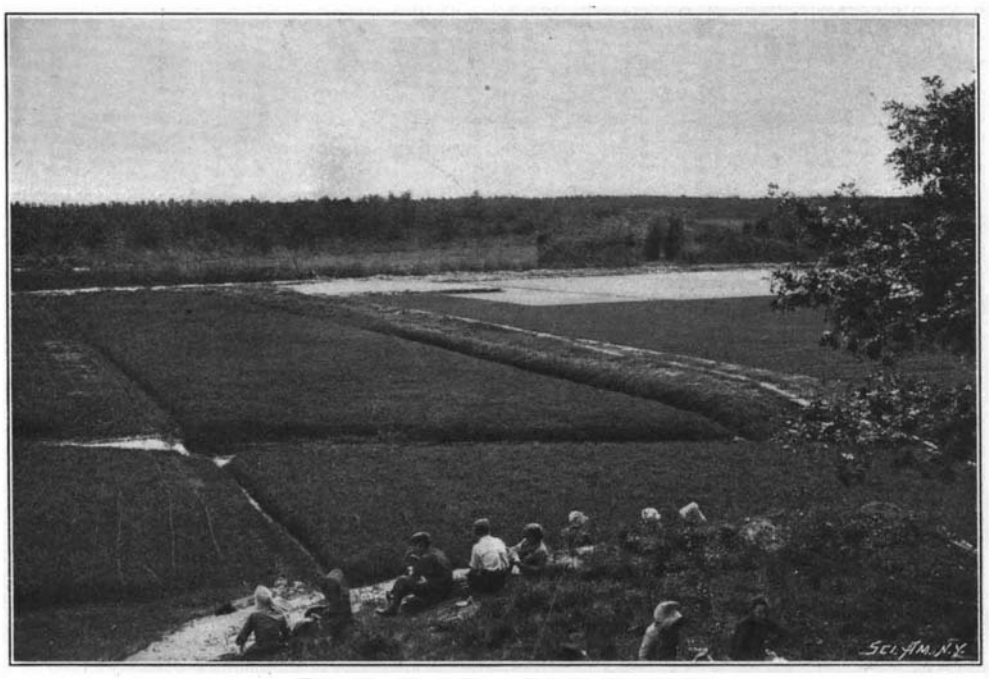
THE CRANBERRY INDUSTRY.

The cranberry growers of the United States have to their credit this year a crop of 1,000,000 bushels. Of the varied industries that have shown unusual results, there are none with a more notable record, for the crop of 1900 was 569,000 bushels. These facts mean that the owners of the cranberry bogs will have

FIRST YEAR'S GROWTH OF THE BUSHES ON A CRANBERRY BOG.

received, when the crop is fully marketed, nearly $1,700,000.

Cranberry raising is an industry which, despite the popularity of the fruit, has commanded small attention from others than those directly interested. Capital is an absolute necessity to engage in it successfully, as a productive bog costs from $300 to $500 an acre to bring to a state of profitable bearing.



GENERAL VIEW OF A CRANBERRY BOG.

HOW THE LABOR OF GATHERING THE BERRIES IS APPORTIONED.

Originally a wild growth, the berry only reaches a state of perfection when cultivated. It is found in its natural state in the northern portions of the United States adjacent to the Canadian border, in the salt marshes of several coast States, in the glades of the Alleghenies, and as far south as Virginia and North Carolina. The wild berry is smaller than its cultivated cousin, and, in apposition to the strawberry, is less delicate in flavor. Moreover, the yield is much less in proportion, and the vines cease bearing after awhile, something that is never true of the vines of a cultivated bog.

The preparation of a cranberry bog is a task requiring much patience and care. Sometimes a marsh is selected, but the bottoms of abandoned mill ponds are most desirable sites. The vines grow best in silicious soil free from any mixture of clay. The presence of silex or silicon is necessary to productiveness and the finest fruit. For this reason great care is exercised not to attempt cultivation in drift formation, as in only alluvial formation can success be achieved. When it is considered that the cultivation of wild cranberries was not attempted until early in the last century, and, furthermore, that it became an embryo industry less than fifty years ago, the results attained are notable.

Once the site of the bog is selected, the soil is prepared for the reception of the cuttings or uprights. The best soil is found to be clean, sharp sand, overlaid by peat. The ground is then marked out in rows fourteen inches apart. The uprights are pressed into the ground with a spade-like tool, placed on the vine about one-quarter the distance from the root to the top, in close proximity to the soil below the sand. Sometimes the vines are chopped into pieces about an inch long. These pieces are sowed like oats on an evenly prepared surface, and then harrowed in. The hardiness of the cranberry vine or bush is shown by the radical success of this primitive mode of planting, for the uprights take root almost immediately. Soon after planting, the uprights send out "runners," which in turn take root. In three years' time the vine comes into bearing, and in five years the bog, if it has received proper attention, gives a liberal yield of fruit.

Cranberry bogs require a plentiful supply of water, and to provide this the grower follows a system of irrigation. Ditches are excavated through the bogs, and from these, 100 to 300 feet apart, laterals or cross ditches are constructed, in which the water runs from six to twelve inches deep. The flow of water is regulated by a gate, and the different sections of the bog are separated by dikes. The dikes are essential features of the bog, because by their aid the flooding process is accomplished. Frost is the cranberry's enemy, and, singularly, water is the only protection for the berries. Thus, when the grower believes a frosty

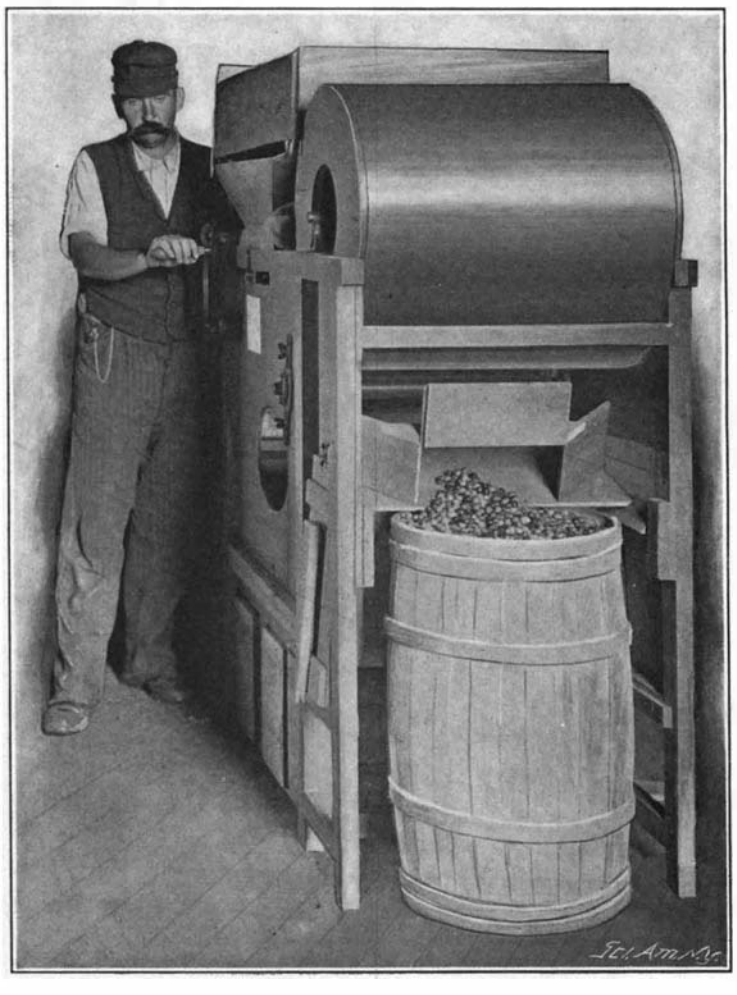
PICKING CRANBERRIES.

night at hand, he floods those sections of the bog where the fruit remains ungathered, letting the water in until its level is 18 to 24 inches over the tops of the vines. With the coming of the sun the water is drained off, and in a short time the ground is dry enough for the pickers to work. After the crop is gathered, in fact from the last of October to the first of March, the bog remains in a flooded state.

The cranberry bog blossoms in June, and it is its appearance at this stage of growth that gives the berry its name. Just before expanding into perfect flower the stem, calyx, and petals resemble the neck, head, and bill of a crane. Hence the name "cranberry," which usage has shortened to "cranberry."

In September the cranberry harvest begins, although October may more properly be called the harvest month. When the section of the bog where the picking is to start is selected, it is divided into rows, the boundary lines being marked by stout twine, running the entire length of the section. These rows vary in width from two to three feet. A row is assigned to a picker, who must strip the vines therein thoroughly before he is allowed to change to another row.

The method of removing the berries from the vines is simple and expeditious. The picker places his fingers, slightly spread apart, beneath the vine, or bush, close to the ground. A quick upward movement, and his hands have stripped the vine of its fruit. The



WINNOWING CRANBERRIES PREPARATORY TO PACKING FOR MARKET.

berries are dropped into a pan by the picker's side. When the pan becomes full it is emptied into a pail holding one-third of a bushel, the contents of these pails, in turn, being placed in crates. The crates are taken to the storehouse, where the berries are put through a winnowing machine, which removes the dirt and leaves gathered during the harvesting. Following this they are crated or barreled, and made ready to ship to market.

The pickers average from seven to twenty pails a day, the number being regulated by individual skill. The average price paid is twelve cents a pail. A picker may be of almost any age, and it is no unusual sight to see whole families at work in the bogs during the comparatively short season of picking Unlike the hop and grape gatherers, the pickers are generally farmer folk of the neighborhood, who take this method of adding to the year's income.

Coincident with the opening of the picking season, early in September, the new crop of berries begins to appear in the market. Few people, dealers say, are able to distinguish the old from the new. The newcomers are worth about five dollars a barrel to the producer, but by the time they have reached the consumer the price is likely to be ten cents a quart, although, if the supply is very plenty, the price is occasionally not more than five cents a quart.

These pioneer berries come from the greatest of cranberry-producing sections, Cape Cod. It is here that cranberry cultivation was inaugurated at the beginning of the last century.

A FLOODED CRANBERRY MARSH.

Cape Cod furnishes a large proportion of the best berries, and about two-thirds the total crop of New England. Next in volume of productiveness comes New Jersey, whose product this year is placed at 300,000 bushels. Part of the Jersey crop is made up of wild cranberries. These are sometimes picked before they have begun to color, then spread on the ground, and exposed to the sun for six weeks; it is claimed that in this way a deeper color is secured.

Following New Jersey come New York State berries, most of which are grown on Long Island. These, on the whole, are particularly good berries, large in size, and for that reason attractive. The cranberry is the one fruit whose quality is held second to its appearance.

There are cranberry bogs in Wisconsin, Michigan, Minnesota, and northern Ohio, and the times of harvesting and marketing are about the same as in the East. The western berry seldom finds its way east, for the home demand is as great as the supply. For this reason the eastern berry often finds its way well toward, and sometimes beyond the Mississippi. Generally it is of better quality, for the proportion of western berries gathered from wild vines is large.

Every year small consignments of cranberries are shipped to Europe, and statistics show a slight but steady increase of exportations. It is only natural that this increase should occur, because the American cranberry is ineffably superior to the European. England receives most of its cranberries from Norway and Sweden, but they are not nearly so good as the American product. Perhaps poor quality has caused the cranberry to lack in popularity abroad. Certain it is that nowhere is this berry as popular as in the United States, where a larger quantity is consumed than elsewhere.

THREE-PHASE 10,000-VOLT RAILWAY AT GROSS-LICHTERFELDE.

BY FRANK C. PERKINS.

The electric locomotive used on the experimental Gross-Lichterfelde high-potential electric railway was designed and constructed by Siemens & Halske, of Berlin. The three-phase current locomotive is seen in the accompanying illustration. The door at the side bears the warning, "Danger. High-Tension Current, 10,000 volts." The locomotive is constructed of steel and mounted on heavy trucks. The brakes are operated by hand as well as compressed air. The air-pressure is secured by an electrically-operated compressor.

The main driving motors of this locomotive are of the asynchronous three-phase type and operate at a potential of 750 volts. The capacity of the motors is from 60 to 240 horse power at normal and maximum load. The speed of the locomotive is 60 kilometers per hour, the ratio of gearing being 1:3.15. If the line were long enough and the track of the right construction, it is stated that the locomotive could easily attain a speed of 125 kilometers per hour. The voltage required at this speed would be 2,000 volts at the terminals of the motors. The controller in the cab regulates the speed by arranging the motor winding in "mesh connection" for maximum pull; and for normal running at high speed, the voltage when connected in "mesh" would be 1,150 volts.

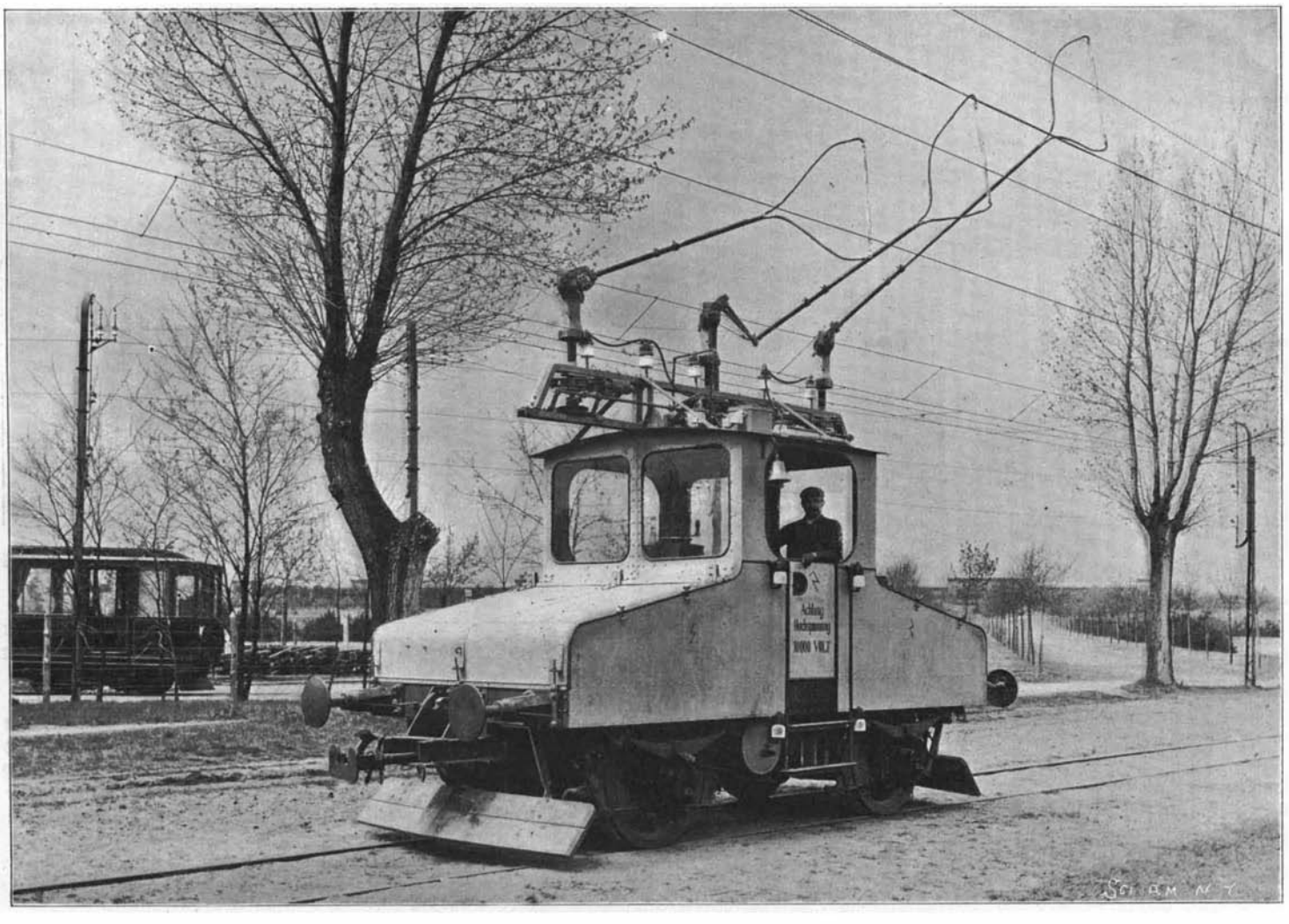
The locomotive has a total length of frame of 4 meters and a width of frame of 2.2 meters, the gage of track being 1.435 meters. The total weight of the outfit is 32,000 pounds. The distance between the axles is 2.8 meters, the diameter of the wheels is just one meter.

The line at Gross-Lichterfelde was built by the firm of Siemens & Halske for the purpose of studying the best means of applying three-phase current of high potential to traction purposes, and the results have been extremely interesting. Many difficult problems arose which have each in its turn been solved. The speeds attained are unfortunately limited by the shortness of the line.

Magnetic blowouts are used for the contacts of the controllers, and the resistance switches are operated in the transformer chamber from the controller by means of chains and chain wheels. The rheostats are mounted underneath the locomotive floor, and as the potential which enters the locomotive from the trolley wires is of 10,000 volts, all of the metal work of the locomotive is very carefully grounded to avoid danger to life.

In order to operate the locomotive motors at the low potential of 750 volts, two step-down transformers are installed on the locomotive, as in the case of the Berlin-Zossen road, which was described in the SCIENTIFIC AMERICAN. Many of the devices adopted for the Berlin-Zossen high-speed road were the result of experience gained in this Gross-Lichterfelde experiment. The switch for breaking the 10,000-volt circuit is of the Siemens & Halske high-tension special tube form, a distance of one foot separating the breaking points when the switch is open. These high-tension switches are arranged on the roof of the locomotive, and all of the connections are carefully insulated with porcelain. The three vertical supports on the top of the car each have mounted upon them a bow-shaped aluminium trolley pole or current collector, heavy springs being provided to press the same against the trolley conductors, three of which are suspended one above the other something over a yard apart. The poles with the aluminium bows, which are constructed of this metal for reducing weight as far as possible, are controlled from the cab by the motorman and may be released from the overhead conductors at will. There are three lightning arresters mounted on the top of the locomotive, of the Siemens & Halske horn-shaped type.

The overhead trolley line consists of three conductors mounted on or suspended with insulators and chain from bow-shaped brackets similar to those used on the Berlin-Zossen high-potential line. It will be noted from the accompanying illustration that loops are also used at the supporting insulators, which are intended to ground any of the conductors breaking and falling to the ground. The trolley wires are flexibly suspended, the lowest of the three wires being about 20 feet above the track, and a wire netting is plainly seen in view for guarding against dropping of broken conductors. The overhead line is supplied by a three-phase current at 10,000 volts and a frequency of 50 cycles per second, from a substation equipped with static step-up transformers and motor generators. This road is of particular interest as being one of the pioneer roads using polyphase alternating currents and introducing high potential directly into the moving vehicles.



A SIEMENS-HALSKE THREE-PHASE HIGH-POTENTIAL ELECTRIC LOCOMOTIVE.

The closing of several London theaters on account of the recent fog is not an unprecedented event of British theatrical history, though this last occurrence had an unusual element, due to the fact that the players engaged at these theaters were unable to reach them.