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A. H. NICHOLS.

BOSTON :

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Nichols, Arthur Howard

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From painting by G. N. Faught

Second Church, Hanover Street, Boston
(Pulled down 1844)

THE EARLY BELLS OF PAUL REVERE.

By ARTHUR H. NICHOLS, M.D., of Boston, U. S. A.

Member of the Ancient Society of College Youths, London.

IN the year 1788, Paul Revere, patriot and versatile craftsman of keen artistic sense, established a furnace for heavy castings at his foundry on Lynn street, now Commercial street, corner of Foster street, in Boston, where within a few years he undertook the production of church-bells. This business was successfully prosecuted until his death, in 1818, at the age of eighty-nine years, during which period more than two hundred bells were turned out. The original foundry having been damaged extensively by the memorable gale of October 9, 1804, which carried away the steeple of Christ Church and the roof of the present tower of King's Chapel, the work of casting was transferred to Revere's estate in Canton, still in the possession of his descendants.

Early in the eighteenth century bell-founding had attained a high degree of perfection; long practical experience having led to the adoption of a uniform design, or pattern, corresponding very nearly in contour to the quadrant of an ellipse, the mathematical curve which harmonizes with the law of acoustics. In theory an instrument moulded in this shape should emit a series of sounds called the tonic, or fundamental; its third and fifth; its octave above, called nominal; and its octave below, or hum-note. In practice, however, founders had learned the advantage of shortening the bell and thus sharpening, or raising, the hum-note in order to prevent the over-powering of the sub-notes by its prolonged drone, or nasal twang, which in the Spanish bells, designed of greater height, affects the ear so unpleasantly. This defection from the chord does not, as might be expected, convey a sense of discord; on the contrary, by the deflection of the modified note into a separate plane, as ingeniously suggested by Canon Simpson, the more tuneful fundamentals and nominals are rendered prominent, especially when the bells are struck in rapid succession, each making a complete revolution to each blow. At the same time the ear is delighted by the frequent resolution of these discords into concords, which must take place if a ring of bells is correctly attuned. It is this sequence of striking harmonic effects that constitutes the ground plan of scientific change ringing, wherein melody is relegated to the back-ground. This principle of advanced music, always appreciated by the English ringing guilds, has been expanded in the art of constructing counterpoint, in which, under certain conditions, discords are admitted with beautiful effect; and the application of this same theory of harmonies has imparted brilliancy and endurance to many of the best classical compositions.

It is desirable to explain that these harmonic effects are not produced by the system of chiming as commonly practised in America, in accordance with which psalm-tunes are slowly hammered out by means of an electrical or other mechanical makeshift, the bells being rigidly bolted mouth downward to an immovable beam. It is only in change ringing, when the bells are moved with velocity upon the principle of the pendulum rather than that of the cart wheel, and each managed by a separate ringer, that the carrying power and harmonic blending of the sound waves is fully developed. This fascinating art, at one time cultivated in Boston, New York and Philadelphia, became lost and virtually forgotten in this country after the Revolution.*

As to the component parts of bell metal, the proper proportion of copper to tin (about 13 to 4) necessary to ensure the maximum resonance consistent with safe brittleness was well known to founders of the seventeenth century, although the law of atomic weights or chemical equivalents had not then been discovered. A knowledge of these fundamental laws, however, was not alone adequate to secure the production of a superior instrument; and if many of Revere's early bells must be allowed to be of inferior quality, this would be the natural result of his want of practical experience and early training; for without such qualifications he could hardly have evolved the various empirical rules and delicate processes by which the English founders had learned to mould that homogeneous, tenacious and elastic amalgam essential to the production of perfect vibration. For instance, it would appear that in fusing his metals he did not at first appreciate the importance of maintaining a comparatively low temperature in order to throw off, in the form of scoria or dross, certain impurities which are reduced by greater heat and thus retained within the amalgam, to the detriment of its sound-producing qualities. Nor could he have appreciated what has since been demonstrated, viz.: the marked difference which exists in the brittleness and sonorous properties of both copper and tin from individual mines. Moreover, none of his bells show traces of any attempt to correct errors of tone by grinding, now accomplished by machinery.

Before this venture of Revere's the art of bell-founding was practically unknown in America, though a few bells had been cast in the colonies, notably the second Liberty bell,† made by Pass and

* In the tower of Christ Church, Philadelphia, is erected a tablet commemorating the only perfect peal ever achieved in America. This "peal-board" records that on June 9, 1850, was successfully rung in three hours and fifteen minutes the composition known to the fraternity as Holt's ten part peal of Grandsire Triples, consisting of 5040 changes. The band was made up of some "College Youths" who had just completed an engagement as hand-bell ringers under the auspices of P. T. Barnum, augmented by other English ringers who chanced to be in that city. The peal was conducted by the late H. W. Haley, one of the most expert London ringers and composers.

† On June 17, 1903, this bell, escorted by a numerous delegation of civic dignitaries from Philadelphia, was drawn in procession through Boston, and displayed on the Common.

Snow, in 1753, for the Provincial Assembly of Pennsylvania, and weighing 2089 lbs. And yet the first New England colonists had brought from the "Ringing Island" a love for the sound of musical bells, and their churches were supplied with bells of a light calibre imported from England. Thus Prince speaks of a bell on the first house for public worship in Newtown, now Cambridge, in 1632; and there exist records of others, viz., in Salem, 1638; in Boston on the First Church, 1641; Watertown, 1648; Charlestown, 1657; Malden, 1658; and Hadley, 1670.

While many of the delicate details essential to the creation of a musical bell were therefore unknown to Revere, no better models could have been found than those at his command in the towers and steeples of Boston and vicinity. With the sweet-toned ring of Christ Church, distant but a few hundred feet from his foundry, he had long been familiar, having been one of the ringers of that tower; and within the radius of half a mile were the fine bells of Brattle Square Church (3694 lbs.), the gift of Gov. Hancock in 1772; of King's Chapel (2475 lbs.), hung June 12, 1772; and of the Old South Church (1200 lbs.), bought with a legacy of £200 from Capt. Timothy Cunningham.

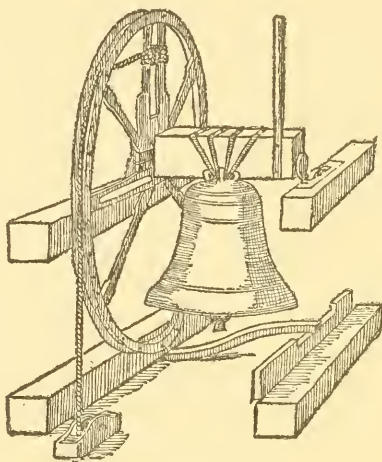
It was doubtless with a consciousness of deficiencies in methods that, in 1804, Joseph Warren Revere, who four years before had become associated with his father in business, visited England and the Continent in order to acquire all available information pertaining to the manufacture of brass and copper. After his return, it is certain that finer castings were produced, until, in 1816, a heavy bell was made for King's Chapel,* which for homogeneous casting, power, grandeur and mellowness of tone can hardly be surpassed. Its minor chord, or harmonious discord, gives it distinct identity, and the writer recalls that often on a quiet night, when the bells of the city were being rung for fire, its ponderous boom could be distinguished above all others. As shown, however, by the late H. P. Munroe, who was endowed with a phenomenal perception for delicate musical sounds, this bell could form no part of a ring, or chime; since, by the resolution of its harmonies by the consonant vibration of other bells attuned to the same key, the most dissonant, doleful combinations would result.

It is a curious fact that inferior bells when placed in a favorable environment may emit a pleasing sound; hence some of Revere's bells, hung in a lofty belfry, upon a hill top, or in a plain surrounded by hills, have attained a fair reputation, though in reality their nominals, or tonics, may vary widely from a true chord. As a practical ringer Revere excelled in his hangings and fittings, and his bells being therefore evenly adjusted and swinging with velocity, were

* The English bell had been cracked while being tolled for evening service, May 8, 1814.

easily managed and their sounds fully brought out. To Revere is to be accorded the honor of introducing a new handicraft into Massachusetts, while his meritorious endeavor to excel in all branches of campanology should endear his name to the devotees of that art. After his death, the business was carried on by his son Joseph until, in 1828, it passed to the Revere Copper Company, which never undertook bell-casting.

The following illustration of Revere's method of hanging shows stop-stay, slider and ground-truck.



In connection with the loss of many historic bells, we must deplore the frequent manner of their destruction at the hands of a bungling sexton by clapping, or striking a heavy blow when the instrument is at rest in a fixed position, a malpractice not permitted by English ringing guilds. It was by such an abuse that the first Liberty bell was cracked, shortly after it had been raised to the steeple; and its successor was likewise broken, while being tolled on July 8, 1835, as a mark of respect to the memory of Chief Justice John Marshall of Virginia, then lying dead in Philadelphia. By some American founders an especial instrument for the speedy destruction of their bells is supplied in the shape of a supplementary tolling hammer, which is quite superfluous, inasmuch as tolling is in reality easily performed by swinging the bell. On occasions of mourning, a still more impressive effect is secured by the half-muffled peal of six, eight, or ten bells, in which the clappers, reinforced on one side by a disk of leather, emit alternately a series of full and then suppressed tones. The twelve heavy bells of St. Paul's, London, were thus pealed by the "College Youths" upon the decease of the late President McKinley, in 1902.

The following list is believed to include every bell inscribed with the name of Paul Revere as founder. All bells made later were



First Church, Roxbury





From painting by G. N. Faught
King's Chapel, Boston

probably marked Paul Revere and Son, or Revere and Co.

No.	Date.	Weight.
1.	1792.	912 lbs.
	For the Second church on Hanover Street, Boston, called the New Brick, and later the Cock-reel church. It bears the inscription: "The First Church Bell cast in Boston, in 1792, by Paul Revere." Many porosities may be seen in its haunch, while its sound is of short duration, harsh and panny. Hung in a lofty belfry, it was very noisy, and though rung for fire, the less discordant bell of the New North Church was swung at morning, noon and night. After the destruction of the steeple in the gale of 1869, on which occasion the swaying of the Hollis Street Church spire was watched by the writer, the bell was removed, in 1871, from the tower and stored until sold, in 1901, to the St. James Church, in Cambridge. The original bell of the New Brick Church, raised in 1743, was sold in 1780, and bought, in 1783, by John Hancock for the Third Church in Jamaica Plain. It bore the inscription: "Thomas Lester of London made me, 1742." Its weight was 342 lbs.; its cost, \$333.33. It was replaced by a larger bell in 1821. The larger bell of the Old North Meeting House, weighing 500 lbs., removed from this church when, during the winter of 1775, it was unnecessarily pulled down for fuel by permission of the British commander, was hung in the New Brick, and cracked in 1792. Incidentally it may be mentioned that in this same year, 1792, a bell, still in use, weighing more than one ton, was cast at the Hope furnace, in Rhode Island, for the First Baptist Meeting House in Providence.	
2.	1793.	638.
3.	"	50.
4.	"	675.
5.	"	120.
6.	"	160.
7.	1794.	673.
8.	1795.	735.
9.	"	150.
10.	"	750.
11.	"	695.
	The Town of Amherst, For Capt. Lane, The Town of Westford, The Academy of Westford, The Church at Hallowell, The Church at Marshfield, The Church at Cohasset, The Frigate building in Boston,* The Town of Newburyport, afterward sold to the town of Bradford, The Town of Groveland, Mass., bearing the familiar inscription: "The living to the church I call, And to the grave I summon all."	

* The *Constitution*, whose keel was laid in Nov., 1794. She was launched Oct. 21, 1797, and first set sail July 20, 1798. The bell numbered 23, which is of more appropriate weight, was probably substituted for that numbered 9. The other frigate, *Boston*, built at Hart's wharf, was not begun till Aug., 1798.

12.	1795.	The Town of New Bedford,	756.
13.	1796.	The Town of Portland,	1073.
14.	"	The Town of Dover, N. H.,	892.
15.	"	The Town of Sudbury,	695.
16.	"	The Town of Falmouth,	821.
17.	1797.	The Town of Boston: The Rev ^d . Mr. Kirkland's Society, or New South, at Church Green,	1125.
18.	"	The Town of Thomastown, a present from Gen. Knox, recast in 1822,	683.
19.	"	The Town of Ipswich. According to tradition, Abram Perkins with his team hauled this bell from the foundry.	827.
20.	"	The Town of Providence, for a school,	52.
21.	"	The Town of Sandwich, for the Academy,	112.
22.	"	For St. John's Church, Portsmouth, N. H. The original bell, weighing 600 lbs., was given to the society, in 1745, by the officers of the New Hampshire regiment, having been brought, with much other loot, from Louisbourg after the capture of that stronghold in the same year. It was hung in the steeple, at the western end of the wooden edifice built in 1732. Broken in 1797, it was recast by Revere in the same year. On the morning of Dec. 24, 1806, when the church was destroyed by fire, the font of Porphyritic marble, taken by Capt. John T. Mason at the capture of Senegal, from the French, in 1758, and given in 1761 to the church by his daughters, was saved by the personal efforts of Alexander Ladd; but the bell was damaged, and was therefore again recast by Revere, in 1807. For a third time, it was recast by the Blake Bell Co., in 1896.	—
23.	1798.	The Frigate <i>Constitution</i> ,	242.
24.	"	The Town of Northfield, Mass.,	944.
25.	"	The Town of Petersham, Mass.,	1150.
26.	"	The Town of Dedham, for the Court House,	224.
27.	"	The Town of Roxbury, recast by Revere and Co. in 1819,	862.
28.	"	The Town of Worcester,	1181.
29.	"	The Town of Bridgewater, for a school,	72.
30.	"	The ship <i>Eliza</i> ,	52.
31.	"	The ship [unknown],	—
32.	"	For Gen. Moultrie, South Carolina,	75.
33.	1799.	The Town of Wenham,	500.
34.	"	The Town of Haverhill,	689.
35.	"	The Town of Boscawen, N. H.,	510.
36.	"	The Town of Greenfield,	250.
37.	"	The Town of Exeter, N. H.,	868.
38.	"	The Town of Brookfield,	683.

39. 1800. The Town of Pownalborough, now Wiscasset, Me., 958.
 On Aug. 3, 1900, was celebrated the anniversary of the raising of this bell to the belfry of the First Church, erected on the site of the present edifice, when its history was related in an address given by R. K. Sewall, of Wiscasset. It was brought from Boston in a ship of which Capt. Joseph Choate was master. It cost, at 2s. 6d. per pound, \$416. Bills for hanging, as well as for liquor used on the occasion, are preserved among the town records.
40. 1800. The Town of Walpole, N. H., 936.
 41. " The Town of Warren, R. I., 1292.
 42. " The Town of Sunderland, 958.
 43. 1801. The Town of Greenland, N. H., 720.
 44. " The Town of Weston, 968.
 45. 1802. The Town of Amherst, N. H., the gift of Perkins —
 Nichols, a merchant of Boston, son of Gen. Moses Nichols of Amherst, N. H.,
 46. " The Town of Milford, N. H., the gift of Perkins —
 Nichols; removed in 1871 to the town house.

For many details relating to Col. Revere, as well as for the record of the early bells of Massachusetts, the writer is indebted to the valuable researches of Elbridge H. Goss, Esq., of Melrose.

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