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Cover Picture

This magnificent desk set needs no words! The candlestick bears the words W Wharton & Sons, Birmingham. Another example is known, but on that one, the black lacquer tray is not ornamented. Desk compendiums were very popular during the Victorian period, (1837-1901); this example was made right in the middle of this period. See the article on candlestick scales, pages 3099-3109.

The editorial staff extends its sincerest apologies to Deborah Jean Warner. We deeply regret that her name was misspelled in the biographical information included at the end of her article entitled "The Harvard Trip Scale" pages 3092-3096.

Editor's note: In this the inaugural issue of a full color format for EQM, I would like to request all members to contribute articles of any size, photos and descriptions to this, YOUR JOURNAL. Without your contributions EQM cannot continue. Please help support the EQM staff by submitting your material for our use.

Many Thanks, Jan Berning

Contents

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3616 Noakes St., Los Angeles, CA 90023
Tel 323.263.6878 **Fax** 323.263.3147
www.isasc.org

For membership information contact
Steven Beare stevebooks@aol.com
7 East Brookland Avenue, Wilmington, DE 19805

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For membership information contact
P. Holroyd Holroyd@lindenlea.u-net.com
11Carriage Drive, Frodsham, Cheshire, WA6 6DU

Editor: Jan H. Berning, **Tel** 815.895.6328 **Fax** 815.895.6328 JHBerning@comcast.net
Associate Editor: Clifford Lushbough **Tel** 303.366.5471 cplush@comcast.net

Candlesticks, Part 1

BY BRIAN BRASS

My wife gave me my first candlestick scale as a present in 1975 (figure 1). I was immediately intrigued, and this initial fascination has not diminished over the years as I examined one variety after another, either in my own, or the collection of someone else. I have examined numerous examples during the lifetime of my scale-collecting activities.

Figure 1. ⮝⮝ R W Winfield, postal rates ½ oz for 1d, 1 oz for 2d, 2 oz for 4d, 3 oz for 6d, 4 oz for 8d (1840-65). See postal rate chart on page 3109.

The Beginnings

In 1840, a unique postal service was introduced in England under the able leadership of William Hill, the newly appointed Post Master General. Entitled the Penny Post, it heralded a new era in the transmission of letters, and was as original in its time as the internet is to us today. Previously, mail had been charged by the distance between sender and recipient - with certain upward adjustments depending on its weight, the number of sheets and their size, and whether the letter was sealed. However, from January 10th 1840 onwards, any number of sheets of paper could be sent within the United Kingdom for one penny as long as the weight was less than half an ounce. A graduated scale of charges was then applied according to the weight of the letter. Neither the distance nor the number of sheets of paper was relevant to the cost of posting.

The Commercial Opportunity

Designs for weighing letters abounded; a race was on for a device which would not only weigh the letter, but would also indicate the value of the new stamp which was required to be affixed on the right hand top corner of the envelope [stamps being first sold in June 1840]. The result was untold examples of Victorian ingenuity and artistry. The Penny Post presented a commercial opportunity second to none. Every desk, every office, every factory dispatching both letters and parcels needed a scale. The first known design of candlestick scale was made by R W Winfield and was dated 13th January 1840 (Figure 2a & 2b).

Figure 2a. ⮜⮜ The first design registration by R W Winfield. Graduated panel screwed on. For weight only, so early, ½ oz , 1 oz , 2 oz , 3 oz , 4 oz. Black patina with lacquered stripes. Also available with gilt finish.

Figure 2b. ⮞⮞ A close up of 2a, showing the method of construction. The cast brass base rises to a neck, into which the tube above is screwed. The collar with the lettering is rivetted over the bottom of the tube, strengthening the join in the soldered tube.

Variety of design and technology

The letter scales which were invented during that early period used almost every conceivable technology available. The most common form was a roberval. There were letter scales using various weighing principles: namely, the steelyard, the rocker, the spring, the bismar, the pendulum, and others using ingenious methods of weighing and calculating. The candlestick variety made

Figure 3. ≺≺ The later version of Winfield's first design registration, the collar no longer claiming that protection, but merely has stamped R W WINFIELD BIRMINGHAM. Postal rates 1/2 oz for 1d, 1 oz for 2d, 2 oz for 4d, 3 oz for 6d, 4 oz for 8d (1840-65).

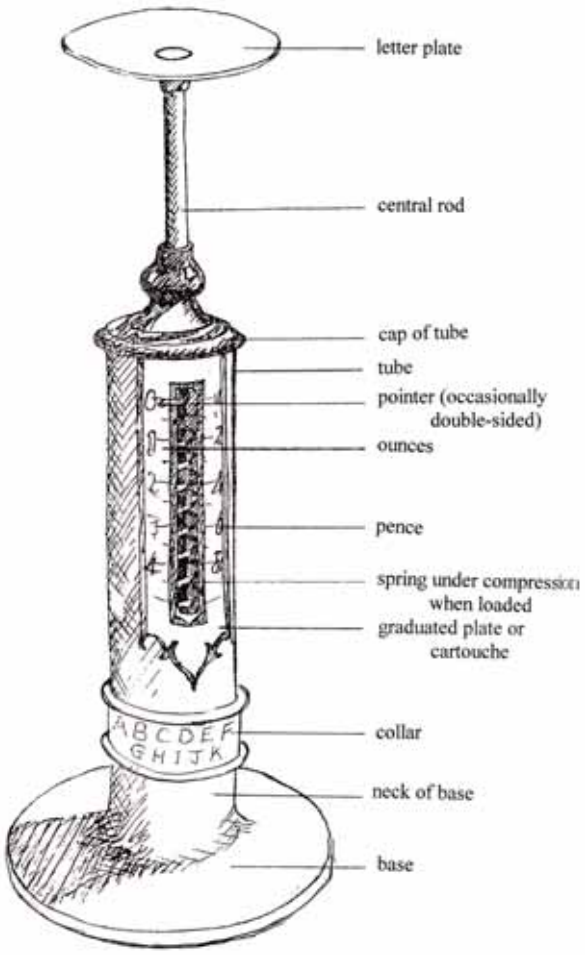


Figure 4. ➢➢ Diagram of the standard candlestick scale. The comment about the base refers to a sheet attached underneath, obscuring the view of the screw and the rod that descends as the load is applied.
The spring under compression was the British method of utilising the spring. The spring under tension was more commonly used in the USA. The length of tube needed was not affected by this variation.

use of the simple spring, which had already contributed so greatly in a multitude of ways to the success of the industrial revolution (Figure 3).

The Description

The candlestick is so-called because (presumably) its central pillar was analogous to a candlestick (in fact a hollow tube). I have long suspected that this tube came from the very factories in Birmingham which made real candlesticks in brass, silver and other metals. As you can see from the drawing (Figure 4) the letter plate is attached to a rod that has a pointer at its bottom. The rod is attached to the top of the spring, so that, when a load is applied, the spring is compressed. The rarer type has the rod attached to the bottom of the spring (Figure 6) and the spring is attached to the top of the tube, so that, when a load is applied, the spring is stretched (in tension, as in Winfield's registered design No. 3267 of 25th May 1852). An even rarer variety has the rod attached to the top of the spring, so that the spring is compressed by adding the load, but the graduations can only be down the top part of the tube, while the spring fills the bottom of the tube (Figure 5). However, not all models used the spring. The hydraulic version uses a liquid such as mercury or water as the basis for indicating the mass being weighed. [See EQM pages 2739-2746 for additional information.]

Figure 5. ➢➢ This minute candlestick is only 3 1/2 inches (87mm) high. The country of origin and the maker are unknown. The design is particularly irritating, as the letter obscures the view of the graduations, and the graduations are so close together that they are very difficult to read. James Reeve collection.

Figure 6. ≺≺ Anonymous candlestick of exceptionally thin proportions, being 7½ inches (190mm) tall. The base is heavy, being an iron casting covered by a thin pressed brass 'cup'.

The narrow spring is attached to the top of the tube, and the rod is attached to the bottom of the spring. The tube is made from flat sheet rolled and soldered. For weight only, ½ oz , 1 oz , 2 oz , 3 oz , 4 oz, 5 oz and the only example known graduated to 5 oz capacity.

The spring is been shown extended by adding a lead mediaeval weight as a load.

Figure 7. ➢➢ The Winfield candlestick on the right is exceptionally tall, being 13½ inches (335mm) high. It is standing beside a standard Winfield for comparison.

The tall scale has a collar stamped N° 170 JANUARY 13 1840 R W WINFIELD BIRMINGHAM and a screwed-on graduated plate for weight only, from 0-16 [ounces].

The rod is confined in the base by three tiny concave rollers arranged evenly round the rod that prevent the rod from binding in the hole in the base. The letter plate is screwed to the top of the rod. The whole scale is solidly constructed of the highest quality lacquered brass.

Candlesticks can be as small as 3½ inches (85mm) in height to 13½ inches (335mm) tall such as a packet scale by Winfield (Figure 7). L E Brown of USA made a kitchen scale in either brass or in zinc alloy, 10 inches (260mm) tall, and Henley, England produced a fat, tin kitchen scale 8 inches (200mm) tall (Figure 8).

The average candlestick scale is about 6½ inches (170mm) high. Most letter plates are simple flat brass discs, but others are gloriously stamped, or embellished (Figures 9, 10, 11 & 12). The main body of the scale (the tube) was usually made of brass, stamped or cast (Figure 13a & 13b), but other varieties have been seen in glass, silver, ivory, patinated brass, tin and wood. A rare variety, in bronze, doubles as a bell. The bases are frequently the most eye-catching part of the scale, being made of

Figure 8. ➢➢ Two candlesticks for household use. The left-hand scale is an American scale by L E Brown of Cincinnati, patented in 1878. The long pointer can be adjusted in its length so that the scale is tared for a bowl.

The right-hand tin-sheet scale is very simple and was so cheaply made that it seems probable that it was given away. The name Henley pressed into the pan looks like a trademark, and is probably the name of the donor, not the manufacturer. The graduations are pressed into the stalk below the pan, where they are in shade, and consequently are almost impossible to read.

Figure 9. ⮜⮜ The top of a Winfield candlestick. The floral design matches the design on the tube and the base. The raised dome of the peg is characteristic of Winfield's construction.

Figure 10. ⮞⮞ The top of the Winfield shown in Figure 13a, with the symbolic flowers of England (a rose), Scotland (a thistle) and Ireland (a shamrock). The top is attached to the rod by a collar soldered to the underside of the plate.

cast-brass, pressed-brass (Figure 14) cast-iron (Figure 15) Matlock marble (Figure 16), glass (Figures 17 & 18), silver (Figure 23), ivory (Figure 19), wood (Figure 20) and tin (Figure 21).

Dating candlestick scales

Candlestick scales were made from January 13th 1840 onwards, when Winfield took out a design registration No. 170 to protect his idea for three years (Figure 2). Some scales do carry that date, but this is the date of the design registration, and not necessarily the date of manufacture. An approximate date can be obtained by looking at the graduated scale on the front of the tube, and referring to the period during which that particular postage rate applied; or from checking the dates during which a maker was known to have worked. Caution is needed when dating by postal rates, as some makers seem to have used a rate that was no longer current, (Figure 22a & 22b). Scales of English silver can be dated precisely by reference to the silver hallmark (Figure 23); otherwise, dating is often a difficult task. The vast majority of candlestick scales bear the postage rates for 1840-1865.

In the UK, the most prolific manufacturer of candlesticks was R W Winfield. The only other competitor to Winfield of any substance was the firm run by the brothers Joseph and Edmund Ratcliff. However, there are other names that appear on candlesticks, T Wharton & Sons and William Blews & Sons. Two candlesticks are known by Samuel Turner of Birmingham (STS on his other

Figure 11. ⮜⮜ A small J & E Ratcliff postal of cheap construction, only 4½ inches (110mm) tall. The lacquered brass is all pressed to give a very decorative finish. The tube is covered with a lattice pattern with an infill of flowers and leaves. It is neatly soldered down the centre back. The tube is screwed into the pressed brass base. Postal rates ½ oz for 1d, 1 oz for 2d only.

Figure 12. ⮞⮞ A standard-height anonymous candlestick using construction methods that match those used by R W Winfield. The graduated plate is screwed onto the tube. The decorated cap is a push-fit on the tube. The base is decorated with a trail of convolvulus. It is probable that the base is pressed, but the base has a sheet of iron concealing the interior. The scale is black patinated with gilt stripes and was also made in gilt brass. Postal rates ½ oz for 1d, 1 oz for 2d, 1½ oz [no price], 2 oz for 4d (1840-65).

Figure 13a. ≺≺ This Winfield scale has the symbols of Great Britain on the plate (Figure 10). The method of construction is the same as used by Ratcliff in Figure 11. The base has three shields interspersed with bunches of a rose surrounded by a thistle stem and shamrocks.

Figure 13b. ➢➢ Close-up of figure 13a, showing the impressed graduated cartouche and the name R W WINFIELD BIRM[M.] The join where the tube screws into the base is clearly visible. The seam down the back is almost concealed by the raised polished lines decorating the matt gilt tube. Postal rates 1/2 oz for 1d, 1 oz for 2d, 1/2 oz [no price], 2 oz for 4d (1840-65).

Figure 14. ≺≺ Below is a comparison between a cast candlestick by Winfield and a pressed candlestick by Ratcliff. The scales are the same height and capacity but the Winfield weighs 255 grams, whereas the Ratcliff weighs only 100 grams. That is a big difference in the amount of brass needed.

Figure 15. ➢➢ This Ratcliff scale is 5 3/4 inches (135mm) tall. The collar (in fact made as part of the tube and not added later) is stamped MANUFACTURED BY JOS[H] & EDM[D] RATCLIFF. The tube is apparently soldered into the iron base. The cap is screwed to the top of the tube. The heavy iron base gives the scale good stability and a feeling of good quality. Postal rates 1840-65.

Figure 16. ≺≺ There are several surviving examples of candlesticks mounted on Matlock marble bases. These bases were a speciality of this Derbyshire village, although some of the stones were imported to add to the range of colours. Some are methodically organised, and some have a crazy patchwork of various stones called 'scrap-work' by the makers. The term 'pietra dura' is inappropriate for bases of British manufacture.

Figure 17. ⩚⩚ Ratcliff competed with Winfield's all glass tubes by producing these elegant bell-shaped bases. They are extremely rare. Postal rates 1840-65.

Figure 18. ⩚⩚ Winfield produced their own bell-shaped glass base in green, and went one better. They put an additional collar of gilt ivy leaves round the base. Unlike the best of S Mordan's work, we do not know where these scales were retailed, but it would be logical to assume that they went into the smart shops in London on Bond Street, Audley Street and Regent Street.

Figure 19. ⩛⩛ This ivory candlestick has the name W I E Rooke stamped into the base, but he is assumed to be the turner. A machine to do intricate turning was invented in about 1860, and thereafter there was a craze for elaborately turned objects. Postal rates 1840-65.

postal scales) (Figure 30). Were his candlesticks made by Ratcliff? All known makers of candlesticks worked in the Birmingham area, where they had ready access to springs made by Salter. There were many competent scalemakers in London, yet none of them appear to have made candlesticks. I wonder why?

Robert Winfield

Robert Walker Winfield operated from 1829 and was located in Birmingham on the Baskerville Estate. His company is listed as brass and copper founders, tube-makers, makers of metal bedsteads, chairs, gas fittings, etc. This activity continued until the late 1890s when the company went bankrupt. The 1840 date shows how quickly Robert Winfield exploited the market for postal scales.

Figure 20. ➢➢ Winfield did some 'mixing and matching'. The pretty ivy decoration overlapping the ebony base is also seen on their green glass candlesticks. Postal rates 1/2 oz for 1d, 1 oz for 2d, 2 oz for 4d, 3 oz for 6d and 4 oz for 8d, (1840-65). The cap on this example is unusual in being shaped like a bud, but it is appropriate to both this and the green scale above.

Winfield manufactured all types of scales, including the popular sovereign rockers.

According to the biographer of Mr Compton (of the famous Compton electric lamps), the person responsible for the expansion of the Winfield business was Mr Charles Torr, an employee, who subsequently became its Managing Director. Mr Torr held this position until the company went into liquidation. Sadly, and shortly after the liquidation, Mr Torr had a heart attack and died. When the mortician was preparing his body for burial, it was discovered that Mr Torr was a woman!

Winfield's second design registration N° 1569 of 18th October 1848 was for a cylinder made of Bristol milk-glass. He extended his range of glass candlesticks without further protection, making superbly coloured candlesticks of turquoise, red, blue, and green (Figure 18). The glass was occasionally ornamented with bands of gilt brass or wreaths of gilt ivy leaves (Figures 24a, 24b & 24c).

Figure 21. ⮙⮙ The Criterion tin candlestick came in at least three variations - the one on the right with the design registration number (allocated to A Barker in 1928), the version with the Criterion diamond trademark (owned by Setton & Durward) and the left-hand version without the trademark but with an extra base made of composition. There are no postal rates, just the weight 0-6 oz.

Figure 22a. ⮘⮘ The anonymous little candlestick has a design registration of 1895 in minute letters under the pan. The maker can be identified as R Hodges, an otherwise unknown maker. Postal rates 1/2 oz for 1d, and 1 oz for 2d only.

Winfield made numerous designs without taking out protection, usually utilising their patent tubes, made by extrusion [that is, without a seam] (Figures 1 & 25).

The third scale design registration was N°. 3267 of 25th May 1852, a brass tube with a spring in tension. The stick was above average height, being 10 1/2 inches (265mm) tall.

Winfield employed his special patented pressing technique to produce an effect on the brass known as *silk brocade* (Figure 34 in Part 2). These brocaded scales could not have been made any earlier than the late 1850s (the date of his patent). Some examples were gilded or lacquered over the brocade, and some were painted; sadly the paint tended to chip off.

Figure 22b. ⮙⮙ Close-up of Figure 22a. A very Victorian decoration! Why was Hodges showing postal rates that finished in 1871 on a scale not designed until 1895? Theories to the author, please!

Figure 24a. ➢➢ This magnificent display of three glass candlesticks all exhibit the characteristics of the Winfield design registration of 1848. The one on the left has W Blews & sons on the letter plate whereas the other two have R W Winfield on their letter plates. Postal rates 1840-65.
Glass is another material that is difficult to maintain, as the gilding tends to come off when cleaned.

Joseph & Edmund Ratcliff

Brothers Joseph and Edmund Ratcliff were also brass founders based in Birmingham. Their offices were at 59/60 St Paul's Square. They, too, had a broad range of products, including chandeliers, gas fittings, letter clips, and (real!) candlesticks. They manufactured several types of scales and produced distinctive and original weights. They are featured in trade directories from 1839 to 1864. Joseph died in

Figure 23. ➢➢ Levi & Salaman solid silver candlestick hall-marked L & S 1904. They took out a design registration N°. 308820 for this elegant shape in 1897. The graduated plate is made of artificial ivory (celluloid), a material that is very prone to being wiped clean by the concientious housewife, leaving a blank sheet! Weight only, 0-12 oz.

Figure 24b. ➢➢ The letter plates, showing left-hand plate stamped lettering REGISTERED SEPT^{R} 5TH 1848 R W WINFIELD BIRMINGHAM and the right-hand plate stamped W BLEWS & SONS BIRMINGHAM WARRANTED CORRECT.

Figure 24c. ⮝⮝ The underside of two of the glass candlesticks, all three of which had exactly the same construction method. The brass is attached to the glass by a white cement.

Figure 25. ➢➢ Winfield scale. Postal rates 1840-65. The cap has the special Winfield knurled edge, as if any owner would wish to unscrew the cap!

1862 and Edmund continued on his own until 1881. They did not take out any protection against plagiarism, either patent or design registration. A candlestick made by Ratcliff (circa 1860) graduated in grams and destined for the French market, emphasised their entrepreneurial abilities (Figure 26a & 26b.)

The Victorians liked compendiums, and cast candlesticks were ruggedly built to act as paper weights as well as scales. The Victorians also liked patriotic objects, so Ratcliffs made a base with the flag of St. George at each corner of the base (Figure 28). A puzzling Ratcliff has an old thermometer screwed to the rear of the tube (Figure 27).

Both Winfield and Ratcliff not only made scales which bore their names but also made a vast number of items specifically for general and other specialist retailers of office and desk set suppliers. Many of these latter production-runs resulted in scales with no maker's name whatever. Both may have used individual parts made by another firm. Evidence for this is a candlestick by Ratcliff; and a scale with an identical base and letter plate by Winfield. Only the central column shows any material differences. Did Winfield copy from Ratcliff - or the other way round? - Very unlikely. Did Winfield make for Ratcliff? Or visa versa? Or did a third party make the same parts for both of them? I have also seen two identical candlestick scales, except that one bears the Winfield logo and other the Wharton logo.

Figure 26a. ⮝⮝ This Ratcliff candlestick was seen in France. It was graduated in grammes and exported. The base is iron.

Figure 26b. ⮝⮝ Close-up of Figure 26a, showing the grammes from 0, 10, 20, 30, 40, 50, 60. The two positions for $7^{1}/2$ and 15 grammes (on the left side of the graduated plate) prove that it was intended for use in France.

Thomas Wharton

Thomas Wharton & Sons of 4 Great Charles Street, Birmingham made small fancy articles in brass, bronze, ormolu, papier-mâché and japanned wood according to their advertisement of 1862. They were in business until at least 1876. Their wares included candlestick scales and ladder scales, pen racks and cleaners (Figures 32 & the Cover.) It has been difficult to confirm that they undertook any manufacturing activity, and it is more likely that they were simply retailers of stationer's sundries which, in those days, would most certainly have included letter scales of all types.

Figure 27. ⮜⮜ J & E Ratcliff candlestick with a thermometer screwed to the rear. The thermometer is much older than the 'stick, and has screws attaching it that are not the normal Ratcliff screws, so this is probably an extra added at some time during the life of the 'stick. As the thermometer plate is too long, it overlaps the stamped collar with their name on it, giving the piece an amateur look. Two 'sticks are known with thermometers on them. Postal rates 1840-65.

On my many trips to the United States, I visited many collectors, a few of whom have Wharton candlesticks which are identical to their English counterparts except that the scales are graduated in US cents. UK manufac-turers like Wedgwood and Masons (in the field of ceramics) made products for British and American retailers who had them transfer printed with their own trademark during manufacture. Wharton is assumed to have done the same. I have seen a desk set in America which is identical in every way to one that I possess, except that the

Figure 28. ⮜⮜ J & E Ratcliff with the flag of St George at each corner of the base. Postal rates 1840-65. Cast brass base.

Figure 29. ⮟⮟ The top of a Ratcliff candlestick.

Figure 30. ➢➢ Candlesticks by Samuel Turner are very rare. The collar has stamped S TURNER BIRM[M] MAKER. He might have meant maker of other types of scales, not candlesticks! Postal rates 1840-1865. Made between 1858-1865.

Figure 31. ≺≺ Anonymous candlestick with an extremely small, light base. The 'stick will topple over with the slightest knock, and probably did not live on a desk. It seems more likely that it lived in a desk or travelling case, and was only taken out when needed. Postal rates 1840-1865, capacity 8 oz.

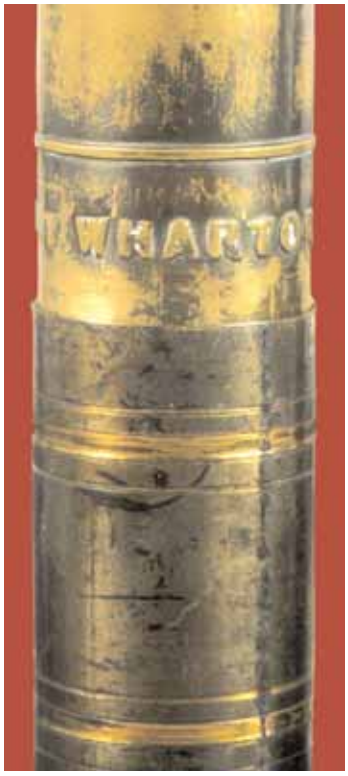


Figure 32. ➢➢ The tube of the candlestick shown on the Cover. The two grooves that are thought to characterise Wharton's work show distinctly. The seam is visible on the right side of the lower tube. The patina has worn away, showing that the black patina is not bronze but is a surface finish on brass.

Figure 33. ⮙⮙ The top of an anonymous desk set candlestick with postal rates 1 oz for 1d, 2 oz for 1½d, 4 oz for 2d, 6 oz for 2½d, 8 oz for 2d (1871-1897). This late period is extremely rare on candlesticks.

name Wharton does not appear. In its place is the name of a well-known American manufacturer. (Note: some of the candlesticks made by Wharton are distinguished by two concentric rings which appear around the bottom of the tube. This may well be an indication that if, as suspected, Wharton used an outside maker to supply his tubes, the rings may have been to distinguish his articles from those of his two major competitors.)

Winfield latterly used his patented extruded tubes without a seam whereas the tubes of candlesticks made by Ratcliff (Figure 29) and Wharton (Cover) are made out of a flat sheet of metal soldered together along the leading edge to make a tube.

Continued in the next issue.....

Postal Rates for Period December 1839 - October 1871

Weight in Oz.	5.12.1839 to 10.1.1840	10.1.1840 to 1.4.1865	1.4.1865 to 5.10.1871
½	4 pence [d]	1 penny	1 penny
1	8 pence	2 pence	2 pence
1½	---	---	3 pence
2	1 shilling & 4 pence	4 pence	4 pence
3	2 shillings	6 pence	---
4	---	8pence	---
	then 8 pence per oz.	then 2 pence per oz.	then 1 penny per half oz.
	up to 16 oz.	up to 16 oz.	

Sandy Harris, Scale Inventor

BY KURT BEYREIS

Soon after the doors opened at the Silent Auction at the 2005 annual ISASC Convention in Washington DC, there was a buzz of excitement at the end of one of the auction tables. I walked over to see what was happening, since there are always scales at the Silent Auction of every Convention that are unusual and exciting. It was the Buckelew and Waterman scale shown in figure 1. I had never seen anything like it and neither had most of the people gathered around the scale.

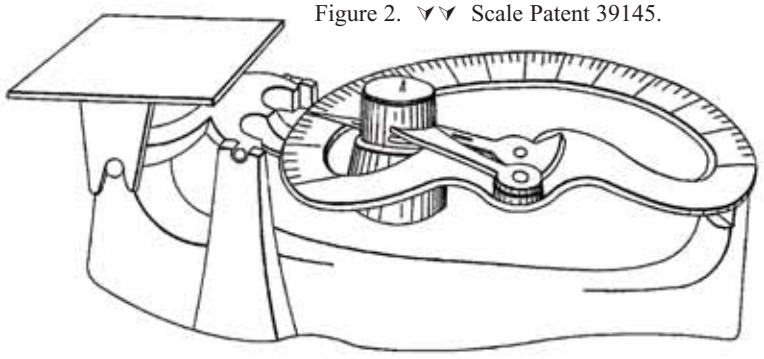
Figure 1. ⮝⮟ Buckelew & Waterman scale with insets below showing the name and patent date information that is stamped into the arched beam.

This half roberval and steelyard shop scale was patented in the United States on July 7, 1863 by Sandy Harris, a one-time grocery clerk, later employed at the Philadelphia Customs House. It is quite large for a scale with a capacity of 4 lbs, measuring 14 ins long, 11 ins high and about 6 ins wide. The scale itself weighs over 13 pounds and appears to be built to handle a capacity far in excess of the indicated 4 pounds which I will discuss later. The base is cast iron and the beam, poise and pan are brass.

The manufacturers, Buckelew and Waterman, had their scale shop at 716 Market Street in Philadelphia in 1869 and produced and sold scales for only a few years, probably starting in 1867 and continuing to 1869. It appears that John D. Buckelew was a wealthy farmer from New Jersey who provided the capital for the venture while Albert G. Waterman was the actual scale maker. Given the short period of time that they produced scales, it cannot be expected that there will be many examples of their scales still available today.

The most unique feature of this scale and the basis for the patent is the mechanism of the poise movement along the beam and its interaction with the pointer for the weight indicator. As shown in figure 2 from the actual patent, there is a cam that allows the poise to move along the beam in an arc more or less parallel to the beam.

Figure 2. ⮟⮟ Scale Patent 39145.



The pointer, shown in figure 3A, has a separate pivot point (F) from the pivot point for the poise(D). The pointer is grooved and slides through a slot in the poise, guided by a pin in the center of the poise at point (G). The net effect is to convert the linear movement of the poise into a circular movement for the pointer to indicate the weight on the outside arc. This results in an

almost uniform scale on the outer arc, making the graduations nearly equal over the 4 pound range.

In fact, after examining the geometry of the scale mechanism, only a ratio of 0.5 of the distance between the pivot points of the poise (D) and the pointer (F) to the distance between the pivot point and the pointer where it comes in contact with the center of the poise(G) will result in a uniform accurate weight scale along the outside arc of 180 degrees. This is shown in figure 3B. It should be noted that the inventor stated in the patent that this ratio should be $^{20}/_{37}$ or 0.5405. However this will result in a slight distortion of the graduations on the graduated arc

Figure 3A.

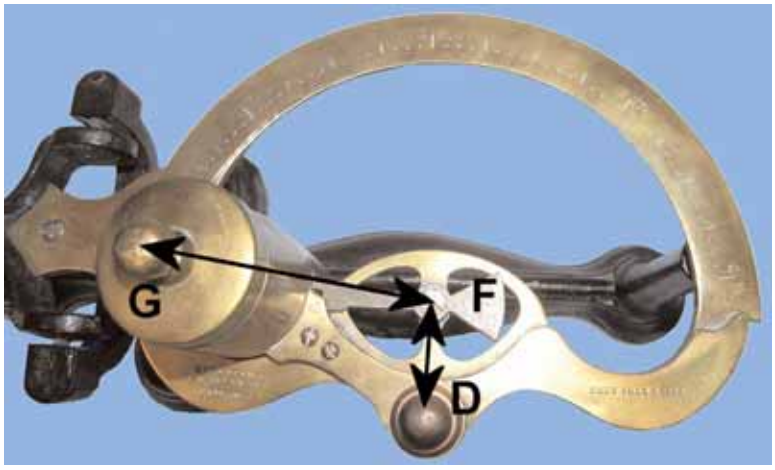


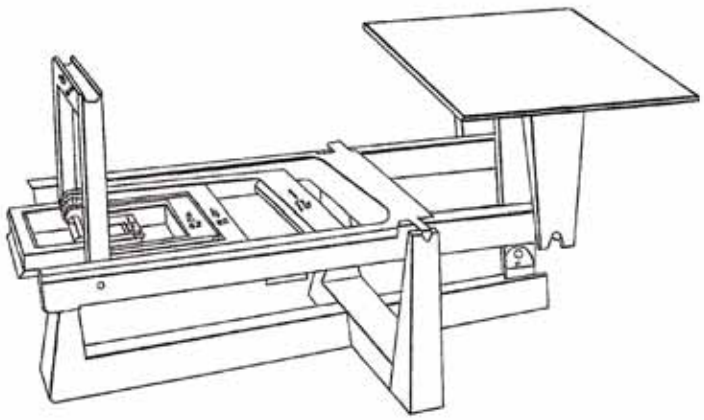
Figure 3B.

If the poise and the pointer were on the same pivot points the resulting gradations would be far apart at both ends of the weight range, say between 0-1 and 3-4 lbs and very close together at the middle of the range from 1 to 3 pounds. When the poise is moved $^1/_4$ of the distance of the total length of the beam the indicator should show 1 lb. Applying geometry to this case, the results show that the weight indicator would be at just over 60 degrees from the line parallel to the beam and the base of the arc so that the first pound would take over $^1/_3$ of the arc and the second pound would take only $^1/_6$ of the arc with the resulting compression of the weight gradations.

The poise also has a removable cap, so that by adding or removing lead, the scale could be zeroed very easily. The scale has no loose weights and is very smooth in operation and easy to use.

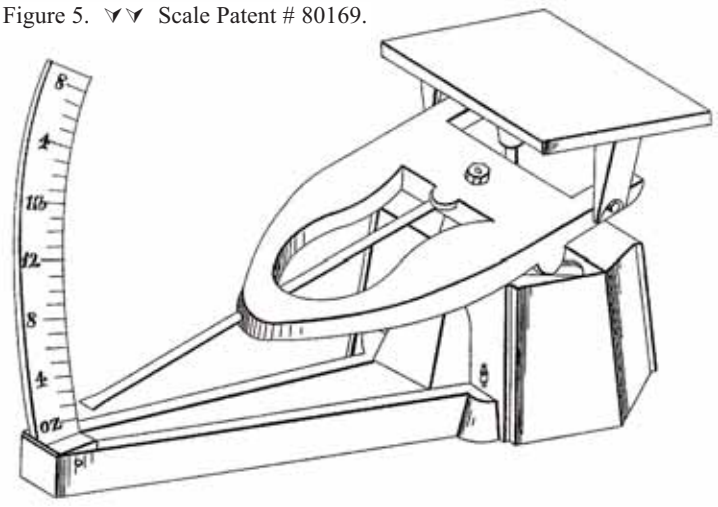
The scale seems to be accurate within only about +/- an ounce or two over the 4 pound range and therefore could have only limited application; maybe in hardware stores or other uses where this level of accuracy would be acceptable. The fact that the poise does not move in a straight line along the beam will put torque on the knife edges and the apparent looser tolerances required to make the poise/indicator mechanism work smoothly all contribute to limit the accuracy and usefulness of the scale. This also probably explains the reason for the apparent over-engineering of the scale. These design features resulted in having to calibrate and mark the graduations on the arc after the scale was manufactured. The inventor in writing about these

Figure 4. Scale Patent # 60184.



factors in the patent puts it as follows; *...but any error in this, as well as any trifling departure from regularity in the operations of the weights and hands, is overcome in graduating the arc, which should be done when all else is complete, and always with the aid of positive and correct weights.* All of these factors probably contributed to the short period of manufacturing and most likely resulted in a very limited production run.

Figure 5. Scale Patent # 80169.



Sandy Harris received three more patents for scales over the next ten years. On December 4, 1866 he received a patent for a half-roberval and steelyard scale, shown in Figure 4, which is based on the principle of "turn-over" poises. In the no-load balance position, all the poises were turned towards the weighing plate. As shown in the patent drawing, the poises ranged from 1 pound to one ounce resulting in a capacity of two pounds. When an object was placed on the plate the poises would be flipped out until the object was balanced. It should be noted that the principle of "turn-over" poises had been used on English folding money scales for many years prior to this patent. Later use of this principle included the Avery bread scale and some American shop scales, which used a flip-over poise to tare the scale when a loose pan was on the weighing plate.

His next scale patent was issued on July 21, 1868. A drawing from the patent of this scale is shown in Figure 5. This scale has the appearance of a steelyard but actually is a half-roberval and pendulum type. From the patent drawing, the scale appeared to have a $1^1/_2$ pound capacity by ounces.

Harris's final scale patent was issued on August 5, 1873, and is shown in Figure 6. This scale utilized two beams; one was immoveable (D) fixed to the scale base and held the cylindrical poises when they were not being used. The other beam (C) was the actual balance beam used for weighing objects. The two beams were nearly touching and had a split rod between them to allow separate poises to be slid over from the fixed beam to the balance beam as required to balance the object to be weighed. From the patent drawing the scale appeared to have a $1^1/_2$ pound capacity by ounces. To my knowledge this scale was never manufactured.

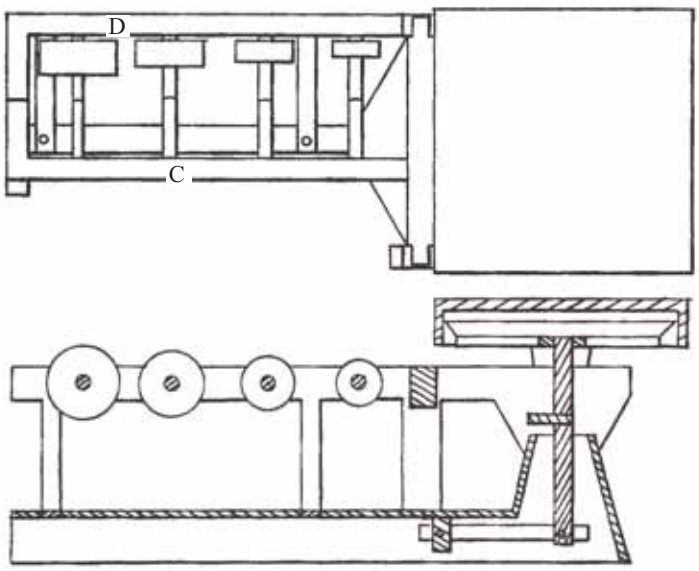


Figure 6. Scale Patent #141556.

All factors considered, Sandy Harris contributed some unique scale designs which had unusual mechanisms, albeit with some practical limitations. While it appears that most of his balances did not make it into the mainstream of scales-manufacturing, they still show us the ingenuity of inventors to find yet another way to weigh objects.

Even with all its faults and limitations, the Harris-designed and Buckelew and Waterman-built scale has become one of my favorites that I will enjoy for many years to come.

Acknowledgements

Special thanks go to Steve Beare and Jan Berning for their help in providing background information for this article.

Buckelew & Waterman - A Short-Lived Philadelphia Business

BY STEVE BEARE

I had not yet seen 'the scale' at the silent auction of the 2005 Washington ISASC scale convention. Kurt Beyreis excitedly showed me 'the scale' and asked if I had ever heard of the unusual Philadelphia maker Buckelew & Waterman. I confidently replied, *Yes, it is a real business name, and not just fabricated for the silent auction.* That is all Kurt needed to hear to decide that 'the scale', stamped BUCKELEW & WATERMAN PHILADA. PATD JULY 7, 1863, must go home with him.

When I returned home and checked my growing directory of 19th-century Philadelphia scale makers, I was somewhat embarrassed to find that all I had under this entry was: BUCKELEW & WATERMAN, 1869, 716 Market.[1]

I then began to aggressively scour 19th-century Philadelphia city directories, decennial U.S. Census reports, and contemporary periodicals for more information, and slowly built up a better picture of this incredibly short-lived and virtually unknown scale business. To my surprise, I found that there are only two Philadelphia city directory listings for the firm of Buckelew & Waterman:

BUCKELEW & WATERMAN (John D. Buckelew & Albert G. Waterman)
scales
1868 716 Market and 515 Callowhill
1869 716 Market

This novel scale was first shown at the annual Meeting of the American Pharmaceutical Association, held in New York September 10-13, 1867. *Buckalew [sic] & Waterman, Philadelphia, exhibited a balance called the arc scale, which has a stationary weight working on a pivot, and indicating both troy and avoirdupois weights.*[2]

Buckelew and Waterman advertised only once, March 14, 1868, in the weekly *Scientific American*, and did not mention their arc scale. *Buckelew and Waterman, 716 Market St., Philadelphia (city Sealer's office), Manufacturers and Dealers in weighing scales, weights and measures, will take agency for some saleable articles.*[3] This ad established that they were co-located at the city sealer's office in Philadelphia in 1868 (see George W. Shaffer below).

U.S. patent number 39,145 was issued for this scale to Sandy Harris, Philadelphia on July 7, 1863. It would appear that Buckelew and Waterman later purchased the patent rights from Harris, and made this scale sometime between 1867 and 1869, the only years they were in business together.

Who was John D. Buckelew?

Surprisingly, John D. Buckelew is not listed as a resident in Philadelphia directories from 1850-1880. However, under the Buckelew & Waterman entry, the 1868 and 1869 directories give Buckelew's hometown as Jamesburg, New Jersey, a rural farming community (Figure 1).

John D. Buckalew [sic] first appears in the 1850 census for Monroe, NJ (a small town near Jamesburg), age 18, occupation Farmer, at home with his farmer father, James, mother, and two brothers and two sisters.[4] James Buckelew was obviously prosperous, as his real estate was valued at $60,000 at the time. There were a dozen hands in the household, including five blacks.[5] In addition to farming, a few of


Buckby Thomas, laborer, h 2213 Richmond
Buckby William, carpenter, h 1256 N 10th
Buckby William, laborer, h 2213 Richmond
Buckby Wilson P., clerk, h 1256 N 10th
Buckdeschel Charles J., engraver, h N 46th n Seneca, W P
Bucke Nicholas, junk, Passyunk av e German
Buckelew John D. (*Buckelew & Waterman*), h *Jamesburg, N J*

BUCKELEW & WATERMAN
(*John D. Buckelew & Albert G. Waterman*), scales, 716 Market & 515 Callowhill

Bucker Gabriel, laborer, h r 706 N Front
Bucker Charles F., superintendent, h 462 St John
Bucker Charles F., Jr., salesman, h 462 St John
Bucker Joseph, barrels, h 610 Jefferson
Bucker Louis, tanner, h 1417 Brinton
Buckhart Alexendar, wiremaker, h 325 Green
Buckhart Robert, carpenter, h 671 N 11th
Buckheiser Frederick, patternmaker, h 1735 Pearl

Figure 1. Gospill's Philadelphia Directory for 1868

James Buckelew's many business activities were producing drain tiles and bricks, running a gristmill, and establishing the First National Bank of Jamesburg.[6] The town of Jamesburg was named after James Buckelew, and there is even an annual Buckelew Day to honor the man who put Jamesburg on the map.[7]

The future arc scale maker next appears in the 1860 census for Monroe, NJ as John D. Buckilew [sic], age 28, Farmer, real estate $5,000, personal estate $4,000. He was still living with his father and mother, whose real estate was now valued at an enormous $250,000, with a personal estate of $70,000. In addition to a younger brother, Lemuel, a Lumber Merchant, and younger sister, Mary, there were four servants and five laborers in the household. Next door lived a married older brother, Isaac, Civil Engineer, who went on to become a Director of the New Jersey Railroad.

James Buckelew died in Jamesburg on May 30, 1869, aged 68 years.[8] As John Buckelew was the only son who was a farmer, he would have taken on many additional farming and business responsibilities after his father's death. This appears to have abruptly ended his short-lived scale business with Waterman, who continued alone for only a brief time as a scale maker (see Albert G. Waterman below).

By the 1870 census for Monroe, NJ, John D. Buckelew is living in his own house (Figure 2), age 37, Farmer, married to Catherine E., age 33. Real estate $80,000, personal estate $25,000. In the 1880 census for Jamesburg, NJ, he is listed as Syrup Manufacturer, married to Katherine E., with two servants. He is next listed as a 68-year-old widower in the 1900 census, living with his brother in Monroe, NJ. Finally, he is listed in the 1910 census for Jamesburg, NJ, age 78, boarder at Lakeview, the family home.[9]

John Buckelew's role in the short-lived Buckelew & Waterman scale partnership appears to have been a financial one, and Waterman was the scale maker.

Albert G. Waterman

The 1860 Philadelphia census for the 8th Ward lists Albert Waterman, age 20, and brother John, age 10, living at home along with three other brothers and a sister, all born in PA. Their father was A. G. Waterman, age 60, broker, born in VA, real estate $20,000, personal estate $1,000, married to Emily, age 49. As evidence of Waterman's financial status, they had three domestic servants and a coachman. Albert senior died in 1862 in Philadelphia.[11]

Albert G. Waterman first appears in the Philadelphia city directories in 1861 as clerk, living with his father Albert G. at 1616 Chestnut. He is listed as clerk through 1867. The 1868 and 1869 directories show Albert G. Waterman (Buckelew & Waterman), at 716 Market. In 1870 Albert is listed alone, scales, 716 Market. The 1870 Philadelphia census for the 15th Ward lists Albert Waterman, age 26, and John Waterman, age 22, scale manufacturers, both born in PA, with $10,000 personal estate each. Albert's last listing in the Philadelphia city directories is in 1871, hardware, 716 Market, and his younger brother John is listed at the same address as salesman. The two brothers evidently left Philadelphia during 1872.

The credit agency R. G. Dun, forerunner of Dun & Bradstreet, gave Waterman a brief but positive credit report: Albert Waterman, Scales, 716 Market St. August 19, 1870. In good standing and credit, pays promptly, estimated worth $8-10M. No change on December 1, 1871 and May 9, 1872.[12]

Figure 2. The Inverness Mansion, home of John Dunn Buckelew, Jamesburg, NJ[10]

By the 1880 census, Albert G. Waterman is located in Manhattan, age 35, still single, and the Waterman census fingerprint is that his father was born in VA. In 1900, both Albert and John Waterman were still single and living in Manhattan, and listed as Metal Manufacturers; the 1900 census indicates that Albert was born in June 1839, and John was born in March 1847. Albert Waterman's scale manufacturing career

was remarkably brief, just four or five years.

Other Buckelew & Waterman Scale Connections

There are several other people who may have been connected with the manufacture of the Buckelew & Waterman scale. These include the inventor, Sandy Harris, a sealer, George W. Shaffer, and three well-known scale makers who were either at or quite near the Market Street address.

Sandy Harris was issued patent number 39,145 on July 7, 1863 for this novel scale, and later must have assigned it to Buckelew & Waterman. One would expect to find clear evidence of Harris's obvious aptitude for invention in either the city directories or census reports, e.g. with the occupation machinist or scale maker. Such is not the case.

Sandy Harris is first simply listed in the Philadelphia directories at 1 Sansom from 1849 to 1851. Then, as U. S. Storekeeper at 24 Walnut from 1852 to 1855, with no listing in 1856 and 1857. Finally, S. Harris, customhouse from 1858 to 1861, with his home at 1341 Chestnut.[13]

From 1862 until 1886, his listings read Sandy Harris, liquors, 31 S. 17th St. [this is located at the corner of 17th & Chestnut]. He died sometime during 1886, as the 1887 city directory lists only his widow Margaret.

The census reports are even more baffling: Sandy Harris was born in North Carolina around 1807 and came to Philadelphia by the 1840 census. He was listed as a gentleman in 1850, a lawyer in 1860, a liquor dealer in 1870, and a saloonkeeper in 1880.[14] There is nothing in the census or city directory information to indicate this Sandy Harris had a background consistent with a scale inventor. This is most unsatisfying and troubling to a researcher, and suggests that I may have found the wrong Sandy Harris.

To understand if there is a solid connection between the lawyer/liquor dealer Sandy Harris and the inventor by the same name, I checked out all witnesses to Harris's four scale patents for both text and drawings. For example, J. W. Mister was a witness to the drawing of the 1868 Harris scale patent. James W. Mister is found in the 1870 census for Washington, DC as a 22-year old draughtsman. This makes good sense, but there is no obvious connection to the Sandy Harris on S. 17th St. However, Sam'l P. Jones, Jr. witnessed the text of the same patent application. Samuel P. Jones, son of a well-known Philadelphia bookbinder, is listed as an alderman in the 1867 to 1871 Philadelphia city directories. His home was at 16 S. 17th, very close to Harris's liquor business at 31 S. 17th. A local alderman makes an excellent patent application witness, so this starts to help solidify the link.

For Harris's last patent, granted in 1873, there were two witnesses to the patent: J. W. Hampton, Jr., and Chas. F. Giller. There is a John Hampton, age 26, Custom Broker in the 1870 Philadelphia census, who is listed in the 1871 city directory as John W. Hampton, Jr., custom house brokers, 402 Library. Likewise, there is a Chas. F Giller, age 19, clerk, custom house broker, in the 1870 Philadelphia census, and he is listed in the 1871 to 1874 city directories as clerk, 402 Library. Clearly, Giller clerked for Hampton's firm. Since Harris had previously worked at the Custom House, this is a possible connection. However, Hampton is also listed as a notary public at 402 Library in the 1873 city directory, and a notary public makes more sense as a witness than a Custom House connection.

Figure 3. NMAH Buckelew & Waterman scale-side view.

The most compelling argument for the Sandy Harris lawyer/liquor dealer/scale

inventor is for the two witnesses to Harris's 1863 patent for the Buckelew & Waterman scale: Wm. Lacey and A. H. Palmer. William Lacey is listed in the city directories from 1862 to 1864 as head of the Philadelphia & Boston Ice Co., N.E. Chestnut & 17th. Similarly, A. Harry Palmer was a clerk at N.E. Chestnut & 17th in 1862 and 1863, and obviously worked for Lacey. Why were an ice dealer[15] and his clerk picked to witness this patent unless Harris knew them? The directories show that Sandy Harris had started his liquor business at Chestnut & 17th by the end of 1861, and he remained there until his death in 1886.

Figure 4. NMAH Buckelew & Waterman scale-top view.

George W. Shaffer appeared at 716 Market in the 1868 to 1873 Philadelphia city directories as sealer of weights & measures. He is also listed in the 1869 Gospill business directory under the commercial heading Scales, Weights, and Measures at 716 Market. Shaffer was at the same 716 Market address as Buckelew & Waterman in 1868 and 1869, and was most likely involved in the manufacture of their patented scale. He appeared in the 1860 census, 20th Ward, Philadelphia, age 48, Machinist, born in PA, as was son William, age 12.

Henry Troemner was at 710 Market during the entire period Buckelew, Waterman and Shaffer were at 716 Market, and Fairbanks & Ewing, agents for E. & T. Fairbanks, were at 715 Market from 1859 until 1872.

John C. Dell, a major Philadelphia scale maker, was at 515 Callowhill in 1866. Charles Mehler, another Philadelphia scale maker, was also listed at this address in 1867, and the Mehler & Dell partnership was at this address in 1865. Buckelew & Waterman were at 515 Callowhill as well as 716 Market in 1868.

Another Buckelew & Waterman Scale

Just as I was finishing this article, I came across a note from a visit to the Smithsonian's scale collections in March 2004. Among other interesting scales, I had seen a Buckelew & Waterman scale and noted the July 7, 1863 patent date. I immediately contacted Ann Seeger, Deputy Curator, who quickly located catalog number 308,930 (Figures 3 and 4). Like the Beyreis example, this scale is stamped "BUCKELEW & WATERMAN PHILADA." and "PATD JULY 7, 1863". It is located in the Division of Medicine and Science Collections of the National Museum of American History, and is believed to have come from the Patent Office.[16]

The NMAH Buckelew & Waterman scale has the original ornate red and gold paint detailing, plus a sliding poise not included on the Beyreis example. The calibrations on the arc are also different, in both avoirdupois and Troy pounds, which indicates additional use as a gold scale.

Fortunately, our intrepid editor Jan Berning had already located a later arc scale patent with an improvement to the 1863 Harris patent. U.S. Patent 78,532 (Figure 5) was granted to Louis A. Matos of Philadelphia on June 2, 1868, and is clearly the design used for the NMAH example (Figures 3 and 4). Matos most likely submitted a modified Buckelew & Waterman scale to the Patent Office as a working model along with his patent application. This would explain the Buckelew & Waterman mark with the old 1863 patent date. It is unknown whether any other Matos versions were built.

The 1868 Matos patent discussed the shortcomings of the 1863 Harris patent. Matos wrote: *I have discovered in my business of druggist, that the aforesaid scale or balance weighs against the buyer. The buyer does not get the quantity of fluid indicated by the index finger AB, but is deficient in quantity equal to the weight of the vial. To correct the inaccuracy, I fix a horizontal bar, D, to the side, and on the vernier end of the scale, a*

sliding weight, E, takes on this bar D.

It is remarkable that Louis Matos, a 30-year old druggist from Cuba, came up with this simple, clever modification very shortly after the scale was first introduced. It suggests that the September, 1867 American Pharmaceutical Association exhibition of the Buckelew & Waterman scale, based on the 1863 Harris patent, found at least one receptive druggist.

The 1900 Philadelphia census shows that Louis A. Matos emigrated from Cuba to NY in 1856,[17] and was a private in the NY Volunteers Regiment from April 1861 to May 14, 1863.[18] Louis A. Matos first appears in the Philadelphia directories as druggist in 1865, and continued to be listed either as a druggist or chemist until his death in 1900.[19]

Acknowledgements

The author would like to express appreciation to Jan Berning, Kurt Beyreis, Tom Bodall-Jamesburg Borough Historian, Ann Seeger-NMAH, and the entire staff at the Hagley Library for invaluable help.

Notes

1. Steve Beare. *Directory of 19th Century American Scale Makers*. In preparation.
2. *Druggists' Circular and Chemical Gazette*, Vol. 11, October 1867, page 235. Other scale manufacturers who exhibited were Henry Troemner of Philadelphia (in addition to prescription balances, there were four patterns of Hoffman's patent balance, one furnished in elegant style, the frame of the box being solid brass, heavily plated with gold, while the sides and top were of plate-glass, showing the working parts of the balance, which were of polished brass and steel), Becker & Sons of Hudson City, NJ (four patterns of their excellent balances-three adapted for prescription use, sensitive to the fiftieth of a grain, while the gold scale with ten ounces in each pan would turn as quickly-we believe them to be equal in accuracy to any made in Europe), V. W. Brinckerhoff, New York (exhibited five patterns of counter balances, and four prescription balances), and W. H. Schieffelin & Co., New York (a handsome cased prescription balance, also a small Beranger balance for the same purpose). See also American Journal of Pharmacy, November 1867, page 568 for a full reprint of the Druggists' Circular report.
3. *Scientific American*, Volume 18, No. 11, March 14, 1868, page 167. The charge was one dollar a line, and evidently Buckelew & Waterman felt a one-time appearance of their three-line ad was sufficient.
4. All census information is through the online index of ancestry.com. Index spellings are retained, even if incorrect, to help relocate census images. Many local public libraries and educational institutions now have online subscriptions to this valuable database under the name of either ProQuest or HeritageQuest.
5. By 1857, James Buckelew, Esq. owned 3,200 acres in Jamesburg. The value of crops was estimated to be $20,000; in grass 350 acres, corn 350, oats 200, wheat 100, rye 50, plus 800 in pasture. The rows of corn in one direction were nearly a mile in length. New York Daily Times, August 14, 1857.
6. See http://www.jamesburg.net/jha/savehistory/historyprofile.html
7. In 1847, because he was incensed by the refusal of authorities to admit a colored boy to the township school, Mr. Buckelew built a brick schoolhouse and declared it open to all children. At the dedication ceremonies, the people acclaimed it as the James B. or Jamesburg School. After this, the stop on the railroad and the town became known as Jamesburg. Louise Johnson Kerwin. *A House Of Many Windows "Lakeview", The Home Of James Buckelew In Jamesburg, New Jersey*. NJ, 1981. http://www.jamesburg.net/jhistory.html
8. *New York Times*, June 1, 1869, page 5.
9. Lakeview is the Buckelew Mansion on Lake Manalapan, NJ, and has been preserved. The original farmhouse dates to 1685, with many additions following James Buckelew's marriage in 1829. See http://jamesburg.net/jha/savehistory/historyprofile.html.
10. The author would like to thank Tom Bodall-Jamesburg Borough Historian, for the use of this photograph. See http://jamesburg.net/jha/history7.html.

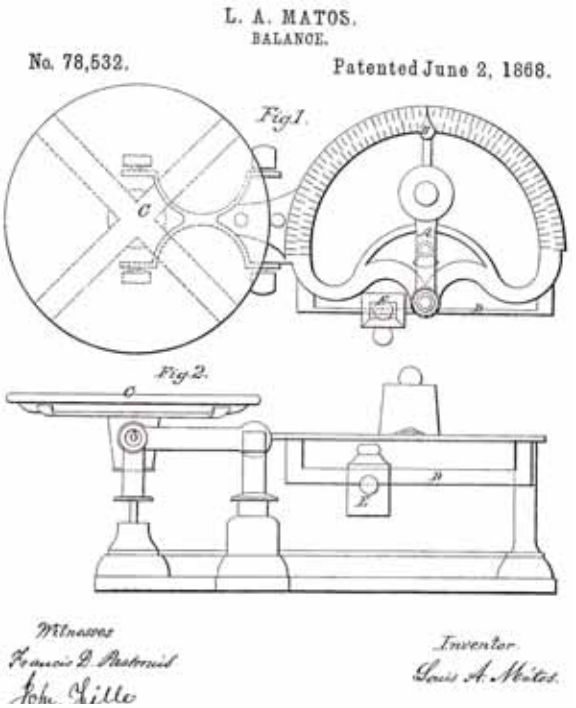


Figure 5. ⩓ U.S. Patent 78,532. Louis A. Matos, June 2, 1868.

11. FamilySearch International Genealogical Index
12. R. G. Dun & Co. Collection, Philadelphia, Vol.16, page 238.
13. A storekeeper was a politically appointed job to oversee the customhouse vaults. The Philadelphia Custom House was located on Chestnut above 4th. Sandy Harris was listed as customhouse officer, 1341 Chestnut, in the 1860 McElroy city directory.
14. Sandy Harris is first listed in the 1840 census, Chestnut Ward, born in North Carolina [no age or occupations were given until the 1850 census]. He appears in the 1850 census, South Ward, age 44, Gentleman, born in NC, married to Margaret, age 47, born in Maryland, two servants. Then in the 1860 census in the 9th Ward at 1341 Chestnut, Landy [sic] Harris, age 52, lawyer, born in NC, married to Margaret, age 51, born in MD, daughter Emma, age 5, born in PA, one servant. In the 1870 census for the 9th Ward, he is listed as a liquor dealer, age 62, b. NC, married to Margaret, age 67, b. MD, with daughter Amy, age 15, born in PA, one servant. By 1880, still in the 9th Ward at 31 S. 17th, Sandy Harris, age 74, is a saloon keeper, b. NC, married to Margaret, age 80, b. MD, one servant.
15. William Lacey is listed as Ice Dealer in the 1850, 1860, 1870, and 1880 Philadelphia censuses. In the 1860 census, Lacey and Harris were 9th Ward neighbors, separated by only 9 pages of entries in the 434-page enumeration for this ward.
16. Grateful appreciation is expressed to Ann Seeger, Deputy Chair, NMAH Division of Medicine and Science, in locating this scale and sharing information and photographs from the NMAH Collection.
17. Immigration records from ancestry.com show that Louis A. Matos also arrived in the port of Philadelphia in 1863 and 1873, and made at least two other voyages back to Cuba. On March 5, 1867, Louis A. Matos, age 29, Engineer, arrived in NY from Cuba, with his wife Sarah E., age 26, and son Louis J., age 3 (NY Passenger List, Steamer Fah Kee, port of embarkation St. Jago, Cuba). Louis A. Matos, age 36, also arrived in NY from Cuba on Nov. 25, 1873 (NY Passenger List-SS Crescent City, embarkation Havana, Cuba). He submitted a declaration of intent on Sept 30, 1863, and was naturalized in Philadelphia on October 17, 1873.
18. 1890 Veteran's schedule, U. S. census.
19. The 1870 census for the 15th Ward of Philadelphia lists Louis A. Matos, age 33, Drug Store, born in Cuba, married to Sarah E., age 25, born in PA, parents born in England, and son Louis J., age 3, born in PA. In the 1880 census, Louis is still listed as a druggist, and has two more children. The 1900 census gives his birth as April 1837, occupation Chemist, and married to Sarah for 37 years. In 1910, Sarah Matos is listed as a widow, living with her son in Swarthmore, a Philadelphia suburb, and is still living in Swarthmore at age 86 in the 1930 census.

Orlando W. Bedell and the Zenith Egg Grading Scale, Part 3

BY CHARLEY AMSBAUGH

Editor's Note: This is the final part of a three-part article.

As discussed in the first two parts of this article (pages 3056-3059 and 3081-3084), the materials used for the base and the t-shaped upright for the Zenith Egg Grading Scale changed over the years, evolving from pot metal to cast iron for the base and from pot metal to formed aluminum for the T-shaped upright and graduated scale. The color of the base also changed over time, evolving from unpainted gray to dark blue to light blue to painted gray (sometimes light, sometimes dark gray, depending on what was available). The counterweight is about the only major part of the Zenith that never changed, either the material used to make it or the color - it has always been made of cast iron and has always been red in color. The labeling used for the Zenith also evolved over time, as depicted below in figures 2 - 8, first as it moved from "patent applied for" status to "patent issued" status (assumed, but patent number not found), then again as ownership changed, as the manufacturing location changed, and finally as new patterns (figure 8) were made to replace the original ones melted in a fire at the Lyons Foundry in Greene, NY.

The Bedell Years

The Zenith Egg Scale was originally designed with pot metal for both the base and the T-shaped upright (Bedell later changed to cast iron for the base and formed aluminum for the T-shaped upright). The scale head was graduated in 1-ounce increments from 18 to 30 ounces per dozen. As a group, these 'early' scales were all gray colored (unpainted), except for the bright red guitar-shaped counterweight and pointer, and they all sported paper labels. Before his patent was issued, the paper label included the words "Pat. Applied For"

(Figure 2). After the patent was issued, "Pat. Applied For" was dropped, of course (Figure 3). Since those early labels were made of paper, only a few have survived the passage of time. Usually, when we find one of these gray-colored 'early-production' models, there are no longer any remnants of the original paper label.

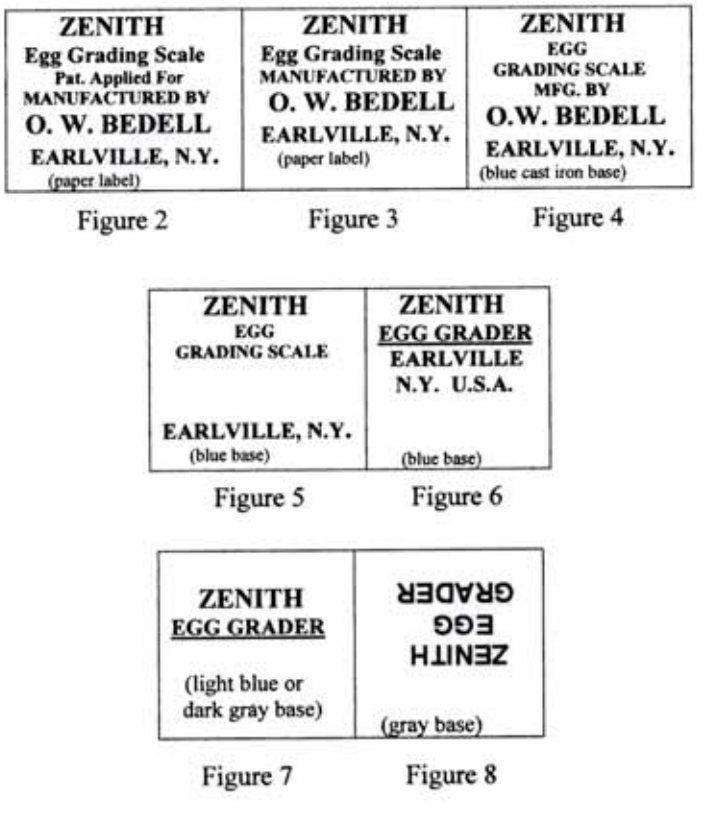


Figure 1. ⩓⩓ Zenith Egg Scale Labels.

The first Zenith Egg Scale was rounded at both ends and was completely flat on the bottom, lacking any legs (Figure 9). This first pre-patent egg scale also lacked the raised bar on the top of the base to the right of center. Another pre-patent model (Figure 10) soon appeared, still without the raised bar on the top of the base to the right of center, but with legs and the ability to level the scale by turning a small bolt through a tapped hole at the left end of the base. This model also had a tapped hole (see arrow) directly under the counterweight into which a small bolt could be screwed to serve as a stop when using the Zenith as an egg grader.

By this time, Bedell had achieved the design he wanted. He added a solid "bar" on top of the base, to the right of center, repositioned the stop bolt (curved arrow on Figure 11) and attached a rubber bumper to it to cushion the blow of the counterweight, and he was ready to start production of the Zenith Egg Grading Scale with a gray-colored pot metal base with a paper label glued to the left top of the base (Figure 11). He probably produced the Zenith egg scale that way until at least 1942.

In the summer of 1942, poultry farming was added to the U.S. list of enterprises most essential to the war effort. That should have made it easier for Bedell to get enough material to make the bases, as well as the counterweights, out of cast iron, instead of pot metal, even during WWII. It is fair to assume that he started making the bases out of cast iron as early as 1942. One thing is certain: the patterns he used to make the cast iron bases had his label cast right into the base, on a slightly raised square on the top left surface of the base, beneath the guitar-shaped part of the weight. Bedell also used that occasion to add some color to his scale by painting the base, first a dark blue and later a light blue. The scale with the dark blue base still had the T-shaped upright and scale made of pot metal (Figure 12), and is thought to have been made that way until aluminum became more readily available after WWII. The scale with the light blue base had the T-shaped upright and scale made of the formed aluminum (Figure 13). All the blue- and red-colored Zenith Egg Grading Scales produced until Bedell sold the business in 1948 bore the "O.W. Bedell" label (Figure 4 above).

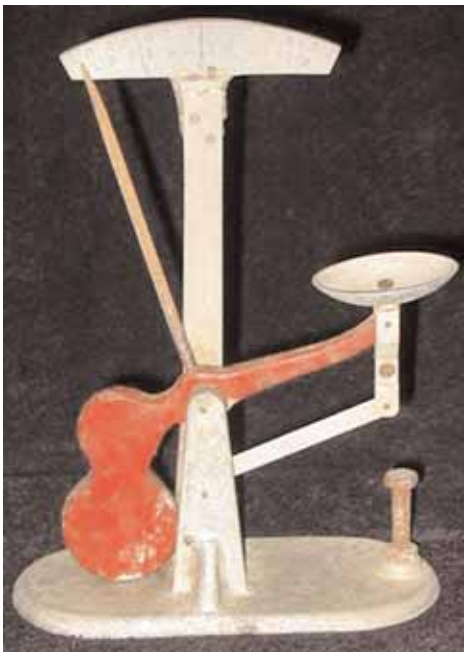


Figure 9. ⩓⩓ Zenith Prototype. Note the rounded ends and the lack of legs or leveling bolt.

The Grange-Agway Years

When the Grange League Federation (G.L.F.) in Earlville bought

production rights for the Zenith in 1948, they simply ground the words "MFG BY O.W. BEDELL" off the master patterns which were used to make the sand molds in which the cast iron bases were poured at the foundry, leaving an empty space in the middle of the label (Figure 5). That enabled them to immediately begin manufacturing the Zenith while they waited for new master patterns to be made. When the new master patterns were ready, they sported a new label, which read "ZENITH EGG GRADER, EARLVILLE, N.Y., U.S.A." (Figure 6). As noted earlier, the Grange changed the wording slightly, calling this an egg grader, not an egg grading scale, and adding "U.S.A." All Zenith Egg Scales sold by the Grange from its outlet in Earlville from 1948 until about 1964 carried either the modified Bedell label or the "U.S.A." label.

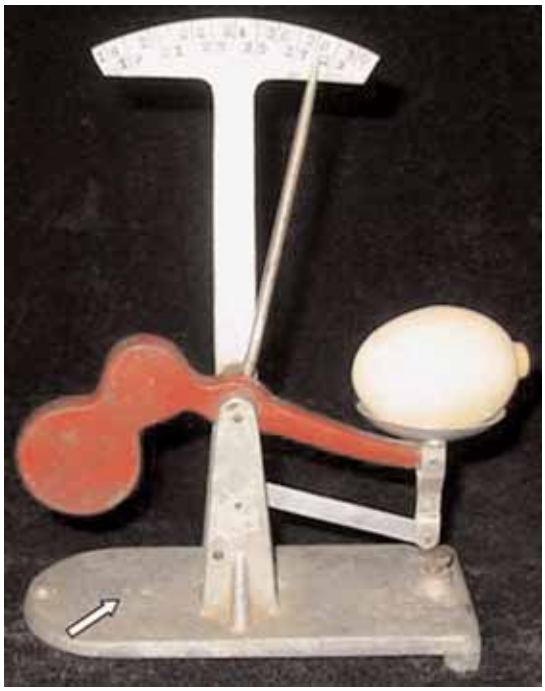
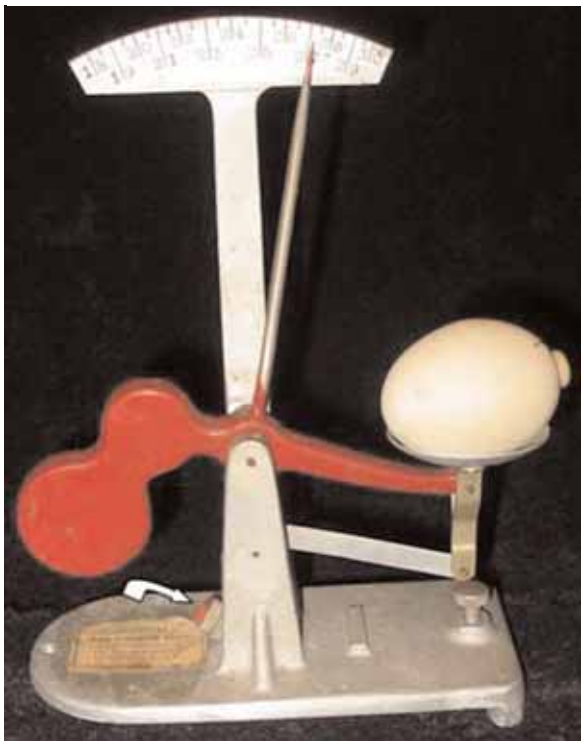


Figure 10. ⮝⮝ Zenith gets legs. Egg test wt used to show scale with load.

According to his widow, Sara, Norval L. (Bud) Pratt started working for the Grange farm store in Earlville, making Zenith Egg Scales, in the early 1950s. The Pratts lived in the New Woodstock area, about 22 miles from Earlville. In 1964, the Grange merged with two other farmers' cooperatives to form Agway. Agway established a new farm store in Cortland, NY, and moved everything there from the old Grange store in Earlville. Pratt accepted a job as the Specialty Manager for Agway in Cortland and continued making Zenith Egg Scales. Agway removed "EARLVILLE, N.Y., U.S.A." from the master patterns, thus creating "ZENITH EGG GRADER (Figure 7) as the new Agway label, and changed the range of the scale to weigh from 16 to 32 ounces per dozen (Bedell's standard of 18 to 30 ounces per dozen had prevailed to that point), but retained the established colors of light blue for the base and bright red for the counterweight. According to Tim Coon, who currently manufactures the Zenith in DeRuyter, Pratt told him that the Grange and Agway were selling 2,000 to 3,000 Zenith Egg Scales annually during their peak years. Demand for the Zenith and other manual egg scales declined in the late 1960s, however, and, in the early 1970s, when sales dropped off enough, Agway shut down its egg scale operation in Cortland and offered the equipment to Pratt.

Figure 11. ⮟⮟ Zenith ready for production.



The Pratt Years

Pratt set up the equipment in his garage in New Woodstock and continued making the Zenith Egg Grader. He kept the Agway label, Zenith Egg Grader, but chose a dark gray paint for the base (Figure 14). A couple years later, the Pratts bought a farm up north, in the town of New Bremen, near Lowville. When they moved there in 1974, they took the egg scale business with them. According to Sara, the Zenith Egg Graders they made in Lowville helped them make it through the first few years on the farm, until it started to prosper. In 1979, Bud and Sara Pratt sold the farm to Clint and Nancy Walzman and returned to the New Woodstock area, taking the egg scale business with them. Bud continued making Zenith Egg Graders in his basement in New Woodstock until he sold the business to Timothy W. Coon,

Figure 12. ⅄⅄ Zenith with dark blue base.

Figure 13. ⅄⅄ Zenith with light blue base.

Figure 14. ⅄⅄ Pratt Zenith with gray base.

in nearby DeRuyter, NY, in 1987.

According to Tim Coon, the Lyons Foundry in Greene, NY, made the cast iron bases and beams (counterweights) for the Zenith Egg Scales for Pratt, Agway and the Grange - presumably also for Bedell - until the early 1980s, when the Zenith master patterns were melted in a fire at the foundry. Pratt had new master patterns made and a foundry in Auburn, NY, has been making the bases and beams ever since. He had the label "ZENITH EGG GRADER", in large letters with each word on a separate line (Figure 8), centered under the counterweight [or poise]. He apparently failed to specify that the label should read from the front of the scale, however, because it reads from the back, so appears to be upside down.

The Coon Years

As noted earlier, Sara Pratt told me her husband had sold the Zenith Egg Scale business to Tim Coon, just down the road in the town of DeRuyter, in 1987. When I arrived at Tim's brother's farm and learned that Tim was there at the time, I drove down to the building where they were getting ready to work on the combine in preparation for harvest. In spite of the fact that I was obviously interrupting his work plans, he was curious about that Zenith Egg Scale I had in my hand. When he found out why I was there and saw the box full of Zeniths made by Pratt and Bedell which I had with me, Tim was kind enough take me over to his farm, where he gave me a tour of his egg scale production line, complete with heavy presses, multi-head drills, grinders and a metal turning lathe, with which he still produces 200 to 300 egg scales per year. When asked who was still buying manual egg scales in the new millennium, Tim told me that some states have such great respect for the accuracy and precision of the Zenith Egg Scale that they require their poultry farms to have at least one Zenith on the premises at all times for use in calibrating their modern, automated egg grading equipment.

Tim also showed me a set of master patterns - four steel patterns fastened to a steel base (Figure 15) - which are pressed into special molding sand to create the sand molds into which the molten cast iron is poured at a foundry to create the bases and beams (counter- weights). He uses the same master pattern as Pratt was using when he sold the business to Tim. Tim refers to this as the "new mold [pattern]" because it's the one that was made after the foundry fire in Greene destroyed the old pattern. Since Tim has not made any changes in the labels of the master patterns since he acquired them from Pratt, unless one looks newer than the other, it is impossible to tell which "upside down" labeled Zenith was made by Pratt (Figure 16) and which by Coon (Figure 17).

Like Pratt and presumably Bedell before him, Tim Coon drills holes in the base and beam for each scale, using special jigs to line everything up correctly. He has three heavy presses with which he cuts the raw material to the correct size; punches, drills and taps holes; shapes each component as appropriate; and punches the numbers into the face of the scale. He

uses a metal lathe to turn the brass pointers, and uses a foot press to form the aluminum upright, shape the pointer and fasten certain pieces together with rivets. After painting the bases gray and the beams red, Tim then begins assembling all the pieces into the finished product.

Figure 15. ⅄⅄ Zenith Master Patterns.

According to Tim, when Pratt was making 2,000 to 3,000 egg scales per year for the Grange and Agway, he was buying rubber caps from Goodyear for the adjustment screws in the base of the scales. When demand for the Zenith dropped to 200-300 per year, however, he had trouble getting those rubber caps from Goodyear in such small lots, at least at a reasonable cost, so it became impractical to use them any more. As a result, Pratt began using regular stove bolts instead, a practice which Tim has continued to date, except that Tim glues a piece of clear, soft rubber to the top of the bolts where the counterweight and the egg cup mechanism hit.

As we finished up our visit, Tim gave me one of Pratt's instruction sheets with his New Woodstock address and one of Tim's instruction sheets with his DeRuyter address. Those complement the ones I already have of Pratt's with his Lowville address and Bedell's with his Earlville address, so I now have a complete set. I then drove Tim back to his brother's farm, where we parted company. It had been quite a day for both of us. I felt good about tracking down all those leads and finally finishing my investigation. Tim felt just as good about the new knowledge he had acquired about the earlier history of the Zenith Egg Scale he is still making today.

Pratt Experimentation

The Zenith Egg Grader shown here (Figure 18) is most likely an experiment on Pratt's part. The needle points down, so the markings for 18, 21 and 24 ounces per dozen are at the bottom. Two stops at the top could be used to set the grader to minimum and maximum settings. Although this egg grader has no manufacturer's markings on it, the tell-tale red, guitar-shaped counterweight, red pointer and distinctive egg cup mechanism clearly demonstrate Zenith physical characteristics. The "1002" on the back and the "3F" on the front of the counterweight are reminiscent of Zenith part numbers first used by the Grange with the "USA" Zenith pattern(Figure 6). Such part numbers never appeared on Zeniths manufactured by O.W. Bedell, and Tim Coon, the current manufacturer, didn't know anything about this grader. That leaves Bud Pratt, who personally manufactured the Zenith from 1948 to 1987, first for the Grange (1948-1964), then for Agway (1964 to early 1970s), and finally for himself in Woodstock (early 1970s to 1974), in Lowville (1974-1979), and in Woodstock again (1970-1987), as the most likely inventor of this one-of-a kind egg grader.

Figure 16. ⅄⅄ Zenith Upside Down Label by Pratt.

Distinguishing Characteristics

So, with all these different models and changes in the labels used on Zeniths manufactured by Bedell, the Grange, Agway, Pratt and Coon, how do we tell the difference? The key is the labeling, or lack thereof:

1. Light gray, unpainted pot metal base with no label: made by Bedell, probably in the 1930s, paper label disappeared over time.
2. Paper label glued to pot metal base: Bedell.
3. Dark blue cast iron base with Bedell's name on it. The first painted base made by Bedell. Quite Rare. He presumably did not like the color on that batch, so changed to light blue, perhaps at the end of WWII.
4. Light blue cast iron base with Bedell's name on it: made by Bedell, probably from 1945 to 1948.
5. Light blue cast iron base with a blank space in the middle of the label where Bedell's name used to be: made by the Grange in Earlville between 1948 and the very early 1950s.

6. Light blue cast iron base labeled “Zenith Egg Grader, Earlville, N.Y., U.S.A.:” made in Earlville by the Grange, 1948-1964.
7. Light blue cast iron base labeled “Zenith Egg Grader:” made in Cortland by Agway, 1964-1970.
8. Dark gray cast iron base labeled “Zenith Egg Grader:” made by Pratt in New Woodstock, 1970-1974; in Lowville, 1974-1979; or in New Woodstock, 1979-early 1980s.
9. “Zenith Egg Grader” label reads upside down when viewed from the front: made by Pratt in New Woodstock from early 1980s to 1987; by Coon in DeRuyter from 1987 to the present.

Figure 17. ⋎⋎ 2005 Model by Coon.

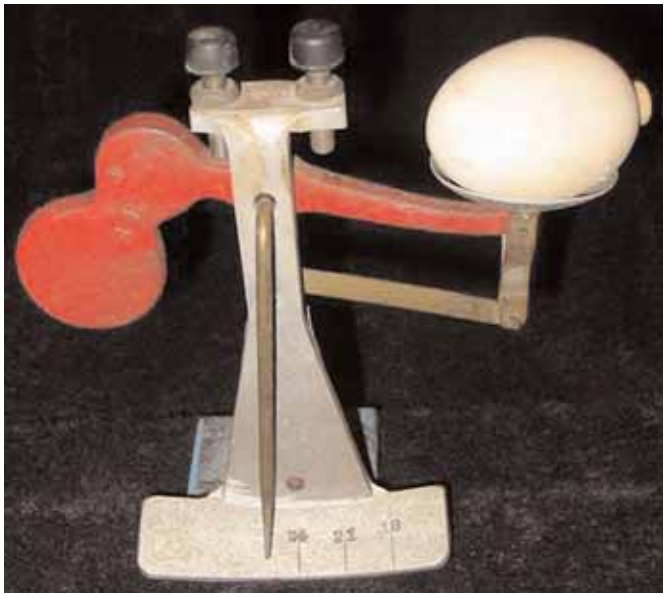
Acknowledgements

Special thanks to Gordon Dresser, a truly generous tour guide, who showed me around Earlville, shared his knowledge of O.W. Bedell and the Zenith Egg Grading Scale with me, and introduced me to other people who also know Bedell personally. My appreciation also to Richard Eades, President of Earlville’s Quincy-Square Museum Association, who provided so much well-documented information on Bedell throughout his life. My thanks to a special lady, Bud Pratt’s wife Sara, for helping me sort out the sequence of events in the 75-year history of the Zenith Egg Grading Scale. Finally, my sincere appreciation to Tim Coon for giving so generously of his time and attention at a very busy time of the year on any farm and showing me all the original equipment which he still uses to make the Zenith Egg Grader in the new millennium.

Notes

1. Labels on various Zenith Egg Scales and Zenith Egg Graders
2. Grange League Federation Patrons Purchasing Guide (catalog), Spring 1953, published by the Cooperative G.L.F. Exchange, Inc., Ithaca, N.Y.
3. Northeastern Supply Co., Inc., Ipswich, Massachusetts, mail order catalog for 1954
4. Original Zenith Egg Grader box with picture of a Zenith Egg Grader on the side and “manufactured by Cooperative G.L.F. Exchange, Inc. Farm Supplies Department, Ithaca, N.Y.” under the picture.
5. Original Zenith Egg Grader box with adjustment instructions indicating the Zenith Egg Grader was manufactured by N.L. Pratt, R.D. #3, Lowville, N.Y
6. Anecdotal information from Bedell’s neighbors in Earlville: Gordon Dresser, Richard Eades, Charlie Crandall and Harry Conley
7. Burgess Tedesco Funeral Home Records, Hamilton, NY
8. Chenango County Surrogate Court Records, Norwich, NY
9. Mid York Weekly September 21, 1961; July 22, 1965; & February 5, 1976
10. West Hill Cemetery, Sherburne, NY
11. Land records at Lewis and Chenango County Clerks’ offices, NY
12. Sara Pratt, widow of Norval L. (Bud) Pratt, who manufactured the Zenith Egg Scale/Grader for at least 35 years
13. Timothy W. Coon, who currently makes the Zenith Egg Grader.

Figure 18. ⋎⋎ Experimental Design Zenith.



About the Author

Charley Amsbaugh, one of our newer ISASC members, has been collecting American egg scales for just over 3 years. Born on a farm in western North Dakota near the end of World War II, Charley recently remarked that none of the earlier generations of his family ever owned an egg scale - they didn't care what the eggs weighed, as long as they were fresh when they hit the frying pan! An information research analyst by trade, Charley has tackled the information surrounding American egg scales with great intensity, buying old poultry equipment catalogs on eBay and searching the length and breadth of the information highway (Internet). Charley met and married Dawn Crysler while at Syracuse University in 1970. During their annual visit to Central New York in September 2004, Charley visited Earlville, the home of the Zenith Egg Scale, where he gathered background material for this article. More information on the Zenith surfaced later, so Charley returned to Central New York in July 2005 to complete his research and get “the rest of the story.”

Showcase

The workmanship on this Troemner Mint scale is superb. These scales were used in the late 19th century at the US Mint to test the weights of gold and silver planchets. Planchets are unstamped coin blanks.

The dimensions of the scale are as follows: The overall height, 17 1/2 inches, the base measures 11 13/16 inches by 5 inches and is 15/16 inches high resting on four adjustable brass feet. The Center support top is 14 inches above the base, the beam is 10 inches long, and the pointer is 4 inches long ending with a horizontal crescent. The pans are 1 1/2 inches diameter by 5/16 inches high.

The base and center support are cast iron. The vertical rod that raises the beam is machined steel. The beam, stirrups, and devices at the end of the beam support are brass. The pan hangers and pans are brass. The pans have a hard steel overlay to prevent wear. The horizontal bracket, just under the beam, is brass and has Troemner's name hand engraved on it. The left hand button raises the beam, and arrests the pans. The right hand button raises the beam and lowers the arrests under the pans.

The weight box is 4 inches wide by 2 1/4 inches deep by 1 5/16 inches high. Horizontally, between the two rows of weights, the wood is embossed, "Least Current Weights". The weights are for gold coins in $1, $2 1/2, $3, $10, and $20 denominations.

Ken Goodhue Collection