

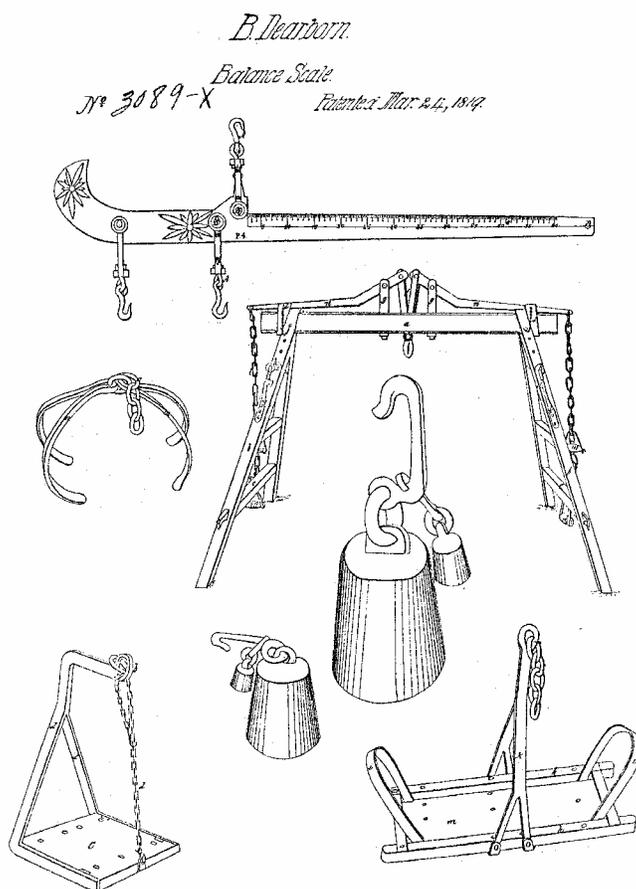
National Park Service
U.S. Department of the Interior

Salem Maritime National Historic Site
Salem, Massachusetts



A LARGE-SCALE ENTERPRISE

By John Frayler, Historian



COMPONENTS OF BENJAMIN DEARBORN'S BALANCE SCALE

Drawing not to scale.

∞ Pickled Fish and Salted Provisions ∞

Historical musings from Salem Maritime NHS

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Throughout the ages, the Latin phrase Caveat Emptor (let the buyer beware) has been the primary watchword of trade. Since unscrupulous individuals around the world stay up late at night concocting perfect schemes to swindle the unwary, the concept of fair trade has come to include the precise regulation of transactions, both legally and physically, by governments. Individuals seek advantage to reap greater profits (which is acceptable within certain ethical bounds) and governments are not to be denied their share of their citizens' prosperity. Citizens' contributions to the national interest finance the protector of the citizen. This is, of course, taxation. In the case of those citizens trading abroad, these taxes are known as customs duties.

All established governments have traditional practices: "It is the custom...." These "customs" are the lubricant of diplomacy. Whether bearing tribute and bowing in the presence of the Ottoman Sultan long ago or shaking hands with the leader of a modern nation, an acceptable standard of behavior has been established over time.

The development of "standard" weights and measures has been the enabler of trade. Money must be of guaranteed value, or it is useless. The same is true for measurement of goods in whatever form is agreed upon. Coins are of specific weight and size. This was much more critical in times past when they were of solid gold, silver, or even copper. They were judged against a standard for uniformity of value. Small balance scales were used to evaluate coins against verified weights to assure that they were not short of value.

This concept was also used to meet the needs of all buyers and sellers of goods. To determine the value of goods in quantity (as opposed to individual objects) it is necessary to accurately determine how much

you have available. In these instances, Customs duties were assessed by weight, volume, and linear measurements.

Each country or city engaged in overseas trade had standards of measure; however, there was not necessarily anything approaching uniformity between trading partners. This is illustrated at the smallest level in a German publication of 1855¹. The length of a millimeter differed among nine European countries and principalities, from .03368 to .04310. The gram and kilogram are listed with eleven variants each. This situation is compounded worldwide. For example, pepper was usually bought by the pecul, or pickul, a Dutch measure of just over 133 pounds generally used (with local variations, of course) throughout the markets of the East Indies. Tea presented a similar situation. It was packaged by the chest, half- chest and cattie, the smallest of the three units. The actual weights of cattles varied with the type of tea they contained. A chart of averages in Stevens' reference on the lading of ships indicates that a cattie was nominally a cube 12" on a side; however, a cattie of Young Hyson tea weighed 22 lbs., while an identical box of Gunpowder tea weighed 24 lbs.² In reality, the packaging was anything but uniform. The product still had to be weighed or measured to determine how much was actually inside the container. If all the containers were equal within a shipment, it was much easier to convert the commodity to pounds or tons, necessary to know how much you were actually buying and critical to properly loading the ship. Wary captains well versed in the devious ways of the world carried their own scales and weights aboard ship.

The few instances cited above reflect the skill needed to buy foreign products efficiently. The mathematics of estimating a purchase and its

¹ J. Schon, *Das gezogene Infanterie- Gewehr* (Dresden, 1855), p. IX

² Robert White Stevens, *On The Stowage of Ships and Their Cargoes: With Information Regarding Freights, Charter- Parties, etc., etc.* Sixth Edition (London, 1873) p. 655

value required knowledge of current market prices and the ability to convert foreign currency, weights and measures into units familiar to the purchaser. These skills were absolutely necessary for merchants, ship captains, first mates and supercargoes to conduct business. Customs officers required the same expertise and it is not surprising to find retired mariners on the Customs payroll.

During September 2002 a new exhibit was installed in the former Deputy Collector's office at the Salem Custom House by the National Park Service to illustrate the technology of the Customs process prior to the computer age.

The exhibit includes information about the procedures and functions of the Customs Service, small portraits of some of Salem's Customs officers (very few are to be found), examples of Customs documents, and an exceptional collection of Customs Service tools and instruments used during the age of maritime sail.

There is Salem's original standard yard received in 1840³- a precisely machined brass bar exactly three feet long- and a large brass and iron-equal arm balance scale with a set of the precision brass standard weights issued to customhouses, and to each state government, by the Office of Standard Weights and Measures of the Treasury Department to insure uniformity of transactions.

In the case containing the standard yard, there is also a selection of typical padlocks of the era, a wooden gauging stick, and a Dicas hydrometer, a model issued to custom houses between 1792 and 1851 to ascertain the alcohol content of spirits⁴.

³ Sarah White Emerson, *Weights and Measures used at The United States Custom House in Salem, Massachusetts 1789- 1937* (National Park Service MS., n.d., n.p.) p. 9

⁴ Emerson, p. 12

The brass beamed balance scale, manufactured by E. and T. Fairbanks and Company of St. Johnsbury, Vermont, is displayed with its polished brass standard weights, formerly used to verify the accuracy of duplicate weights, including those carried to the docks to assess duty on imported cargoes. It was transferred to Salem from the Boston Custom House. The records accompanying it indicate that the Customs Service obtained it in 1839. It must have been a popular and reliable model; a nearly identical item (Town and City Sealers' Scales) is illustrated in the Fairbanks catalog for 1906.⁵

*Fairbanks
scale in
the Salem
Custom
House*



Photo courtesy of David Kayser

A rack of caliper gauges stands to the rear of the Fairbanks scale. These were used to determine the potential capacity of a cask. A movable slide allows the length and diameter of a barrel to be measured accurately. These items were used locally (the Salem

⁵ E. and T. Fairbanks and Company, Fairbanks Standard Weighing Machines (St. Johnsbury, 1906) p. 882

Customs district also included Beverly) in conjunction with dipsticks (also known as gauger's spears or rods) imprinted with ruled scales to measure the depth of liquid, and tables for computing volume, much like a slide rule.

And last but not least is the very large "A" frame dock scale. Standing nearly ten feet high, it is of the type commonly called a steelyard or weighmaster's beam. It is a perfect example of the double lever framed balance scale improved upon and patented by Benjamin Dearborn on March 24, 1819. Records are spotty on how many were in service at any given point in time but there are five of the heavy iron beams in the museum collection.

Operators pulled the downhaul chains to lift the beam and load clear of the ground. Similar in operation to a common doctor's scale, the use of a large counterweight at the small end allows the same beam to increase its capacity from 500 lbs. (calibrations on the front) to 2250 lbs. (calibrations on reverse side). One pound increments are achieved by sliding a smaller weight (called a poise) along the grooved surface until the beam "floats" in its restraint. This style supplanted the equal arm balance suspended from a tripod seen in 18th century illustrations.

Hoisting platforms known as "bottoms" are used in combination with the balance beam for weighing bagged coffee, pepper and spices, hides and similar items. Tubs were available for weighing loose bulk commodities subject to duty by the pound. Special iron hooks were used to pick up bales of jute fiber (beginning in 1865, Salem manufactured jute fabric for gunny bags), cotton, and hemp. The actual weight of the bottoms (the one on exhibit weighs approximately 140 lbs.), tubs, or hooks is allowed for in the calculations, as is the estimated weight of packing materials (known as "tare"). The "tare

weight" is the overall weight including a predetermined allowance for the shipping container or wrapping materials that may be averaged over a number of similar containers for convenience. The weighing, measuring, and gauging operations were integrated into the inspection and appraisal (grading) process to determine the proper duty on a given body of goods.

The disassembled dock scales were transported by wagon to the wharves where cargo was to be landed. Various sizes of weights accompanied the scales. For example, in 1792 the Second Congress fixed the weight of a bushel of salt at 56 pounds⁶. Frames, beams, weights, leveling platforms, tubs, bottoms, hooks, chains and equipment boxes were hauled to the job site. The cargo was processed and documented, and the scales transported to the next job or returned to storage in the Scale House at the rear of the Public Stores (bonded warehouse) on Orange Street.

Being a Customs officer was not particularly glamorous or exciting compared to the activities of the captains and seamen who delivered the cargoes. The daily activities of weighers and measurers going about their duties are rarely described in detail. Even Nathaniel Hawthorne, who was one of them for a number of years, glosses over the details of how they performed their work.

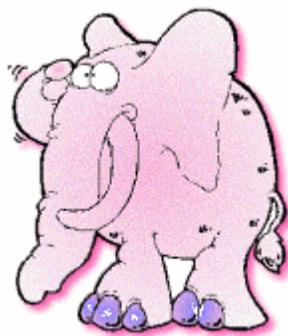
However, we sometimes get lucky.

A number of years ago an elderly gentleman was looking at our dock scale very intently. I asked him what caught his eye. He told me that when he was a young man, about the time of the First World War, he worked with scales just like ours on the New Orleans waterfront. They

⁶ Emerson, p.5

were known as six- man scales because teams of six men were assigned to each scale for efficiency of operation while weighing cotton bales. The bales weighed from 400 to 500 pounds and were awkward to handle. He also told me that the sliding poise was called a "peel". When I asked why, he said that the sound of the weight sliding quickly over the notched beam made a tearing sound like peeling an orange.

In the days before the personal income tax, Customs duties provided the largest portion of revenue collected by the United States. During the Federal period, with the rapid expansion of international trade, the Customs Service quickly became a large- scale enterprise. The Salem Custom House became an integral part of that enterprise. Thanks to Mr. Dearborn and his patent balance beam, Salem's Customs officers had scales large enough to meet the demands of financing the new nation.



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