

The Post Glacial History of the Peninsula of Boston.

The geological history of the site of Boston, Mass., since the glacial epoch, is described as follows by Professor Shaler, in the history of the city called out by the 250th anniversary of its settlement:

"After the ice had lain for an unknown period over this region, climatal changes caused it to shrink away slowly, and by stages, until it disappeared altogether. As it disappeared it left a very deep mass of waste, which was distributed in an irregular way over the surface, at some places much deeper than at others. At many points this depth exceeded 100 feet. As the surface of the land lay over 100 feet below the present level in the district of Massachusetts Bay when the sea began to leave the shore, the sea had free access to this incoherent mass of debris, and began rapidly to wash it away. We can still see a part of this work of destruction of the glacial beds in the marine erosion going on about the islands and headlands in the harbor and bay. The same sort of work went on about the glacial beds, at the height of 100 feet or more above the present tide line. During this period of re-elevation, the greater part of the drift deposits of the region about Boston was worked over by the water. Where the gravel happened to lie upon a ridge of rock that formed, as it were, a pedestal for it, it generally remained as an island above the surface of the water. As the land seems to have risen pretty rapidly when the ice burden was taken off, probably on account of this very relief from its load, the sea did not have time to sweep away the whole of these islands of glacial waste. Many of them survive in the form of low, symmetrical bow-shaped hills. Parker's Hill, Corey's Hill, Aspinwall, and the other hills on the south side of Charles River, Powderhorn, and other hills in Chelsea and Winthrop, are conspicuously beautiful specimens of this structure. Of this nature were also the three hills that occupied the peninsula of Boston, known as Sentry or Beacon, Fort, and Copp's Hills. Whenever an open cut is driven through these hills, we find in the center a solid mass of pebbles and clay, all confusedly intermingled, without any distinct trace of bedding. This mass, termed by geologists till or boulder clay, is the waste of the glacier, lying just where it dropped when the ice in which it was bedded ceased to move, and melted on the ground where it lay. All around these hills, with their central core of till, there are sheets of sand, clay, and gravel, which have been washed from the original mass, and worked over by the tides and rivers. This reworked boulder clay constitutes by far the larger part of the dry lowland surface about Boston; all the flat lands above the level of the swamps which lay about the base of the three principal hills of old Boston—lands on which the town first grew—were composed of the bedded sands and gravel derived from the waste of the old boulder clay. These terraces of sand and gravel from the reassorted boulder clay make up by far the greater part of the low-lying arable lands of Eastern Massachusetts; and of this nature are about all the lands first used for town sites and tillage by the colonists—notwithstanding the soil they afford is not as rich nor as enduring as the soils upon the unchanged boulder clay. The reason these terrace deposits were the most sought for town sites and cultivation is that they were the only tracts of land above the level of the swamps that were free from large boulders. Over all the unchanged drift these large boulders were originally so abundant that it was a very laborious work to clear the land for cultivation; but on these terraces of stratified drift there were never boulders enough to render them difficult of cultivation. The result was that the first colonists sought this class of lands. One of the advantages of the neighborhood of Boston was the large area of these terrace deposits found there. There was an area of 15,000 or 20,000 acres within seven or eight miles of the town that could have been quickly brought under the plow, and which was very extensively cultivated before the boulder-covered hills began to be tilled."

Practical Value of Science.

BY PROFESSOR S. H. TROWBRIDGE, IN "THE ADVANCE."

Our obligations to the branch of physics are almost unlimited, but we will mention only two or three applications of a single agent in this wide field. It would seem to roll back the world into the dark ages to take from it now the benefits of electricity in its multiplied and yet rapidly multiplying applications.

It seems incredible, from our present standpoint, that so short time ago, in our congressional halls, the electric telegraph was almost ridiculed and voted into oblivion, from which it could never rise. When a bill was presented appropriating \$30,000 to be expended, under the direction of the Postmaster General, in a series of experiments to test the merits of Morse's electro-magnetic telegraph, one member moved an amendment requiring half the appropriation to be used for the encouragement of mesmerism. Another proposed to include Millerism in the benefits of the appropriation; others to appropriate part of the sum to a telegraph to the moon. And when the bill came to a final vote, this was so close that a change of three votes would doubtless have left us till this day without the benefits of the telegraph. After his invention was in working order, and transmitting messages between Baltimore and Washington, Mr. Morse offered it to Congress, to be attached to the Post Office Department, for the sum of \$100,000. But it was declined, on the statement of the Postmaster General, who reported that, while the invention was "an agent vastly superior to any other ever devised by the genius of

man," he was not satisfied that "under any rate of postage that could be adopted its revenue could be made to equal its expenditures." By this short-sighted want of appreciation of science, the United States government deprived itself of a source of revenue sufficient, doubtless, to liquidate the entire national debt in a single decade.

The application of electricity, now attracting world-wide attention, enjoys a vastly more hearty reception than did the telegraph. The telephone is constructed on the principle of the human ear. It consists of an elastic diaphragm, to receive vibrations of air from the human voice or from other sources, so connected with the wires of a battery (or even with wires without a battery) as to communicate the same vibrations in every respect to another membrane or diaphragm situated at a distance. The two diaphragms of a telephone in distant places correspond, in every practical sense, to the two membranes of the human ear, and the connecting wire to the chain of bones between the two membranes. Probably no invention has come more rapidly into popular favor. Already many thousands of them are in practical use in this country and abroad. "It is employed as a means of communication between counting room and factory, merchant's residence and the office, publishing house and printing office, and, in short, wherever oral communication is desired between persons separated by any distance beyond the ordinary reach of the human voice."

The speaking phonograph is also copied from the human ear. The vibrating diaphragm, in this case, has a stylus connected with it, which impresses the peculiarities of vibration, due to any particular sound, upon a roll of tin foil arranged to receive the impression. By reversing the process, the indentations and prominences of the tin foil cause the stylus to fall and rise, which results in vibrations of the membrane, and these reproduce the original sound. These impressed sheets of tin foil may be preserved or mailed to any part of the world, and by putting them into a similar instrument, may be made to reproduce the pitch, tone, and quality of the original sound thousands of miles or of years distant. By this instrument, voice may be phonographed, as the face is photographed and we may listen to the veritable voice of the dead, or preserve for future comparison the voice of a person from the first infant prattle and the manly utterances of mature life even to the feeble speech of old age. Public speeches and songs may thus be preserved and delivered indefinitely or till the tin foil wears out. In public libraries may be preserved languages of different nationalities spoken from century to century "with all the peculiarities of pronunciation, dialect, and brogue."

Correspondence.**A New Safety Sail Boat.**

To the Editor of the Scientific American:

"Don't trust yourself in that craft; you'll be overboard sure." Such was the warning of a professional boatman at the barge office on the Battery, as I stepped upon a frail boat on a "fresh" afternoon. I think I know something of boats myself, and but that I knew this one to be provided with means intended to overcome the very danger against which the honest boatman warned me, I should have more than hesitated. But the pursuit of science must be deterred by no dangers, and, moreover, my pursuit in this instance was in behalf of the whole world, as represented by the SCIENTIFIC AMERICAN.

The Jane was an especially dangerous-looking craft, 18 or 20 feet long, whose bottom and deck formed the sharp V-shaped edge which proclaim an entire want of bearing power, while her immense sails, main and jib, were ample for a boat of twice her dimensions. Her captain was a New Zealander, whose motions were the reverse of safety-inspiring. My own conception of the care needful under the existing circumstances had no place with him, and, but for entire faith in my ability to swim, I should never have ventured.

As the Jane shot beyond the pier head, her huge sails were struck by a blast more than sufficient for instant destruction. Involuntarily I made ready for an impromptu bath, and the boatman tauntingly called out, "What'd I tell ye?" but *only the mast yielded*. The boat came to her bearings and moved on as steadily as though impelled by the mildest zephyr. The triumph was already complete; but more was to come. Presently we were in a large sea-way, and, with our good speed, a large inflow of sea water over the low and sharp bow was a matter of course. In that, also, I was agreeably disappointed. The boat, instead of carrying the weight of the wind and being thus forced through the sea, rose to it and she glided easily over. Again it was the mast that yielded—yielded to the motion of the boat as easily as before it yielded to the force of the blast. The surplus force of wind, instead of racking the boat and making misery for her passengers, was simply "spilled" over the top of the sail. The motion was free from the thumps and jars usual under the same circumstances.

How all this was accomplished may be difficult of explanation without the aid of an engraving. Instead of being "stepped" in the usual way, the mast was held in a rocking shaft at the deck, and to the keel, on either side, springs were attached, having their opposite ends secured under the deck. Thus the mast, in the absence of pressure, remained upright, but under pressure yielded on either side. The amount of pressure needful to compel this yielding was

regulated by nuts and screw on a guide rod inside the springs. A second pair of springs, placed longitudinally under the deck, were connected by pulleys with the shrouds, and these aided to stiffen the mast while they yielded to its movements under pressure.

For pleasure boats this spring mast is a great addition. It not only insures safety, but gives an ease of motion which cannot but prove especially delightful to those who are timid upon the water. More than this, it permits an unvarying course for the boat, and thus avoids the checks and delays inseparable from "luffing," as also the necessity of unusual skill and care in the management of even a "crank" vessel in a "flowy" wind. M. S. B.

New York, October, 1880.

[The invention, a practical trial of which is above described, is that of Mr. John McLeod, Hill's Pavilion, Flushing, N. Y. A patent has been allowed. It appears to be a really valuable and practical improvement.—Eds. Sci. Am.]

An Opening for Two New Articles of Manufacture.

To the Editor of the Scientific American:

I. In the Southern States 1,500,000 baskets are required for the harvesting of the cotton crop. These baskets are made of oak splits, and, except with extraordinary care, they last but one season, and are then thrown away. They require an expenditure on the part of planters of nearly \$2,000,000 annually. Is it not possible that a basket may be made of iron, either wire or ribbons, which would last several seasons? The ribbons or splits might be made of some cheap quality of steel so as to be elastic, and if they could be made to weigh not more than 15 to 20 pounds each, and not to cost more than \$2.00 to 2.50, they might prove a great success.

II. A great expense and trouble to the poorer people of the South is on account of cabin chimneys. On plantations and farms at a distance from cities, brick chimneys are so expensive as to compel owners of cabins to content themselves with stick and mud chimneys, which cost about \$5.00 each, and which, if they do not burn up in the meantime, certainly fall down within a few years. A good substantial dirt chimney may be built up as far as the throat above the fireplace, but the shaft of the chimney, built of small sticks and daubed with mud, last but a brief time, and are always dangerous from fire. I would suggest to the manufacturers of concrete wares that a chimney stack with a flaring bottom (to sit on the dirt built jamb) might be constructed at a price which would commend it to the wants of thousands and tens of thousands of tenants of log cabins and cheap frame houses in this country. The form should be a square tube, 10 to 16 feet long, 16 to 18 inches square, flaring at the bottom to a size of 16x36 inches.

If there is any difficulty in this form, the flared portion and the stack might be constructed in different pieces, like joints of piping, with flanges to fit into each other. Here is certainly a great opening for industry in a new channel.

J. B. C.

Nodina, Ark., September 14.

AGRICULTURAL INVENTIONS.

Mr. Samuel E. Licklider, of Everett, Mo., has patented an improvement in the class of live stock feeders consisting of combined hay racks and mangers. The feature of novelty is the construction of the rack or hay receptacle and its arrangement relative to the manger.

Mr. Theodore C. H. Krüger, of San Marcos, Texas, has patented a machine for planting corn or cotton, that may be attached to almost any kind of plow. It is simple in construction, easily repaired by an ordinary blacksmith, and may be used for planting where stumps and rocks would interfere with the operation of machines of ordinary construction.

Big Farms on the Pacific Coast.

The "Mammoth Farm," of the Blacklock Wheat Growing Company of Washington Territory, comprises 60,000 acres of wheat land, of which 25,000 acres are fenced. Ground has been broken for a crop which is expected to foot up between 300,000 and 400,000 bushels.

Another large farm is that of Dr. Hugh J. Glenn, of California. It is in the Sacramento Valley, and comprises 65,000 acres, of which 45,000 acres were in wheat this year. The owner had provided 350,000 sacks, each holding 140 pounds, but at last reports they promised to be unequal to the task of holding the crop. Dr. Glenn has his own machine shops, blacksmith shops, saw and planing mills, etc. He manufactures his own wagons, separators, headers, harrows, and nearly all the machinery and implements used. He has employed 50 men in seeding and 150 in harvest, 200 head of horses and mules; 55 grain headers and other wagons, 150 sets of harness, 12 twelve-foot headers, 5 sulky hay rakes, 12 eight-mule cultivators, 4 Gem seed sowers, 8 Buckeye drills, 8 mowers, 1 forty-eight inch separator, 36 feet long and 13½ feet high, with a capacity of 10 bushels per minute; 1 forty-inch separator, 36 feet long; 2 forty-feet elevators for self-feeder, 1 steam barley or feed mill, and 2 twenty horse power engines. The forty-eight inch separator thrashed, on the 8th of August, 1879, 5,779 bushels of wheat.

RAPID TELEGRAPHING.—A political speech, of about sixteen thousand words, and occupying four hours in the delivery, was telegraphed to Cincinnati, from this city, September 24, in five hours and five minutes, by one operator on one wire. He used the Phillips system of steno-telegraphy.