

IMPROVEMENTS IN BOSTON HARBOR.

On our front page we give a bird's eye view of Boston Harbor, showing the different channels which have been widened and dredged by the United States government, and some of the numerous islands which dot the harbor, showing also more in detail some points where the more important work has been done by the United States corps of engineers.

The objects of these improvements, which were commenced in 1825, is first to preserve the harbor by protecting the islands and headlands, and second to improve it by widening, deepening and straightening the channels.

The projects adopted for this purpose since 1866 have been mainly in accordance with the recommendations of the United States commissioners, whose labors terminated during that year.

The works of preservation consist of sea walls, aprons, jetties, etc., which protect the shores of the islands and headlands, prevent additional wash into channels, control the tidal scour, and preserve the full height of anchorage shelter for vessels in the roadsteads.

Point Allerton, which is at left of bird's eye view, is at the southeasterly entrance of the harbor. Is protected by a granite sea wall 1,202 feet in length. Its concrete foundation for a distance of 1,005 feet is protected by an apron and eight short jetties of granite rubble stone.

The bluff protected by this wall is not fully covered from storm action, and the sea wall should be extended westward for a distance of at least 150 feet, and the foundation should be protected with rip-rap.

Lovell's Island, which is much nearer the city, is protected on the western shore by a rubble stone apron 975 feet long, the northern shore is covered by a granite sea wall 750 feet long and the eastern shore protected by a granite sea wall 800 feet long and by two rubble stone aprons, one between the northern and eastern sea walls 1,440 feet long and the other south of the east sea wall 1,330 feet long. The detail views of Lovell's Island at bottom of front page, showing the construction of the sea wall and the rubble stone apron, are made from photographs taken especially for us at low tide.

Three prominent bluffs on Deer Island are protected by granite sea walls originally built about 1827. The north head wall is 1,740 feet long, the middle head wall 840 feet, and the south head wall 380 feet long. These walls have been partly rebuilt and in the weakest places backed with concrete.

Long Island is protected on the north head by a granite sea wall 2,081 feet long. Part of the foundation of the sea wall and of the beach at both its ends is protected by a rubble stone apron, aggregating 1,375 feet in length. During the last year 1,100 tons of rubble stone were landed at the beach and used to form a rip-rap protection for the beach west of the sea wall. This work will be continued this year.

Boston Harbor consists essentially of an inner and outer harbor, united by a deep waterway, and each accessible by distinct channels from the sea, widening into a deep and spacious roadstead.

The inner harbor lies to the north and westward of Long Island and receives the discharge of four rivers, the Charles, Mystic, and Chelsea Rivers from the north and the Neponset from the south. The direct entrance from the sea is by Broad Sound.

The outer harbor lies to the southward of Long Island and has a fine anchorage in Nantasket Roads, as well as in Hingham Bay, a well sheltered harbor southeast of Peddock Island. It connects with the inner harbor by the main ship channel through the narrows and by secondary channels east and west of Long Island. It is reached from the sea by Nantasket Roads, which lie south of Georges and Great Brewster Islands. Weymouth and Weir Rivers empty into the outer harbor. The range of tides at the navy yard is 9.8 feet and at the entrance to the outer harbor 9.4 feet.

The main ship channel before improvement had a least width of 100 feet and a least depth of 18 feet at mean low water. The general project for its improvement was submitted in 1867, and was to dredge the channel 23 feet depth at mean low water, 1,000 feet wide at the upper and lower middles and 685 at the narrows. At subsequent dates these figures were changed, and on June 30, 1892, the main ship channel was 23 feet deep at mean low water, 1,100 feet wide west of the upper middle, 800 feet wide at the upper middle, 1,000 feet wide at the lower middle, and at least 625 feet wide elsewhere.

The total amount of appropriations for Boston Harbor from 1825 to date are \$2,304,276.10.

It is now proposed to have a uniform width of the main channel of 1,000 feet and to increase the depth to 27 feet at mean low water. According to an estimate submitted by Lieut.-Col. S. M. Mansfield, of the corps of engineers, the improvement would cost \$1,500,000; but as the present inadequate depth of water in the channel causes nearly all of the deep draught vessels to anchor outside Boston Light and await the tide, so that delays of from three to nine hours in the delivery

of mails and passengers are not infrequent, it is hoped that Congress will take some action in the matter.

Our thanks are due to Lieut.-Col. S. M. Mansfield, U.S.A., who is in charge of this district and under whose supervision much of the work has been done, for many facilities afforded us and for much of the data for preparation of this article.

Prizes for Mule Carts for India.

The Secretary for India has decided to offer five prizes, ranging from \$3,750 to \$625, for designs and models best adapted for mule carts for the transport use of the British army in India, after practical test in India of a full sized specimen. The competition is open to all nations. Intending competitors wishing for the fullest details as to the kind of cart required will be supplied with further instructions on application to the Director-General of Stores, India Office, Westminster, London, or to the Secretary to the Government of India, Military Department, Calcutta, British India. The designs and models, framed in needful detail, should be sent direct to the Secretary to the Government of India, Military Department, Calcutta. No designs or models reaching Calcutta later than September 30, 1893, will be allowed to compete. The time of transit for parcel post from London to Calcutta may be taken at twenty-four days. The instructions for competitors state, among other things, that the object sought is a design for a military transport cart for a mountainous country, with absolutely no local resources in the way of skilled labor or constructive material. The few existing unmetaled roads are steep, narrow, and rough. Carts would further be largely employed on unbridged and unmetaled tracks newly opened along hill sides and stony river beds, to meet the exigencies of military operations. The roughest handling is unavoidable. The cart must be entirely made of metal or of combinations of metals. As the merits of a design will be largely judged from its prime cost, competitors will consider how far light and strong, but possibly very expensive, metals should be used in place of commoner material, having a special regard to the importance, in the matter of durability, of the cart itself not being unduly light with reference to the load it has to carry. In this connection, 656 English pounds as a maximum, and 492 pounds as a minimum, are indicated as generally suitable limits of weight for an empty cart. This remark, however, in no sense need restrict designers' ingenuity in devising a lighter cart if of sufficient strength. The cart is to have only two wheels, to be provided with a brake or drag, and to be drawn by two mules. Each designer is to state in describing his cart whether he is willing to enter into a contract for its supply, and, if so, within what time and at what cost he is prepared to furnish a single specimen cart, 12 carts, 100 carts, or from 500 to 2,000 carts free on board in London, or delivered in Calcutta, Bombay, or Allahabad. The English language, although not obligatory, as German and French may be used, will necessarily have an advantage in the competition. English measures, weights, and prices are alone admissible in the specifications, drawings, and models.

A Beautiful Piece of Mechanism.

We have recently had the pleasure of seeing a remarkable model of a locomotive made by Mr. Henry Case, of Gloversville, N. Y., watchmaker. It runs by steam upon a track ten feet in diameter.

Weight of engine, $1\frac{1}{2}$ pounds, with tender, 2 pounds $2\frac{1}{2}$ ounces; length of engine, $8\frac{1}{2}$ inches, with tender, 12 inches; height of engine, $3\frac{1}{2}$ inches; gauge of track, $1\frac{3}{8}$ inches; diameter of cylinders, 5-16 of an inch; stroke of piston, $\frac{1}{2}$ inch. The piston heads are fitted up with sectional or ring packing; stroke of valve, 1-16 of an inch; length of main and parallel rods, $1\frac{3}{4}$ inches, connected up with straps, bolts, keys, set screws and boxes around the pins; length of links, 7-16 of an inch; width of links, $\frac{1}{2}$ of an inch; diameter of eccentrics, $\frac{1}{4}$ of an inch; diameter of drive wheels, $1\frac{3}{8}$ inches; diameter of truck wheels, $\frac{1}{2}$ inch; length of whistle, 7-16 of an inch; diameter of whistle, 5-32 of an inch. The reverse lever in the cab is arranged with thumb latch, click and quadron. Also in the cab there is a throttle lever, deck lamp, safety valve, glass water gauge, lazy plug, steam gauge, which registers the pressure of steam. Also a gong in the cab and many other fixtures too numerous to mention. No. 60 Coates' cotton thread is employed as wicks for cab lamp and head light. These lights burn about twenty minutes. The driving wheel boxes are loose in the frame, fitted up with wedges, springs, hangers and equalizing bars. The tender will be found as perfect as the engine.

The materials used in construction of this midget locomotive are solid gold, silver, steel and brass. There are 1,815 pieces, exclusive of screws, bolts and rivets; 668 screws and bolts, 353 rivets, making in all 2,836 pieces.

At the beginning of the eighteenth century all European armies had pontoon trains.

Decisions Relating to Patents.

REISSUE OF LETTERS.

Letters patent No. 171,425, issued December 21, 1875, to John C. Reed, for a non-conducting covering for "boilers, steam, water, and other pipes," claimed a covering composed of layers or wrappings of paper saturated with adhesive material, and compressed while being formed into tubular sections "of a thickness of one-half inch or more," substantially as described. A reissue of the patent—No. 8,752, granted August 10, 1879—omitted from the claims the quoted words. The Circuit Court of Appeals rules that this was an enlargement of the claim, rendering the reissue invalid, and that this effect could not be avoided on the theory that a covering of less than half an inch would not constitute the "thorough non-conductor" of the specifications; for, while a less thickness might not be sufficient for boilers and steam pipes, it manifestly would be for "water and other pipes." 1.

PATENTABILITY.

It is held by the Circuit Court of Appeals that in view of the prior state of the art, as shown by the patent of February 9, 1883, to Charles F. Woerd, and patent No. 206,674, to Hoyt, there was no invention in the mere introduction of springs in the mechanism for effecting the winding and hands setting engagement, in order to avoid liability of injuring the wheels by the force of the push or pull upon the short stem arbor, as claimed in letters patent No. 10,631, granted August 4, 1885, to Duane H. Church, for an improvement in stem-winding watches; but the claims are valid as covering a new and useful combination, the peculiar usefulness consisting principally in rendering watches and cases interchangeable. 2.

The United States Circuit Court lays it down that upon the idea of making an improvement, an adaptation of an old machine to the new purpose was proposed almost simultaneously by three distinct and independent parties, by an alteration of mechanism slightly different structurally, but the same in principle in each case, is evidence that such change was obvious, and did not involve invention. 3.

EXTENT OF CLAIM.

The Circuit Court of Appeals decides that if reissued letters patent No. 11,062, issued February 25, 1890, to William R. Fox, for an improvement in miter cutting machines, could be held to show patentable invention, it constitutes one of a series of improvements, all having the same general object and purpose, and the patent must, therefore, be limited to the precise form and arrangement of parts described in the specifications, and to the purpose indicated therein. 4.

Letters patent No. 261,054, issued July 11, 1882, to C. W. Siemens, as assignee of Frederick Siemens, cover "a tank for the continuous melting of glass, having gas and air ports, and of the depth herein described, for the purpose of forming, below the upper fluid portion of the metal, a layer of metal in a semi-fluid or partially solid condition, as and for the purposes described." In his specifications the applicant states that "in the fusion of window or other white glass there is a continuous descending and ascending movement of the particles throughout the mass, as is proved by the wearing away of the bottoms of shallow tanks. The advantage to be obtained from increasing the depth of the tanks will be the formation of a layer of chilled glass at the bottom, at which point the movement of particles ceases, whereby the bottom blocks will be protected from wear, the presence of stone in the glass avoided, and a larger proportion of first quality glass be produced." The Circuit Court holds that the increased depth of the tank was only for the purposes here specified, and did not, and was not intended to, provide for the alleged discovery of the so-called "vertical finding" of the glass. 5.

Letters patent No. 200,119 were issued February 12, 1878, to Henry G. Ashton, for an improvement in safety valves, consisting substantially of an ordinary spring valve with a pop valve chamber added, in combination with a valve seat, an inclosed spring chamber, and an inclosed discharge chamber. In his specifications he stated that his combination was very important "in all cases where the steam is prevented in any way from escaping freely from the hood or casing, as is often the case." In another place he stated that he provides holes or vents in the spring chamber for the escape of such steam as may enter it, but these vents were not mentioned in the claims, which covered merely the above combination, "arranged to operate as described." The Circuit Court of Appeals rules that the patent did not cover the use of the vent holes. 6.

1. Am. Heat Insulating Co. v. A. Johnston & Co., 52 Federal Reporter, 228.
2. Illinois Watch Co. v. Robbins, 52 Federal Reporter, 215.
3. Bromley Bros. Carpet Co. v. Stewart, 51 Federal Reporter, 912.
4. Fox v. Perkins, 52 Federal Reporter, 205.
5. Siemens v. Chambers & McKee Glass Co., 51 Federal Reporter 902.
6. Ashton Valve Co. v. Coale Muffier and Safety Valve Co., 52 Federal Reporter, 314.

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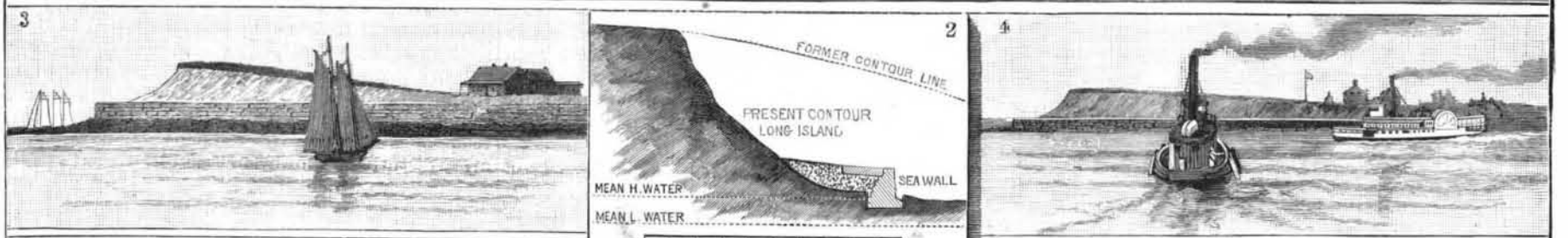
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1. Bird's eye view of Boston harbor. 2. Cross section showing retaining wall. 3. Point Allerton. 4. Gallup's Island. 5. Long Island. 6. Sea wall, Lovell's Island. 7. Rubble stone apron, Lovell's Island.

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