des Idiots" (1843); "Images Graduées à l'Usage des Enfants Arrières et Idiots;" "Traitement Moral Hygiène et Education des Idiots et des autres Enfants Arrières" (1846); "J. R. Pereire, Primier Instituteur des Sourds et Muets en France" (1847); "Historical Notice of the Origin and Progress of the Treatment of Idiots," translated by Dr. J. S. Newberry (1852); "Idiocy and its Treatment by the Physiological Method" (1866); "New Facts and Remarks Concerning Idiocy" (1870); "Medical Thermometry" (1871); "Prescription and Clinic Records" (1865–77); "Mathematical Tables of Vital Signs" (1865–77); "Thermomètres Physiologiques, Manual of Thermometry for Mothers, Nurses, Teachers, etc." (1873); "Official Report on Education at the Vienna Exhibition of 1873," published in 1875. Among his later essays, "The Physiological Training of the Idiot Hand" is perhaps the most valuable.

Captain R. F. Loper.

Captain R. F. Loper, for many years a prominent inventor and shipbuilder, died recently in Brooklyn. After a long and successful career as a seafarer, Captain Loper settled in Philadelphia and turned his attention to shipbuilding. Between 1847 and 1866 he constructed about four hundred vessels, among the largest being the steamship Lewis, for the Boston and Liverpool Steamship Company; the Star of the South, ten steamships for the Parker Vein Company, and the California, for the Newfoundland Telegraph Company. He also designed and constructed some fast yachts. Captain Loper was the owner of several patent rights, including the Loper propeller engine, propeller boiler, and a patent for constructing a slip so as to prevent decay of her timbers for a long period of time. During the Mexican War Captain Loper built in thirty days 150 surf boats, in which the American troops were landed at Vera Cruz. The naval officials estimated that it would take ninety days to build these boats, but on Captain Loper being consulted he agreed to furnish them in thirty days. Had the time for constructing them been as long as ninety days General Scott would, in all probability, have been obliged to postpone his expedition against Vera Cruz until the following year. During the late war Captain Loper's services as Assistant Agent of the War Department were of signal value, and were characterized by the well-directed energy and practical success which marked his whole career.

Col. E. L. Drake.

Col. E. L. Drake, the first to sink a well in Pennsylvania for oil, and the pioneer in the petroleum business in that State, died at his home in New Bethlehem, Pa., November 7. The first well was bored in July and August, 1859. Having lost the fortune made by his earlier ventures, Col. Drake was granted in 1864 an annual pension of $1,500 by the State he had done so much to enrich. A statue to his memory is about to be erected in Titusville.