London. However, it is not likely that the ware made at this pottery was white, general opinion being that it was yellow and cream colored, as at that time no other ware was known except the porcelain which came from China, and was known as "China ware." Ordinary household pottery and ornamental vases for flowers were made in West Whiteland, Chester County, Pa., as early as 1753; a pottery and glass works was in operation in Germantown, New Quincy, Mass., in 1760; and a pottery in South Carolina in 1765. Cream colored ware, both plain and decorated in blue, was made in Philadelphia in 1770.

It appears, however, that the potteries established before the revolutionary war did not meet with marked success, and that this industry, like the manufacture of brick, did not assume commercial importance until after that war, when a period of new economic and industrial life began. About this time many enterprises were launched, including a number of potteries.

Our first page engraving shows a graphical comparison of the magnitude of clay products for one year. The pyramid would be 4,294 feet high and looms well up toward the summit of Mount Washington.

The total value of the products of clay in the United States in 1907 was $158,942,369. It was divided up as follows:

	Quantity.	Value.
Common brick	9,795,698,000	$58,785,461
Vitrified paving brick	876,245,000	9,654,282
Front brick	585,943,000	7,329,360
Ornamental brick		361,243
Enameled brick		918,173
Fire brick		14,946,045
Stove lining		627,647
Drain tile		6,864,162
Sewer pipe		11,482,845
Architectural terra cotta		6,026,977
Fireproofing		3,162,452
Hollow building tile or blocks		1,088,165
Tile, not drain		4,551,881
Miscellaneous		3,000,201
Pottery		30,143,474

Correspondence.

POE AS A SCIENTIFIC WRITER.

To the Editor of the SCIENTIFIC AMERICAN:

At this writing the University of Virginia is celebrating the one-hundredth anniversary of the birth of America's great poet and author, Edgar Allan Poe. It may not be generally known to those interested in scientific subjects, aviation, etc., that the immortal composer of the "Raven," originator of the short story, and the first great exponent of the science of deduction and unraveler of intricate ciphers and cryptograms, cherished an ambition, according to his biographer, to shine as a scientific writer. Among his miscellaneous writings there is a descriptive article on the flying machines of Henson and Stringfellow, the originators of the single and superposed fixed surfaces, or aeroplane, as it is known, and whose labors at that time (1845) were the sensation of Europe. Henson and Stringfellow constructed and tested a number of model aeroplanes of various shapes and designs; what they conceived to be the best one was fitted with the marvelously light steam engine constructed by Stringfellow (now at the Smithsonian Institution, Washington) and forms the subject of Poe's article, written in the flawless style peculiar to him, employing terms in the description of the model that are new, and doubtless were the invention of his own fertile brain. J. C. PRESS.

South Norwalk, Conn., January 20, 1909.

AUTOMATIC BLOCK SIGNALS.

To the Editor of the SCIENTIFIC AMERICAN:

I do not agree with Mr. Fagan, who says automatic signals are in any way responsible for railroad accidents. The Boston Elevated Railroad is thoroughly equipped with an automatic block system, installed in such a manner that an accident from a rear-end collision is impossible. A train disregarding one of these signals, at danger, is brought to an immediate stop by an air tripping device. This is much better than any system of rigid discipline of employees. A signal system has come under my notice, which will eventually, I believe, be universally used on all railroads in the United States. It is a system of electric semaphores, centrally controlled, and by pressing a button from the central office, it will set the signal at danger at any desired point on the road. This signal, equipped with a telephone in a box, is located at the base of the pole. As each conductor carries a receiver in his pocket, the train crew is in a position to communicate with the central, or dispatcher's office, and find out why any particular signal was at danger. These signals would be so arranged (as all automatic signals are at the present time) as to show danger in case the signal was out of order; and the train crew would communicate with the dispatcher before proceeding. With this system a dispatcher could *block* trains for a whole division. Of course, he would have to receive prompt "O. S." from stations along the line. The advantages of this system would be a saving in interlocking apparatus and the doing away with a great many block towers (but not switch towers). It is also superior to the automatic block system, in my opinion, for this reason: That trains are under central control, and in case of a train disregarding a signal, an indicator located in the dispatcher's office would show what signal had been disregarded. This is the case in the Boston Elevated Railway's dispatcher's office. F. H. SIDNEY.

Signal Dept., B. & M. Railroad Terminal Division, Wakefield, Mass., January 12, 1909.

THE MEAT INDUSTRY OF AMERICA.—II.

The reader of this article will be surprised to learn that from fifty-six to fifty-eight per cent only of the animal, as purchased on the hoof, is available for the table. In the early days of the meat industry, the other forty-two to forty-four per cent was regarded as useless and allowed to go to waste. To-day, however, there is practically no part of the animal that is not turned to some useful account. It is claimed, indeed, that the profit of the packing houses is now almost exclusively made out of the by-products.

The hides are carefully stripped by a workman, especially trained to the task, who is careful not to spoil the hide by the slightest slip of his knife. After they have been inspected, they are graded, according to their quality, salted, and stored, and finally sold to the tanneries. The various fats from the animals are worked up into tallow, and the finer qualities, known as butter fats, are used in the manufacture of oleomargarine or butterine, for which by-product Swift & Co.'s plant has a capacity of fifteen tons a day. From the beef suet is made the by-product known as stearine, which is used in large quantities by the tanners and the candle manufacturers. From the seven thousand skins of the sheep, which are killed in this establishment every day, there is gathered daily about ten tons of wool. The lean meat trimmings are passed through a process of preparation, from which they emerge as a good quality of sausages. Horns and hoofs, which at one time were thrown away, now find a ready market. Packing-house refuse is used extensively, also, in the great fertilizer industry. The viscera, immediately upon their separation, are passed down a chute into a lower room, where, after going through certain processes of cleansing and chemical treatment, they are made to render their tribute of useful product, the fibrous matter being dried and ground up for fertilizing material. The bones are worked up into glue and phosphate, the latter being ultimately made into fertilizing material by mixing it with the nitrogenous matter of the fibrous residue, above mentioned, and of the blood.

A most important part of the work of the government inspector consists in looking after the sanitary conditions of the various floors or rooms throughout the building, and the personal cleanliness of the large army of employees. The workmen are required to keep their working clothes clean, or as clean as the conditions of work of this character will admit. Those that handle the meat must wash their hands at stated intervals, lavatories with running water and the necessary appliances being provided for this purpose. If an inspector sees a workman with clothing that is unnecessarily soiled, he orders him to at once change to another suit. For the disinfection and cleansing of the cleavers, scrapers, knives, saws, and other tools, vats of boiling water are provided in close contiguity to the rail and the working benches; and, in cases where defective animals have been detected, the inspector orders the butchers, before they proceed to another department, to at once cleanse their hands in a disinfectant solution of bichloride of mercury; he sees, also, that all tools and implements are similarly cleansed and disinfected. Sheet-iron clothes lockers are provided for the clothes of the workmen, with sheet-iron partitions between the compartments, and perforated sheet-iron doors in front to insure a free circulation of air.

Having now described in detail the various processes in the preparation of refrigerated meat for the market, we will proceed to describe the other great system of meat preservation known as curing, as carried out in the cutting up, pickling, salting, and smoking of ham and bacon. The hogs are driven from the stockyard pens, where they have already undergone a government inspection, to the dressing floor, which has a capacity of 1,000 hogs an hour, or 10,000 per day. They are driven, a few at a time, into a pen, on one side of which revolves a large hoisting wheel with short lengths of chain attached by means of hooks to its outer rim. In the pen are two boys, who quickly loop the chain around the hind legs of the hog. As the wheel revolves, it lifts the animals, one by one, to the top of the wheel, at which point the chains are automatically transferred to an inclined rail. Here the porker passes an operator, who swiftly dispatches it with a deft knife thrust; and after a short interval it is automatically released into a huge vat of scalding water of a temperature of 150 deg. F., where it remains for five minutes. The effect of the hot water is to loosen the hair and scurf and clean the hide. It is then taken from the tank and drawn up through a vertical cylindrical scraping machine, which is full of downwardly-projecting steel scrapers, which are pressed by springs against the body of the animal as it passes through, and take off in a few seconds time nearly all of the hair. It then passes to the scraping bench, where such portions of the hair as have not been removed by the machine are taken off by hand. The bench is arranged as a traveling table, and the hogs, laid across it side by side, travel slowly past the line of operators. When the animal reaches the end of the bench, the operation of dressing is begun. Here the first government inspector examines the glands of the throat, feeling some and cutting into others in order to be sure that the animals are perfectly healthy. The animal is then held in front of what is known as the polishing machine, which consists of a rotating shaft provided with a number of flexible arms made of heavy belt leather, each arm being shod at its end with a steel strap. As the shaft revolves, the animal is pressed against the rotating arm and is strongly beaten and scraped. It is then subjected to a steam jet blast, after which it is hung on the shaving rail, where the last of the hair is removed by hand. This finishes the cleaning; and at this point government inspector No. 2 looks for and identifies the pass mark of inspector No. 1, and places a tag upon the animal.

The animal is now ready for cutting up, and this work is done by an army of skilled workers, each one of whom, as the animals, traveling at the rate of about thirty feet a minute in a continual procession, pass before him down the overhead rail, performs his particular part of the operation with really marvelous speed and dexterity. The viscera are placed in a trough, whence, after they have been carefully examined by a government inspector, they pass to a room where they are separated and sorted, and subsequently manufactured into various by-products. The stomach, after the grease has been extracted, is made into fertilizers; the liver and heart are sold as food products, and the intestines are cleaned and made into sausage casings. The leaf lard (the fat which grows on the inside of the body) is taken out, and subsequently worked into kettle-rendered lard or neutral lard, the kettle-rendered lard being the ordinary lard of household use, and neutral lard being used in the manufacture of butterine. The animal, after being split in two along the vertebræ, finally reaches the end of the rail, where it passes before the fourth government inspector, who examines the inside of the pleural region as a final assurance of perfect health, and also examines the glands near the base of the backbone. The next journey is to the hanging floor, where the sides are sorted according to weight and quality, and are partially cooled by being allowed to hang in a draft of air for a period of a few hours. From the hanging floor the sides are carried into the chill room, a huge refrigerator capable of accommodating many thousand sides. Here they are kept for forty-eight hours at a temperature of 32 deg.

From the chill room the sides are taken to the cutting room, where the shoulders are chopped off, the hams removed, and the feet are cut from the hams by band saws. The bacon pieces are put through rolls to flatten them out into a suitable shape for salting and packing. All the portions of the meat, as thus cut up, are carefully trimmed, and the trimmings are sent down a chute to a room below, where they are retrimmed, the lean portions being subsequently made up into sausage meat, and the fat portions into lard. In the cutting room the "fresh-meat portions" are wrapped in paraffine paper, and packed in boxes and barrels for immediate shipment to the retail butchers. After the meat has been trimmed and cut up, it is sent down a chute into the grading room, where each ham, shoulder, or side is weighed and sorted according to its weight and quality.

It is probable that there is no feature of the meat industry, at least as carried on under modern conditions in the largest establishments, regarding which there has been more popular misconception than that of the curing of meat. While it is undoubtedly a fact that some meat, prepared by obscure and small dealers, occasionally may be subjected to treatment that renders it undesirable, we believe that the system of curing, as carried out by the large establishments under the regulation of federal laws, is perfectly wholesome, and absolutely insures the use of only such ingredients as are healthful.

As a matter of fact, the constituents of the solution or pickle used in curing meat, viz., salt, saltpeter, and sugar, are the same that have been used by the farmer, the butcher, and the housewife from time immemorial; and it is certainly remarkable that, in spite of the fact that the problem of meat preservation has been made the subject of thorough laboratory investigation for a long period of years, the chemists have been able to find nothing which gives more satisfactory results than the time-honored preservatives of our forefathers.

The supervision of the federal government of the curing of meats is carried on with the same thoroughness to which we have drawn attention in our description of the preservation of meats by the method of refrigeration. Salt, saltpeter, sugar, vinegar, and wood smoke are specified by law as the only preservatives that may be used. Borax, of which so much has been heard lately, is expressly prohibited except in the case of meats put up for export in accordance with the directions of a foreign purchaser. In this case borax may be used, provided it is not prohibited by the country to which the meat is to be sent. England