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QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

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Cover Picture

The analytical balance on our cover was made by Josef Nemetz. His balances are mechanical marvels manufactured between 1874 and 1908. To learn more about these extremely intricate mechanisms read the article The Nemetz Balance of the Science Museum of Porto on pages 4219 to 4225 of this issue of EQM.

Contents

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Article submissions are preferred in MS Word with Times New Roman Font size 12.
Photos are best in 300 DPI Jpegs in a separate file with a maximum of 3 photos per Email.

The Nemetz Balance of the Science Museum of Porto

BY THOMAS ALLGEIER

Or: Options lists are not an invention of 20th century car makers.

Some readers may remember my article about digitising the Jenemann archive from a previous edition of EQM. This project is still ongoing, but as you would imagine there are occasional interruptions when Ritzo Holtman and I get side-tracked. While we strive to make progress with the thousands of pictures as fast as we can, it still seems worthwhile to spend time on interludes such as this one, in particular when the subject is not entirely disconnected from the main task.

Ritzo was contacted by Marisa Monteiro, curator of the Museu de Ciência, Universidade do Porto. That museum has in their possession the fabulous Josef Nemetz balance pictured on the cover page of this edition. She wanted to find out a bit more about it and at the same time thought it would be a good subject to raise the profile of her institution within the world of historic instruments.

Figure 1. ⮝⮝ A close-up view of the Nemetz balance of the Museu de Ciência, Universidade do Porto. Note: Three of the 50 g weights were mistakenly placed on the left suspension, see Fig. 5 for correct assembly.

Nemetz, of course, was a maker whom Hans Jenemann[1] had written about, and whose balances he has photographed in the process of his researches. So, while our archive is not quite finished, we still thought we could put what we have to good use, and tell you a little more about these mechanical marvels all at the same time.

While Nemetz was a very prominent maker over a significant period of time, and while his balances were once world-famous due to their prominence in the highest realms of mass metrology, there seems to be very little tangible information available nowadays, apart from Jenemann's publication and a small number of catalogues[2,3,4,5,6] and price lists.

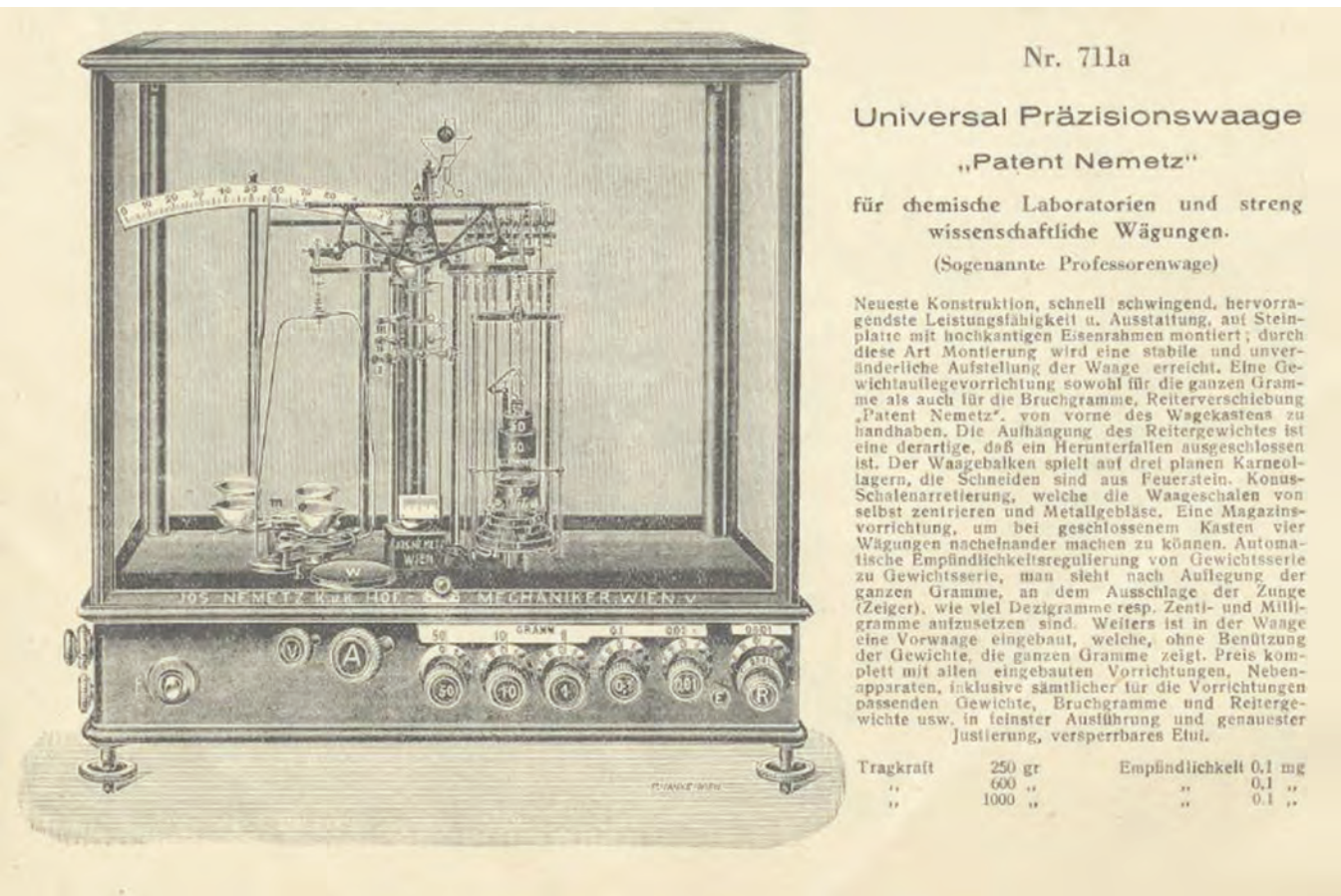
Ritzo, as usual, shied neither fromcosts nor efforts to get hold of all that was available in this respect, and, while discussing his finds, we decided that I should focus on Nemetz' approach to selling balances, coupled to a descriptive narration of his many inventions and advances to balance design. The two subjects go together better than you might think.

Josef Nemetz founded his institute for precision mechanics in 1874. According to Jenemann, he was born in Vienna in 1851, and was active until around 1908. His successors carried on until 1938 when the firm was deleted from the Austrian company register. What we are looking at in these pages appears to stem from the "peak period" of this particular maker, and perhaps also of Vienna as a centre of excellence in balance making.

The eye-opener for me was his catalogue of 1891. Show me another example of a balance maker's advertising of that period which comprises of 182 pages, only dealing with what we would now term precision / scientific balances and weights. There are no trade scales etc. in this catalogue, but otherwise it probably contains at least one example of each and every balance that could be used for scientific purposes known to man. Excerpts were re-published in 1893 as "Spezial-Kataloge" in separate sections, not all of which have been found yet. Several other editions (1884, 1885 and 1897) are known to exist, but have also not yet found their way into Ritzo's archive. By comparison, Albert Rueprecht's equivalent of 1911 runs to 76 pages, earlier editions were shorter.

Nemetz' pamphlets are richly illustrated, with very detailed descriptions of his inventions, of principles used in his instruments, and of the specific balances themselves. No expense was spared in their production, mirroring no doubt the approach taken for the manufacture of the products shown therein. One assumes there was method behind the madness: You would probably not want to portray the crème de la crème of scientific instruments, the more elaborate ones of which costing small fortunes, in a cheap and cheerful rag that leaves many questions a potential buyer might have unanswered.

So, there are dozens of individual models and capacities, and each could be had in several different versions and with several add-on features. All this is explained and described in considerable detail, with a corresponding price entry.



Nr. 711a

Universal Präzisionswaage

„Patent Nemetz"

für chemische Laboratorien und streng wissenschaftliche Wägungen.

(Sogenannte Professorenwage)

Neueste Konstruktion, schnell schwingend, hervorragendste Leistungsfähigkeit u. Ausstattung, auf Steinplatte mit hochkantigen Eisenrahmen montiert; durch diese Art Montierung wird eine stabile und unveränderliche Aufstellung der Waage erreicht. Eine Gewichtauflegevorrichtung sowohl für die ganzen Gramme als auch für die Bruchgramme, Reiterverschiebung „Patent Nemetz", von vorne des Wagekastens zu handhaben. Die Aufhängung des Reitergewichtes ist eine derartige, daß ein Herunterfallen ausgeschlossen ist. Der Waagebalken spielt auf drei planen Karneollagern, die Schneiden sind aus Feuerstein. Konus-Schalenarretierung, welche die Waageschalen von selbst zentrieren und Metallgebläse. Eine Magazinsvorrichtung, um bei geschlossenem Kasten vier Wägungen nacheinander machen zu können. Automatische Empfindlichkeitsregulierung von Gewichtsserie zu Gewichtsserie, man sieht nach Auflegung der ganzen Gramme, an dem Ausschlage der Zunge (Zeiger), wie viel Dezigramme resp. Zenti- und Milligramme aufzusetzen sind. Weiters ist in der Waage eine Vorwaage eingebaut, welche, ohne Benützung der Gewichte, die ganzen Gramme zeigt. Preis komplett mit allen eingebauten Vorrichtungen, Nebenapparaten, inklusive sämtlicher für die Vorrichtungen passenden Gewichte, Bruchgramme und Reitergewichte usw. in feinster Ausführung und genauester Justierung, versperrbares Etui.

Tragkraft	250 gr	Empfindlichkeit	0,1 mg
„	600 „	„	0,1 „
„	1000 „	„	0,1 „

Figure 2. "Professorenwaage" from Nemetz 1906 catalogue.

The esteemed customer desires his chosen model with patented rider movement, fractional weight loading and selectable sensitivity - no problem at all! A vacuum balance perhaps, with remote operation from 3 metres away and mirror readout through a telescope? Again, we can deliver that. Or would you even want a balance constructed entirely to your own design and requirements? Just let us know exactly what you want, and we will build it for you.

In modern terms, think of the glossy brochures of a Japanese car maker with his many models, and even more optional extras, at the same time combined with the customer-focussed approach of Rolls-Royce who will incorporate into their cars any such feature as a paying customer could want to desire, as long as it is legal.

However, it must have dawned on Josef Nemetz that the broad approach to what is essentially a narrow range of products could not have been all that economical. So he actually states in one section that although there are numerous combinations possible, in his experience most customers order pretty much the same balance. This led him to design and market his "Universal-Präzisionswaage System Nemetz" to which he dedicates 3 pages. We can probably deduce something about the man from the fact that he then goes and spoils it all by offering this item in no less than 8 different versions! We could perhaps forgive 2 of them as they are of different capacities. But the remainder feature options with respect to their weight-loading mechanism - where did we loose the universality along the way?

Figure 3. ⅄⅄ Probably the most famous of Nemetz' original designs: The double carousel fractional weight loader.

We must now return to Marisa's wonderful machine, its features, and corresponding extracts from Jenemann's picture archive.

In the Nemetz 1906 catalogue, the balance from the Porto museum is referred to as "Professorenwaage", the Professor's model of balances.

It came in 3 capacities, 250 g, 600 g or 1000 g, all with a sensitivity of 0.1 mg. Marisa's is the 250 g, it was made in 1906.

The following features are listed in the description and can be identified from the photos:

- Full weight loading, both of the large weights and the fractionals, the latter using the well-known double carousel of Nemetz' own invention.
- Nemetz' patented rider movement with the vertical column behind the beam.
- Selectable sensitivity (4 ranges) by placing 3 weights on the pointer to lower the centre of gravity as required.
- A weight exchanger on the left hand pan, with 4 positions. This is to carry out intercomparisons by substitution weighing without opening the case.
- A pre-scale (the graduated arc over the left hand pan) showing to the nearest gram or 10 grams which weight needs to be selected on the right hand side.
- Cone-type pan arrestment, another unique Nemetz feature.
- A "blower" which utilised a metal bellows, operated by the button on the left side, used to control the oscillations of the beam by directing a faint blast of air to the underside of one pan.

It is my strong belief that Nemetz sold these kinds of assemblies to the Professors not only for actual use, but also to advertise the various mechanisms to students (as future potential customers):
The 4-position weight exchanger is used to determine the differences between 4 nominally equal weight pieces in comparison weighing, or perhaps samples in series of analytical tests. For day-to-day use this is not a must-have item, but more a case of: Look here what we can do!
The pre-weighing scale is of course very useful if a completely unknown weight has to be determined, and the same applies for the sensitivity-switching attachment. This may not be the kind of work you would routinely do with such a superb instrument, but it does show off the ingenious designs of Mr Nemetz very effectively. Of course the fact that Mr. Rueprecht also offered many of these optional features may have had something to do with it.

Figure 4. ⮝⮝ Nemetz balance N1, Mettler museum, Greifensee.

In 1900 - and even today - one would have had 2 different instruments if the same laboratory was even expected to carry out so widely different tasks as weight intercomparisons and analytical weighings. On the former, you would want as few mechanical distractions as possible, not cluttering up the balance case, keeping everything simple and symmetric. On the latter, while the pre-weighing and weight loading clearly would speed up the operation, 1 kg capacity with 0.1 mg resolution was rarely required. It seemed to be more a case of "how much can we squeeze into this balance case", given that the Professor only had about 3 feet of shelf space to display (= advertise) that particular product.

Ritzo thinks the reverse argument is also a possibility, and I agree: “Look here what a great Professor I am, being able to afford the top-of-the-range balance fitted with every single feature that is possible to obtain.” Calling it the “Professorenwaage” was certainly a brilliant bit of marketing.

Hans Jenemann took detailed, high quality pictures on medium format film of 3 of these magnificent balances: 2 were located at the Mettler museum at Greifensee (identified as N1 and N3 in the following) and one at the Technical Museum at Vienna (N2). Of a fourth balance also located at the Vienna museum we found no images - somewhat strange considering the many thousand pictures he took, and the many dozens taken of the other 3 Nemetz balances.

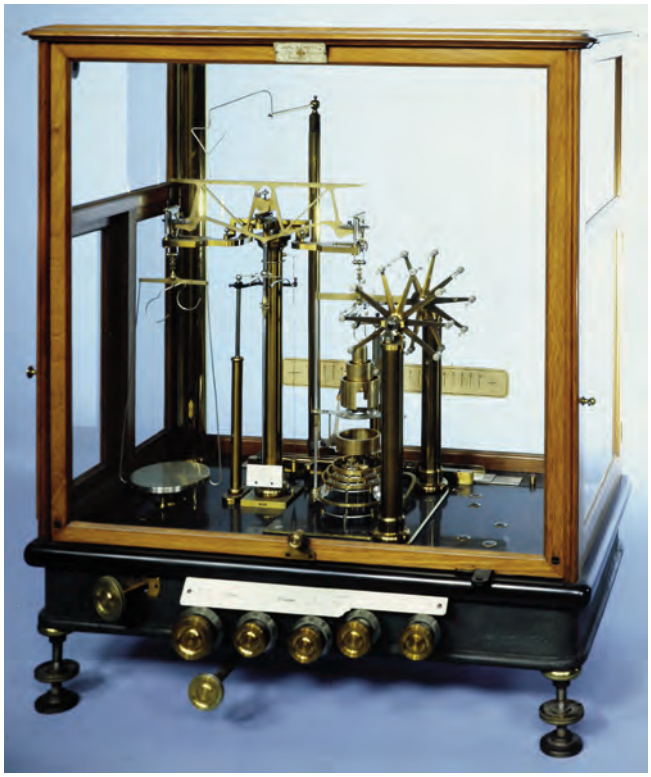


Figure 5. ➢➢ Nemetz balance N2, Technisches Museum Vienna.

They all carry a varying amount of accessories and options, with N3 being the most "loaded" example. N3 is also the youngest, since it has the later version of mg weight loading which has done away with the carousel feature and uses push-rods instead.

We probably need the following table to keep track of what was fitted to which of the 4 balances:

FEATURE	N1	N2	N3	PORTO
mg weight loading with carousel	√	√	-	√
later style of mg weight loading	-	-	√	-
weight loading to 100 g in total	√	√	√	√
weight loading to 250 g in total	-	√	√	√
Nemetz rider mechanism	√	√	√	√
selectable sensitivity (2 ranges)	√	√	-	-
selectable sensitivity (4 ranges)	-	-	√	√
blower to control swing	√	-	√	√
pre-weighing mechanism	-	-	√	√
weight exchanger	-	-	√	√
loupe	-	-	-	√

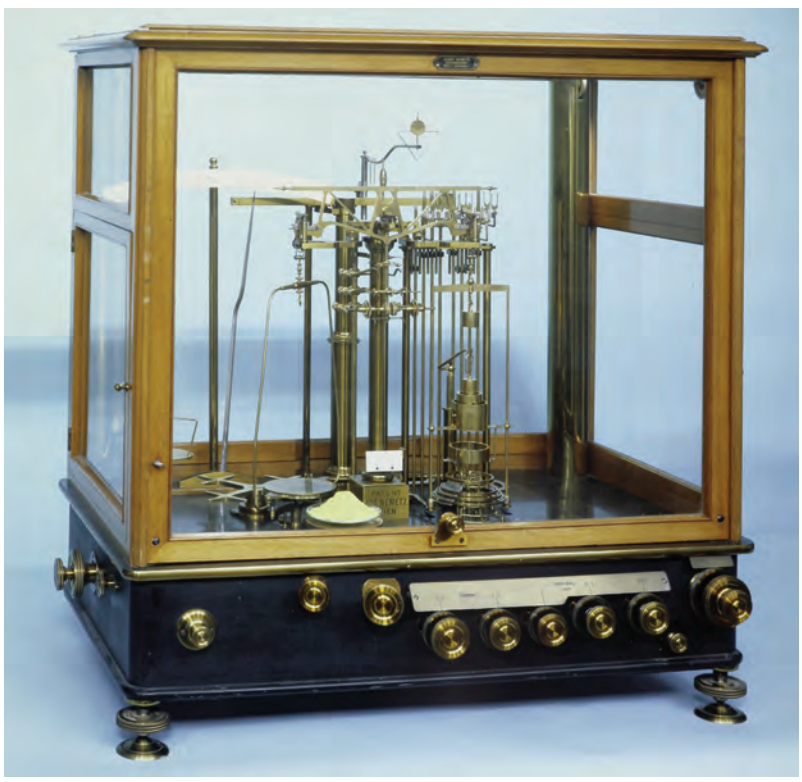


Figure 6. ⮝⮝ Nemetz balance N3, Mettler museum, Greifensee.

From this table we can take that Marisa's Porto balance is closely related to N3 at Metter/Greifensee, but clearly pre-dates it on account of the earlier carousel weight loader. N1 is the simplest model of the 4, N2 is fairly similar but has a larger weight-loading range.

Hans tried out the pre-weighing attachment when he took the pictures, which gives us a unique glimpse of how it worked: It is an entirely independent scale, either with pendulum or spring resistant, using a separate pan and a large fan-style chart with very long pointer. A sample of powder has been placed on the separate pan, the weight of which can be seen indicated. His collection of images also contains various close-ups of other parts of the mechanism. Space does not permit us to show them all, you will have to wait until our archive of his material has gone on-line.

In the meantime there are three more Nemetz balances we can show here: The first was the subject of an article in “Meten & Wegen”, the Dutch collector society’s journal in 2009[7]. It is an analytical balance with some, but not all of the available features:

The earlier carousel-style weight loading to 1 g, the “blower” to control the swing, the Nemetz rider mechanism, the cone pan arrestment and, as far as we can make out, dual-range sensitivity. The balance is significant in that it can be precisely dated to 1901, this year being stamped into the wood just above the maker’s name plate.

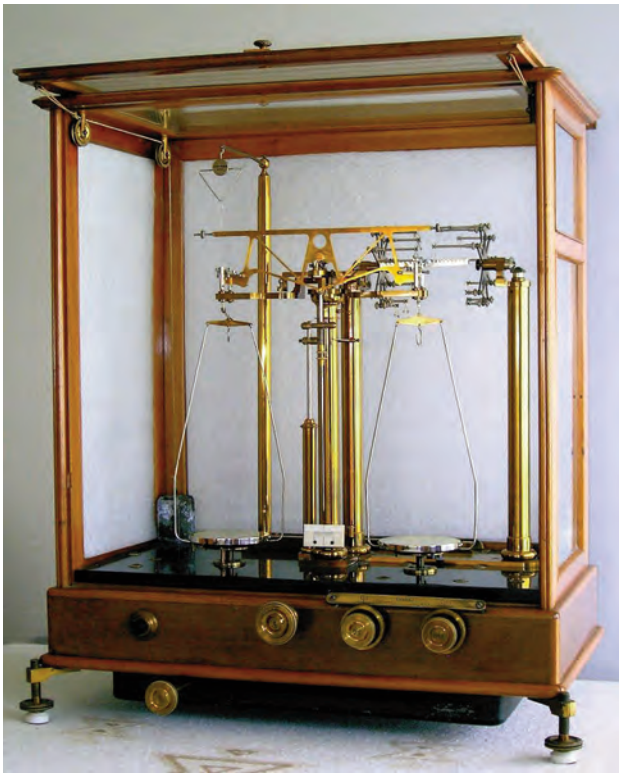


Figure 7. ⮜⮜ Nemetz balance of 1901 (Meten&Wegen, June 2009).

The second is located in the Hungarian Museum for Science, Technology and Transport in Budapest. It was brought to our attention by Dr Alison Morrison-Low, curator of the National Museum of Scotland, who photographed it there in 2010.

It appears to be of higher capacity than the one previously described, and it has a slightly different selection of options fitted: Weight loading to what looks like 100 g, with old-style carousel fractionals, blower, rider, but only single-range sensitivity.

The latest addition to the known Nemetz balances is located at the Historic Collection of the University Vienna, Faculty of Physics. It was brought to our attention by Jean-Francois Loude, who also discovered the "Professorenwaage" at Porto and brought us in touch with Marisa. This balance is again a somewhat "simpler" combination of features. We believe it to be a Model Nr. 707 from the 1893 catalogue with a capacity of 250 g. It has weight loading to 100 g, the Nemetz rider and probably the blower. Note the right hand suspension is off the beam and the fractional weights are missing. This one can be dated fairly accurately to 1894, when the institute purchased it.

While there is never an excuse needed to show these marvels with their beautiful polished wood and brass the last three pictures are included to clearly prove that the full range of models and any combination of features actually found their buyers; they are not just catalogue entries which nobody wanted.

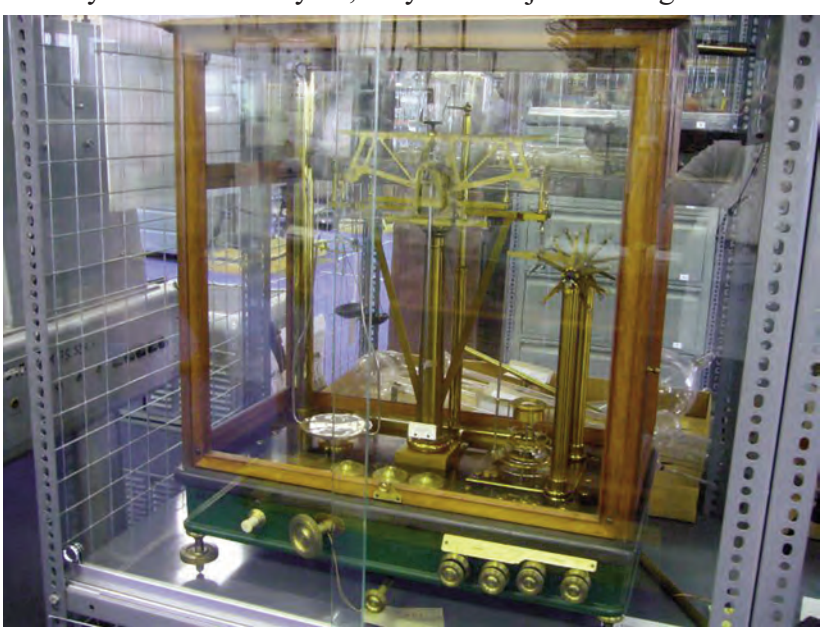


Figure 8. ⮝⮝ The Nemetz balance of the Hungarian Museum for Science, Technology and Transport.

This is somewhat in contrast to later trends in balance design when makers focussed to standardise on a handful of models with fairly common features, there often being very few selectable options. Did Nemetz' different approach perhaps play a part in the eventual disappearance of his once-great firm? I suspect so – as costs must have become an ever more important consideration in purchasing such equipment, and as competition from larger firms with a more streamlined range of models increased the mantra of "You can have any balance with any combination of features – and then some" was probably unsustainable in the long run.

There is another danger to this approach of overloading an otherwise useful balance with too many complicated mechanisms (an illness Ritzo terms "featureitis"). We all

know if we buy the car with all the electric options and gadgets we will have either frequent trips to the repair workshop or else are faced with much frustration when something has gone wrong, and it would appear balance users and makers were faced with much the same situation. Josef Nemetz' main competitor Albert Rueprecht was in receipt of a letter[8] of complaint by none other than Wilhelm Conrad Roentgen (of X-rays fame) in which the latter points out that after several repairs and improvements to his newly-purchased balance he cannot be expected to be exposed to yet another such attempt, and would the former please accept the return of the instrument.

Even the greatest of the great get it wrong occasionally.

Figure 9. ⮜⮜ The Nemetz Balance at the University of Vienna, Faculty of Physics, image courtesy of Franz Sachslehner

Literature

1 Zur Geschichte der Herstellung von Präzisionswaagen hoher Leistung in Wien, Hans R Jenemann, in: Blätter für Technikgeschichte, 49, 1987.

2 Preis-Courant über Präzisionswaagen und Gewichte für wissenschaftliche Zwecke, Jos. Nemetz, Wien, Nr. 6, 1886. R J Holtman collection.

3 Haupt-Katalog Nr. XII, Präzisionswaagen und Gewichte für wissenschaftliche Zwecke, Jos. Nemetz, Wien, 1891. Available from www.books2ebooks.eu.

4 Neu-Constructionen aus dem Institute für Präzisions-Mechanik von Jos. Nemetz, Nr. XIII, Wien, 1893. Museu de Ciência da Faculdade de Ciências, Universidade do Porto collection.

5 Auszugs-Katalog Nr. XIV, 1893, Abtheilung für Präzisionswaagen und Gewichte für wissenschaftliche Zwecke, Jos. Nemetz, Wien. Museu de Ciência da Faculdade de Ciências, Universidade do Porto collection.

6 Präzisionswaagen und Gewichte für wissenschaftliche Zwecke, Jos. Nemetz, Wien, 1906. Museu de Ciência da Faculdade de Ciências, Universidade do Porto collection.

7 Balans van Nemetz uit 1901 met ruitercarrousel, G. Cuynen, in: Meten & Wegen No. 146, June 2009.

8 Letter of W.C. Roentgen to A. Rueprecht, Feb. 10, 1908, probably Munich, offered for sale by zvab.com in September 2015.

Acknowledgements

I am very grateful to Ritzo Holtman for bringing the Porto balance to my attention and for digging up the entire literature used in this article. Many thanks also to Marisa Monteiro for her all-round support and to Jean-François Loude (http://museephysique.epfl.ch). He found the Porto Nemetz during a visit and brought us in touch with Marisa. He also made us aware of the Nemetz at Vienna. Franz Sachslehner was very helpful in supplying the picture at such short notice.

Finally a big thanks to Barry Oliver for remembering the “Budapest picture” and to Alison Morrison-Low for permission to reproduce it.

If proof should ever be needed, isn’t ISASC a wonderful international-interdisciplinary bunch of like-minded people?

A Pre-Metric Spanish Steelyard

BY LIONEL HOLLAND

The steelyard shown in Fig. 1 was purchased in a Barcelona flea-market about 40 years ago. No background information was available from the vendor; but the materials from which it is made, and the way they have been utilized, can tell us something about the people by whom, and for whom, it was produced. From its scale markings (see below) we can tell that it was made some 150 years or more ago.

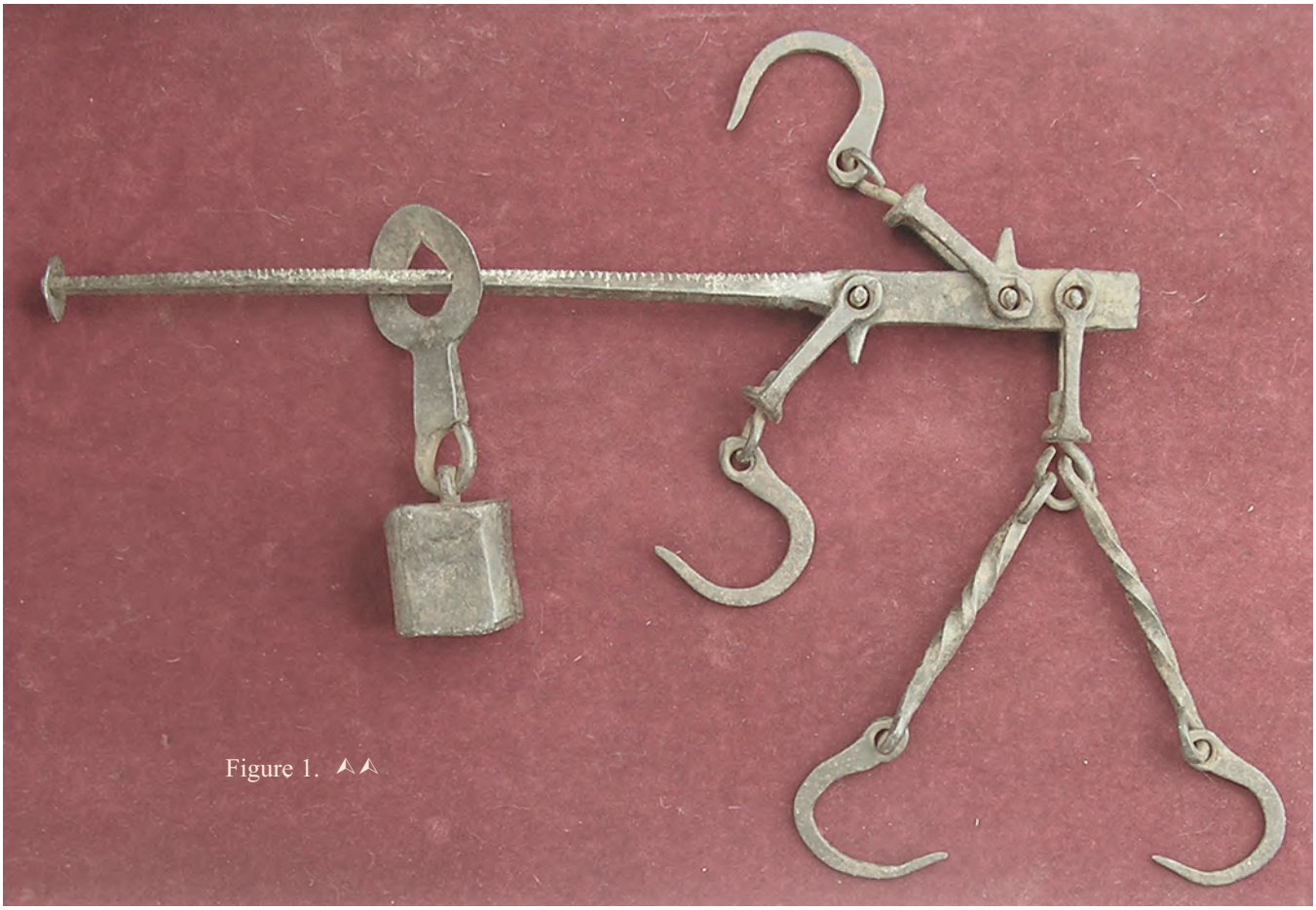


Figure 1.

The instrument is made of wrought iron (except for the beam, which may have been cast). Its dimensions are given in Table 1. It has two hooks, suspended from a single pivot, for the load, and two sets of pivots and bearings with hooks for suspension of the beam, allowing the use of two weighing scales of different ranges. This design is identical in principle, and in many practical details, to that of the copper-alloy steelyards made and used by the Romans many centuries earlier – though all the pivots have (or to be more precise, had) knife-edges, which were unknown in Roman times, and only came into use in Europe around the 16th century. The evident wear on the pivots and bearings of this steelyard (Fig. 2) shows that it has seen a great deal of use.

TABLE 1

DIMENSIONS OF STEELYARD

Entire instrument, including cursor 449 g
cursor 219 g
beam length, butt to tip 280 mm

Light scale :
suspension to pivot 53 mm
pivot to 0 units 12 mm
pivot to 23 units (two dots) 182 mm

Heavy scale:
suspension to pivot 16 mm
pivot to 0 units 9 mm
pivot to 1 unit (four dots) 37 mm
pivot to 7 units 200 mm

Figure 2.

The steelyard beam appears to have been cast in a foundry, complete with pointers, and the scale marks added later, during calibration (the stop at the end of the beam is a separate part). It is not possible, without damaging the instrument, to ascertain whether the pivots were also cast as an integral part of the beam, or whether they were inserted and finished later. All the other parts could have been made, and the steelyard assembled, in a well-equipped smithy – one equally capable, no doubt, of producing other useful articles of iron: horseshoes, pokers, tongs, nails, hooks, railings, cartwheel tyres, agricultural and domestic implements, etc. The instrument has been designed with a thoroughly minimalist, utilitarian end in view: almost every single detail of its design is essential to ensure its proper functioning, but nothing more. No effort at all has been expended on embellishment – with one small, but significant, exception (to which I shall allude later). Its designer/manufacturer clearly had two objects in mind: (a) to turn out a sturdy, serviceable implement, which would do its work over a long period of time, while requiring only a minimum of maintenance and repair; and (b) at the same time, to maximize productive output, by designing an article which could be produced with as little work, and in as short a time, as possible. This steelyard has been assembled from only 17 (or possibly, 20, if the pivots were not integral with the beam) separate parts. The chains, which on Roman and Byzantine bronze steelyards, were used for attaching the load hooks, have been replaced here by rigid rods of iron. Had this steelyard been equipped with chains, it would have taken far longer to produce, without gaining any functional advantage. The image conjured up is of an ironworks of considerable ability, serving a clientèle with demanding operating requirements, but with no money at all to waste on fripperies.

Figure 3.

From the 16th century onwards, for several centuries, much of the wealth of Spain was generated and maintained by the importation of huge quantities of gold and silver from the mines of the Imperio de las Indias. Local industries were not developed in Spain to anything like the same extent as in other European countries. Spanish society was organized in a rigid hierarchy: at the top, a small ruling class, owning most of the land and other sources of wealth; below these, a middle class of businessmen, professionals, clerics, etc.; and at the bottom, a rural population, supporting itself by subsistence farming, mostly on land belonging to others. It is most likely among this last group that this steelyard had its origins.

A look at the scale-marks along the beam helps to date the steelyard. The beam is of rectangular cross-section, with scales marked out along each of two opposite sides. One scale is divided into units (26 in all), each indicated by a notch, and a line graven across the width of the beam; half-units are indicated by a partial line (Fig. 3). The other scale is divided duodecimally. There are seven full units, indicated by punch-marks ; each

unit is divided into twelve sub-units (Fig. 4). This division is a sure indicator that the scales were made to a non-metric measure.

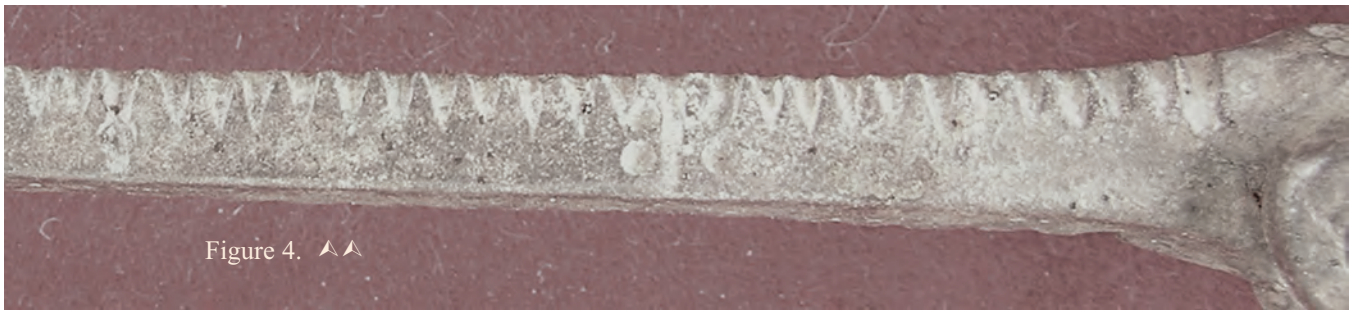
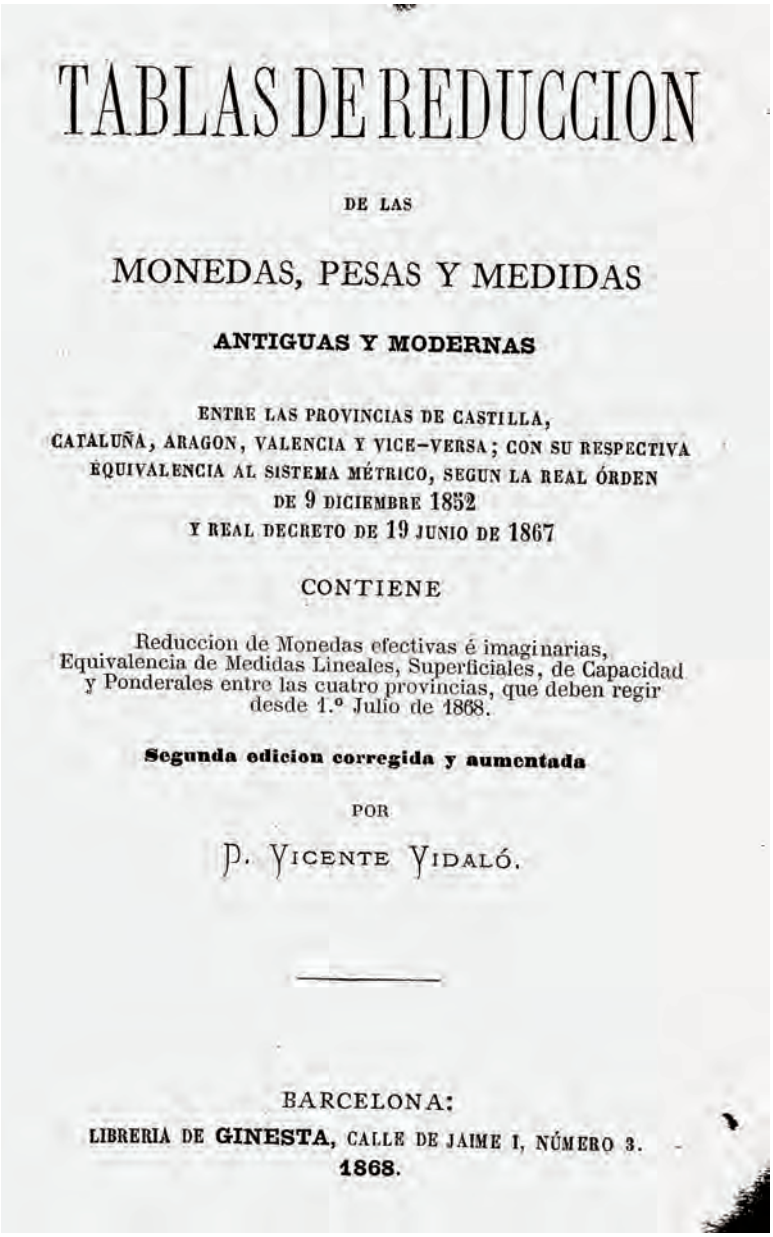


Figure 4.

Until the 19th century, the weight systems used in Spain were (as in other European countries) based on the ancient Roman system of pounds and ounces. The absolute mass of the units varied from one region to another; and in some regions, the pound was divided into 12 ounces, while in others, it was 16 ounces. The first attempts at introducing a uniform system of measurement were made early in the 1800's, while Joseph Bonaparte was King of Spain; but (as happened in other European countries, including France itself) the full implementation of metric units throughout Spain was not completed until more than 50 years later. I have beside me a handbook, or ready reckoner, published in Barcelona in 1868 (Fig. 5), which gives (besides a great deal of other comparative data) the metric equivalents of four different regional weight systems: Castile, Aragon, Catalonia, and Valencia.



TABLAS DE REDUCCION

DE LAS

MONEDAS, PESAS Y MEDIDAS

ANTIGUAS Y MODERNAS

ENTRE LAS PROVINCIAS DE CASTILLA, CATALUÑA, ARAGON, VALENCIA Y VICE-VERSA; CON SU RESPECTIVA EQUIVALENCIA AL SISTEMA MÉTRICO, SEGUN LA REAL ÓRDEN DE 9 DICIEMBRE 1852 Y REAL DECRETO DE 19 JUNIO DE 1867

CONTIENE

Reduccion de Monedas efectivas é imaginarias, Equivalencia de Medidas Lineales, Superficiales, de Capacidad y Ponderales entre las cuatro provincias, que deben regir desde 1.º Julio de 1868.

Segunda edicion corregida y aumentada

POR

D. VICENTE VIDALÓ.

BARCELONA:

LIBRERIA DE GINESTA, CALLE DE JAIME I, NÚMERO 3.

1868.

Figure 5.

To determine the units in which this steelyard is graduated, calibration was necessary. This involved setting up the steelyard in operating mode, placing the cursor successively at various points along the scale, and balancing it at each point with known weights. This was not easy: with its worn knife-edges and rusted bearings (Fig. 2), the steelyard has become very insensitive. Without going into detail , I can report that the lighter scale is graduated in ounces (onzas) of about 33 g (and half-ounces), and the heavier scale in twelve-ounce pounds (libras) of about 400 g; a result which leaves no doubt that the steelyard was designed for the weight-system which was used in Catalonia, before the introduction of the metric system. Its full range is from 1 ounce to 7 pounds (a little less than 3 kg).

One thing remains to be said: The sole non-functional feature of this steelyard is in the design of the two rods, which connect the load hooks to the beam. Each of these, rather than being left a plain straight bar, has been carefully shaped by its maker into an elegant spiral. This small, entirely gratuitous act is (in my view) an aesthetic tour de force, which eloquently expresses the craftsman's pride in his skill, and the satisfaction he must surely have found in producing such a graceful instrument.

Notes & References

1. On each of the two scales, there are anomalous punch-marks: on the light scale, at 23 ounces (two dots), and on the heavy scale, at 1 pound (4 dots). I have no explanation for these: they may have had to do with the original calibration of the instrument.

2. The calibration process made me think long and hard about the problems involved in producing a steelyard with two scales – especially one of iron. For anyone who is interested, and writes to me, I can provide full details and results of my calibration procedure.

Almost Instant Gratification

BY JAN BERNING

One day, several years ago, as I was looking through the USpto.gov website at scales, I found a unique implement patent number 2,507,073 entitled *Letter Scale* (Figure 1). The web site had recently become available for searching online and I had discovered how to search for only scale patents. The patent intrigued me; particularly the curves which appealed to the artistic side of my life. I read the patent text and learned that several tools were incorporated in its design. Not only was it a letter scale as the title read, but it included a one foot *ruler, protractor, compass, level, French curves, and magnifier.*

A favorite subset of scales in my collection is letter-opener scales and I felt there was a possibility that this letter scale incorporated a new style to add to the group already in my possession. I had letter-opener scales incorporating a magnifier, but had never seen a scale meeting this description, let alone one that had several tools in its design. Were these ever manufactured?

I printed the patent and shared it with my husband Bill, stating *You can find me one of these, someday!*

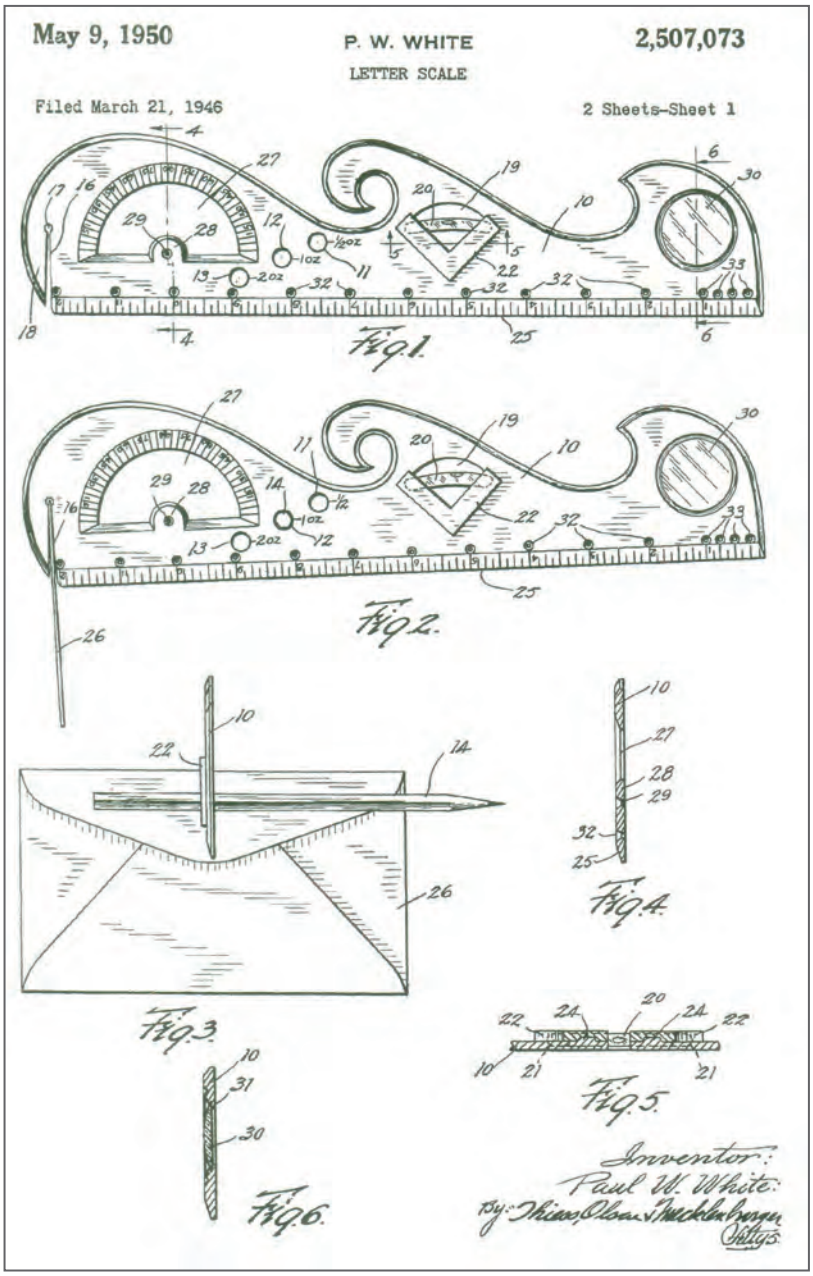


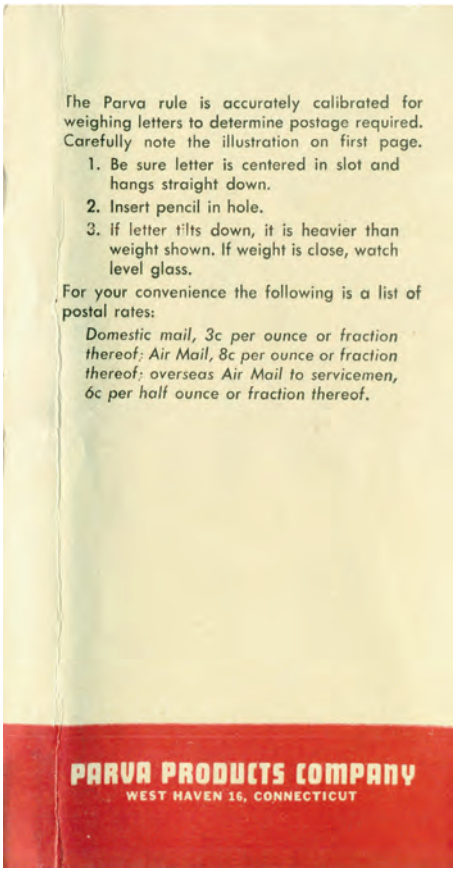
Figure 1. ➢➢ Patent number 2,507,073 was applied for on March 21, 1946 and issued on May 9, 1950, to Paul W. White of New Haven, Connecticut. It was assigned to the Parva Products Co. of Chicago, Illinois.

Later that day, we decided to make a trip to the two large antique malls in the nearby city of Rockford. The malls were open until 9 p.m., giving us plenty of time to browse through both of them. Our standard procedure is to look around the perimeter of an antique shop, mall or show and continue down each aisle until we have seen everything. As we were nearing the back of the mall, Bill reached down and picked up an item. He tried to hide it so that I couldn't see what he had found, but my persistence paid off and he showed me the box in figure 2. I asked if there was an object in the box because I couldn't believe that he had found one of these tools so soon after I discovered its possible existence!

Figure 2. ⅄⅄ The navy and cream cardboard box holding the Parva Letter Scale reads *8 Tools in one*. *For Architects, Artists Carpenters, Craftsmen, Draftsmen, Engineers, Home, Office.* It also has a picture of the tool on its front below which is printed *PATENT APPLIED FOR - MADE IN USA*. The box measures 12¾" by 3¼" and is ½" deep.

On our way home with our new found treasure, I looked in the box and found, along with the scale, a brochure (Figures 3 & 4) and an old paper advertisment (Figure 5).

Figure 3. ⅄⅄ The brochure included in the Parva box gives details about each of the tools or instruments that the Parva incorporates.



The Parva rule is accurately calibrated for weighing letters to determine postage required. Carefully note the illustration on first page.

1. Be sure letter is centered in slot and hangs straight down.
2. Insert pencil in hole.
3. If letter tilts down, it is heavier than weight shown. If weight is close, watch level glass.

For your convenience the following is a list of postal rates:

Domestic mail, 3c per ounce or fraction thereof; Air Mail, 8c per ounce or fraction thereof; overseas Air Mail to servicemen, 6c per half ounce or fraction thereof.

PARVA PRODUCTS COMPANY
WEST HAVEN 16, CONNECTICUT

Figure 4. ⮝⮝ The back of the brochure explains how to use the letter scale and shows the manufacturer.

Parva

COMBINATION Letter Weigher & Ruler

8 Handy Instruments in One—Letter Weigher—Ruler—Magnifying Glass—French Curve—Compass—Protractor—Level—Mitre. The Xmas gift that's different. Order Now.

Send Check or Money Order. $2.00 We will not ship C.O.D.

CHESTER A. HANSON
831 Chapel Street New Haven 10, Conn.

254 POPULAR MECHANICS

Figure 5. ⮝⮝ This advertisement appeared in the November 1946 issue of *Popular Mechanics* Magazine.

The Parva is made from cream colored plastic and measures 12¼" long by 2¾" in height. The example I have is slightly bowed, probably from heat in an attic years ago. The box still bears its $2.00 selling price on its end and is in relatively good condition, considering it is nearly 70 years old.

The patent was filed on March 21, 1946, and the scales were advertised in *Popular Mechanics, Modern Plastics, The Architectural Forum, Product Engineering, Printer's Ink* and *Hardware Age* as Christmas gifts that year. The patent was issued on May 9, 1950, to Paul W. White of New Haven Conn. and assigned to the Parva Products Co. of Chicago.

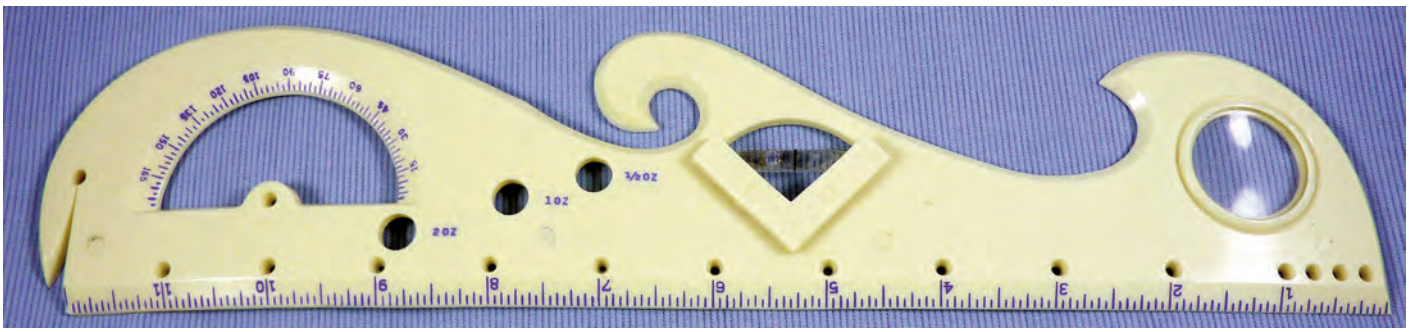


Figure 6. ⮝⮝ To use the letter scale, the envelope is inserted perpendicular to the instrument in the slot on the left. A pencil is inserted in the ½ oz, 1 oz or 2 oz hole near the center. If the letter tilts down, it is heavier than the weight shown. The magnifying glass is on the right and the spirit level is at center.

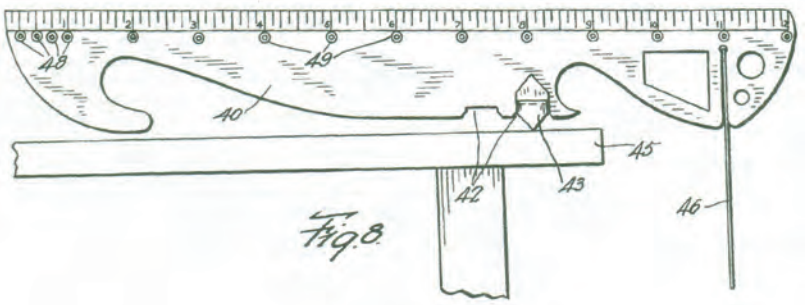


Figure 7. ➢➢ In the other version, shown in the patent *the body member 40 is provided with a plurality of notches 42 for receiving a separate knife-edged fulcrum element 43 which is provided with a pair of spaced, upwardly extending arms for receiving the body when it is desired to use the instrument as a letter weigher. The notches 42 serve to position the fulcrum element 43 longitudinally of the scale beam or body member 40, and it will be understood that these notches are properly located so as to provide for balancing the instrument when letters of predetermined weight are carried in the slot 41. In figure 8 the instrument is shown in use as a letter weigher, the fulcrum element 43 resting on a flat surface such as a table top 45 and it will be observed that the weight of the letter has caused the left-hand end to rise off the table, thereby indicating that the letter 46 is slightly overweight.*

Weighing Snow

BY BILL BERNING

James Edward Church Jr (Figure 1), was born in Holly, Michigan on February 15, 1869. He received an AB Degree in Classics from the University of Michigan in 1892, and accepted an offer that same year to teach Classics at the University of Nevada, Reno. There Church taught courses in the Appreciation of Literature, Beauty of Art and Nature in addition to Latin & German. In 1894, he married his college sweetheart Florence Humphrey and they had two sons, Willis Humphrey and Donald E. Church[1].

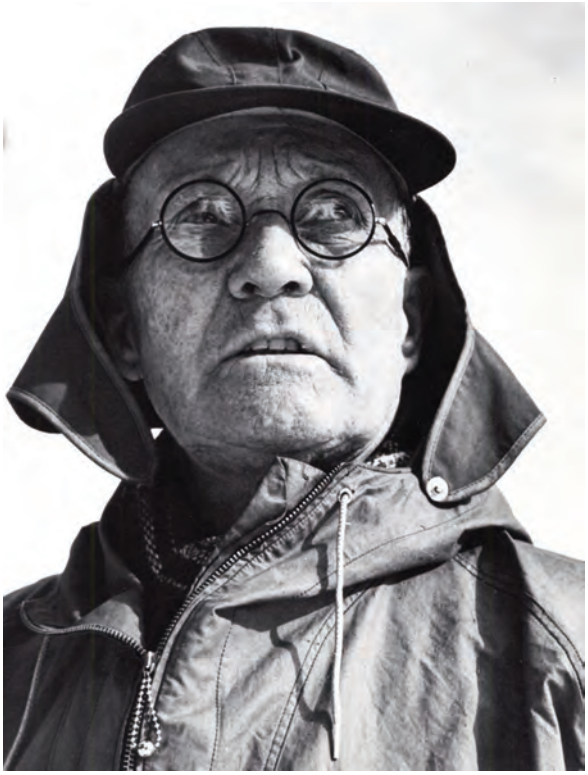


Figure 1. Dr. James Edward Church, Jr. Special Collections, University of Nevada, Reno Libraries.

Church returned to Michigan from 1898 to 1899 to work on a graduate degree and then attended the University of Munich from 1899 to 1901, where he was awarded his Ph.D. The Churches returned to Reno, Nevada, in 1901, where he taught Classics and Art History until his retirement in 1939.

Dr. Church grew to love the community of Reno. He was particularly fascinated by the Sierra Nevada Mountains, so utterly different from the terrain of his native Michigan. In 1895, he made his first mid-winter ascent of Mount Rose. Florence often accompanied him on his mountain climbs. The Churches were members of the Sierra Club and published their adventures in the club's bulletin. Their published accounts tell of treks to the summit of Mount Shasta in California and a winter climb of Mount Whitney. Each time, upon his return, he was questioned by farmers and other interested parties regarding the snow conditions in the mountains. Dr. Church decided that some kind of measurement must be made to give a record of his findings. There were, at the time, various methods of measuring snow, but most of them were not accurate. The only inelastic measure is the water content of the snow.

The Mt. Rose Meteorological Observatory was established on the summit of the mountain at an elevation of 10,800 feet above sea level to make an accurate detailed study of the weather and particularly of snowfall. Here Dr. Church experimented with various types of instruments to measure the precipitation in the form of snow. After several years of experimentation under severe conditions, it was concluded that it was impracticable to measure the snow as it fell since instruments unattended for long periods failed to get results and to have an attendant on duty for such work was out of the question.

The solution to the problem was to measure the snow on the ground at the end of the winter. Based on this principle, Dr. Church started what we now call snow surveying[2]. The first surveys were made over the winter of 1907-1908. During the winter of 1908 – 1909, Dr. Church developed the Mount Rose snow sampler, which measured and provided the water content in a column of snow. He announced the development of the sampler in February 1909[3]. In 1911, Dr. Church made his first forecast of streamflow based upon these surveys. Since that time, snow surveying has spread to all regions of the western United States.

Figure 2. ⮝⮝ Dr. Church using the Mt Rose Snow Testing Scale. The scale holding the sampler tube is hanging from a pole in front of Church. His wife Florence stands in the background. Special Collections, University of Nevada, Reno Libraries.

In order to obtain the water content, it is necessary to remove, from the snow on the ground, a core of snow representing the full depth of the snow. For this purpose, there is a tube, or several tubes connected together, at the bottom end of which there is a steel milled cutter. This sampler is driven into the snow to the ground level to retrieve a sample of snow[4]. The Mount Rose balance is the dial type, especially graduated so that the weight of the snow core is indicated as inches depth of water. To weigh a snow core with this balance, the weight indicator is set at zero while the empty sampler is on the balance. This adjustment is made by turning the knurled nut near the top of the face of the instrument. Tare thus having been detemined, the net weight of the snow core is the weight procured when the sampler, with enclosed snow core, is placed on the balance[5].

Figure 3. ⮝⮝ The snow sampling scale in the author's collection is made of aluminum and is graduated in inches from 1 to 150 by one inch.

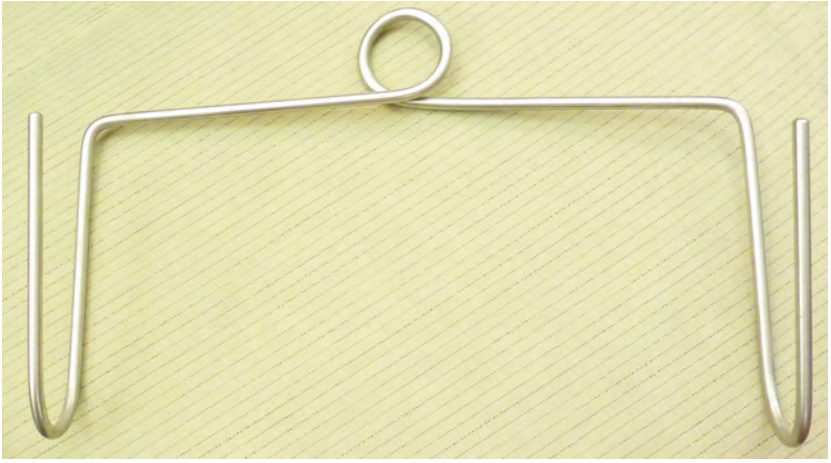


Figure 4. ⮝⮝ This is one of several tube cradles in the Special Collections at the University of Nevada, Reno Libraries. The cradles were several different sizes. This one is shown as an example.

In the papers of James Edward Church at the University of Nevada are several vague references to several different snow scales made by Forschner and Chatillon including specifications and prices. The library does not have any examples of Dr. Church's snow scales. They do have several examples of the cradles (Figure 4) used to hold the sampler.

The snow scale pictured here (Figure 3, 5, 6, 7 & 8) is one I bought on Ebay several years ago. It is made of aluminum and has a dial capacity of 150 inches or 450 inches with three revolutions of the dial hand. Engraved above the face on the front of the scale is "MOUNT ROSE SNOW SAMPLER 13". It also has the twist on dial cover to protect the face as it has no glass over it. The cradle is missing from this scale.

Fiigure 5. ⮝⮝ The scale is equipped with a dial cover to protect it when it is being transported to the snow survey site.

Figure 6. ⮝⮝ Engraved above the dial of the scale are the words *Mount Rose Snow Sampler 13*.

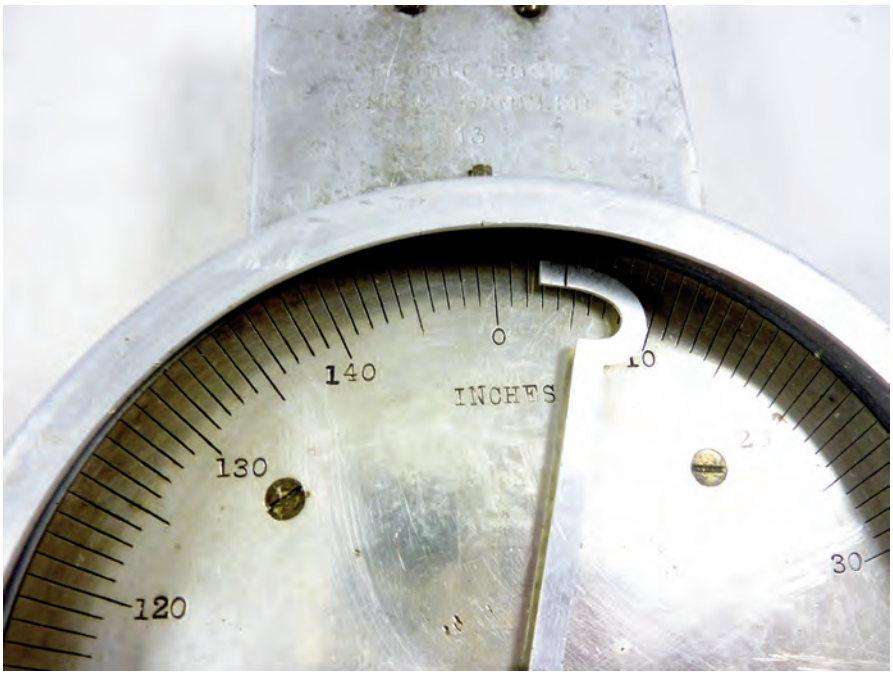


Figure 7. ⮝⮝ The dial is graduated in inches to 150 and rotates 3 times to measure up to 450 inches of snow pack.

Figure 8. ⮜⮜ In this photo you can see the clip that holds the dial cover on as well as the knurled knob to adjust the tare.

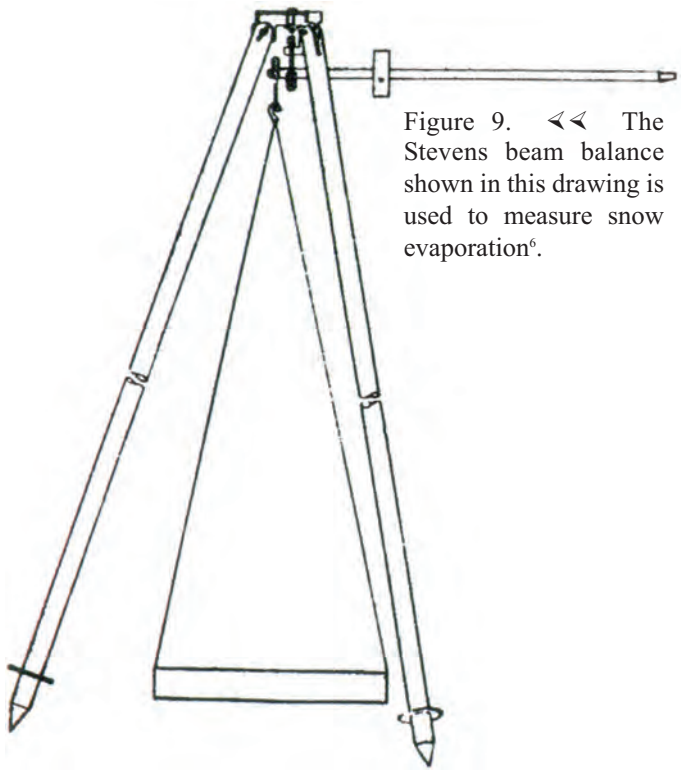


Figure 9. ⮜⮜ The Stevens beam balance shown in this drawing is used to measure snow evaporation[6].

Federal snow sampling equipment differs from Mt. Rose snow sampling equipment. Mt. Rose uses a sampler with a snow cutter with an inside diameter of 1.5 inches. This size requires a special scale graduated in inches. The Federal sampler (Figure 10) uses a snow cutter with an inside diameter of 1.485 inches. With this cutter a scale graduated in pounds and inches is used.

In a section of the June 1940 United States Department of Agriculture Snow Surveying Publication number 380, it describes the care of equipment as follows: *The balances should frequently be tested for accuracy. They should weigh accurately to one-half division; if they do not, they should be returned for replacement. They should be well protected while being transported and while in storage, carefully handled while in use, and wiped clean and dry after each use*[5]. The price listed in this publication for a balance is $9.17. This is the actual cost of the scale purchased in quantity.

In addition to determining the water content of the snow on the ground, another factor to consider is evaporation as the snow sits on the ground for the season. One method used to determine the rate of evaporation is with evaporation pans. These pans are weighed at regular intervals to determine evaporation. The Stevens beam balance (Figure 9) is one type of scale that can be used for this operation.

Dr. Church's snow measuring techniques are still being used today.

References:

1. The Papers of James Edward Church, Collection NC96, Special Collections at the University of Nevada, Reno Libraries, Reno, NV.

2. Church, J. E., Dr, "Snow Surveying its principles and possibilities". *The Geographical Review*, Vol XXIII, No. 4, October 1933, pp. 529-563.

3. Mergan, Bernard, "Seeking Snow: James E. Church and the beginnings of the snow science". *Nevada Historical Society Quarterly,* Vol. 35, No. 2 (Summer 1992). pp 80.

4. Church, J. E., Dr., ibid.

5. Mare, James C., "Snow Surveying", *USDA Publication No. 380,* June 1940*,* pp 10-11, 14.

6. Church, J.E., "Exhibit and Discussion of Apparatus for Measuring Snowfall and Snowcover, both Accumulation and Evaporation", *International Geodetic and Geophysical Union. Association of Science Hydrology. Bulletin. No.23*, 1938. pp 749-754

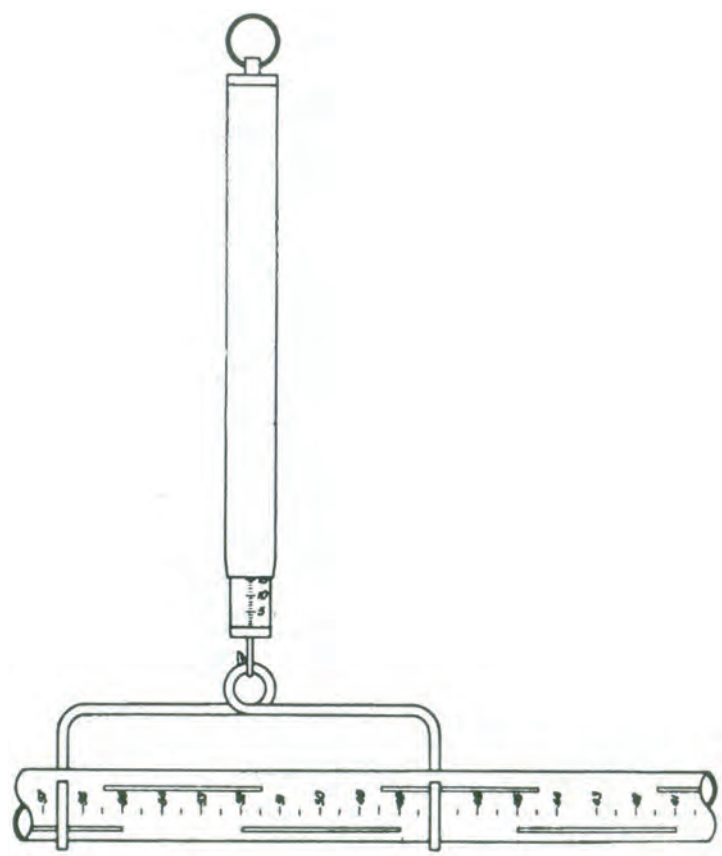


Figure 10. ➢➢ This is a drawing of the Federal snow-sampling equipment using a spring balance. This system uses a balance graduated in pounds and ounces as well as a different size sampler tube and cutter[5].

My Unusual *Abacus Scale*

FROM VERNON DENFORD

Notes & Queries

N & Q No. 162

In October 2015, ISASC(E) held a meeting near Warwick (UK). The theme for the day was *The Unusual Weigh*. Members were encouraged to bring to the meeting novel and strange aspects of weighing, some members spoke about unusual scales in their collections. Please refer to the ISASC E November 2015 edition of *Fulcrum*.*

Figure 1.

Figure 2. ⮟⮟ Folded.

Being unable to travel from Australia for this meeting prompted me to make a contribution of a particular scale in my collection. I consider my *Abacus Scale* fits into the category of unusual.

My contribution unfortunately did not make it to the UK forum. However, on completion of my endeavours to describe this scale, it has been suggested that perhaps it will be of interest to the wider membership of ISASC through EQM.

My colloquial name for this item is an *Abacus* Scale, simply because the layout of the mechanism and the movement of the counterpoises is in a similar fashion to the use of an abacus. In this case, equilibrium is the objective, which convinces me to consider it as unusual.

I describe this scale as a 5 beam steelyard (can you have a steelyard with 5 beams?) with a balancing counterpoise on the central rear beam, the other counterpoises which are proportional weights, being 8 by 1/8 oz on the front 2 beams, 16 by 1 oz on the central beam and 12 by 1 lb counterpoises on the 2 outer beams. The total capacity of the scale, less any tared container which may be used, is 13 lbs 1 oz.

The unloaded scale mechanism and weight system is shown in Figure 1.

The gallows and beam arrestment guard at the front of the mechanism base board doubles as a latch to catch on a clip on the wooden upright when the scale is folded to the wall or post.

The dimensions of the wooden back board are 20½ inches by 2¾ inches by 7/10 inches (520 mm x 70 mm x 19 mm). The mechanism base board is 18¾ inches x 1½ inches (smaller width) x 7/10 inches (476 mm x 38 mm (smaller width) x 19 mm.

Figure 3. ⮜⮜ Scale folded out showing how pan folds flat to wall when not in use.

Figure 4. ➢➢ Scale ready for weighing.

The sequence of operating the scale from folded to weighing a load is shown in the accompanying photographs figures 2 to 5. It is designed to be suspended on a wall or a post and the pan and suspension chains to be released and the beam base board folded down to a right angle ready for use.

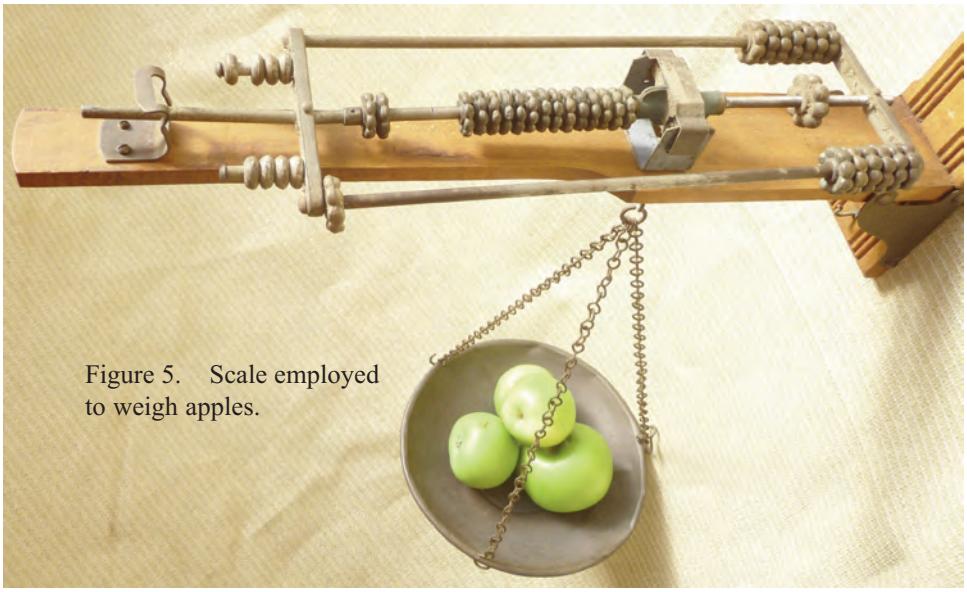


Figure 5. Scale employed to weigh apples.

Zero balance and tare, if required, is achieved by adjusting the counterpoise on the central rear screw beam with all other counterpoises pushed to the rear of their respective beams.

The scale is quite sensitive and when balanced at 10 lb the beam will turn with a ¼ oz weight added.

This scale was purchased in Melbourne, Australia but I have no clues as to the inventor or manufacturer, or of its place of origin.

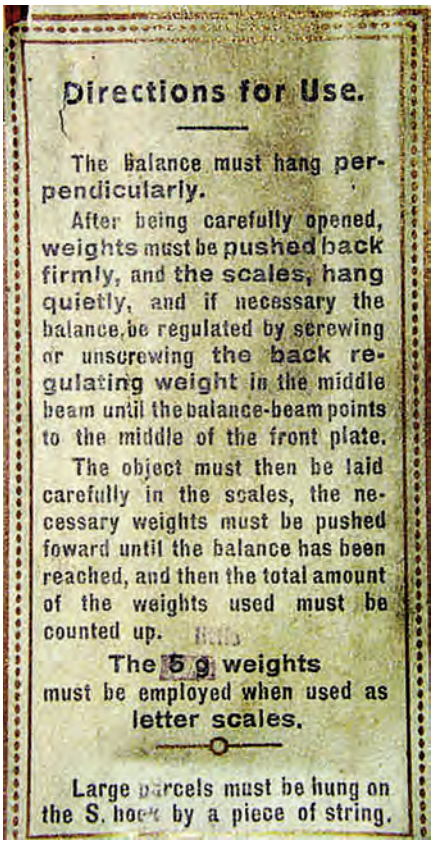
Can anyone describe the type or principle of this scale mechanism in a better way, or assist in identifying the maker and origin of this *unusual* scale please?

Notes:

**Fulcrum* is currently available online on at the ISASCE.com web page.

The author is an expatriate Englishman (Bristolian), a resident in Australia since 1969, who has enjoyed being a member of ISASC since 1979.

Response: Your scale was patented in Germany and most likely manufactured there as well. It was made primarily for kitchen and postal use as it folded neatly against the wall, out of the way. The German population, in my opinion, comes up with some brilliant methods of solving everyday problems and this fits the solution of weighing quite convieniently. This three beam steelyard with its tare and original pan is easy to use and folds up, out of the way when not in use.


Directions for Use.

The balance must hang perpendicularly.

After being carefully opened, weights must be pushed back firmly, and the scales, hang quietly, and if necessary the balance be regulated by screwing or unscrewing the back regulating weight in the middle beam until the balance-beam points to the middle of the front plate.

The object must then be laid carefully in the scales, the necessary weights must be pushed foward until the balance has been reached, and then the total amount of the weights used must be counted up.

The 5 g weights must be employed when used as letter scales.

Large parcels must be hung on the S. hook by a piece of string.

The scale is equipped with 14 one pound weights, 16 one-ounce weights and 8 drachma weights. It also has an adjusting weight to tare the scale

On his web site www.s-a-w.net, Matt Hass, a German collector, shows a similar scale which has a manufacturer's stamp showing that it was patented and made in Germany by the Wi Wa Company. His scale has the words pounds, ounces and drachmas stamped along its side to designate which weights correspond to a given weight. In addition, his scale has a label containing the following directions:

Directions for Use.

The balance must hang perpendicularly.

After being carefully opened, weights must be pushed back firmly, and the scales, hang quietly, and if necessary the balance be regulated by screwing or unscrewing the back regulating weight in the middle beam until the balance-beam points to the middle of the front plate.

The object must then be laid carefully in the scales, the necessary weights must be pushed forward until the balance has been reached, and then the total amount of the weights must be counted up.

The 5 g weights must be employed when used as letter scales.

Large parcels must be hung on the S hook by a piece of string.

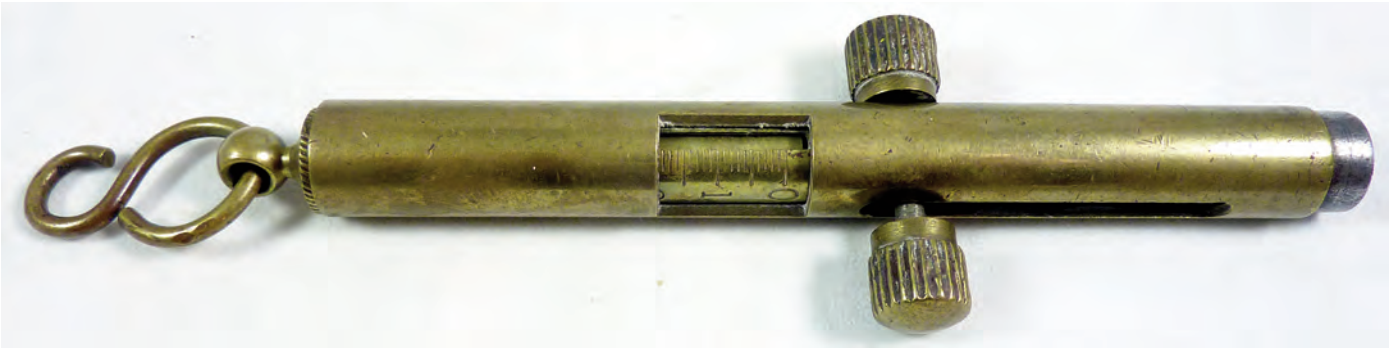
Jan Berning

Notes & Queries

FROM BILL BERNING

N & Q No. 163

The spring balance shown here is an item from the John & Virginia Cattle collection. A brass cylinder scale, with no name or markings, it measures 6" without the wire hook. It is graduated in Kilograms by 10ths to 5 and is ½" in diameter. Two knurled knobs are affixed on a steel rod going through the cylinder center. Pulling on these knobs engages the scale. Can any member explain the use of this scale or know the maker's name?



Miniature Portable "Brass Box" Sovereign Balance Makers

BY MICHAEL FOSTER

Paine & Simpson and Thomas Wood were two London sovereign balance makers who distinguished their product offering by making distinctive Portable Brass box rocker scales.

Paine & Simpson and Thomas Wood of London took very different approaches to making a portable counterfeit sovereign coin detector but in both cases they used a "Brass Box" approach.

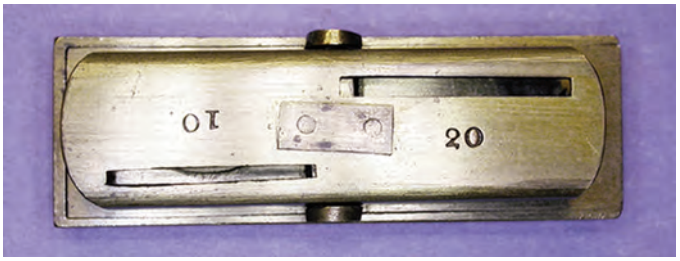
Paine and Simpson

The first style of miniature portable Balance found in a brass box was made by John Paine and Thomas B. Simpson, under the business name of Paine & Simpson, Comb manufacturers and Hardwaremen of 29-31 High St., Borough. London, from known dates 1816 to 1838.

Their non-standard sovereign rocker is described in Sheppard and Musham on p.149:

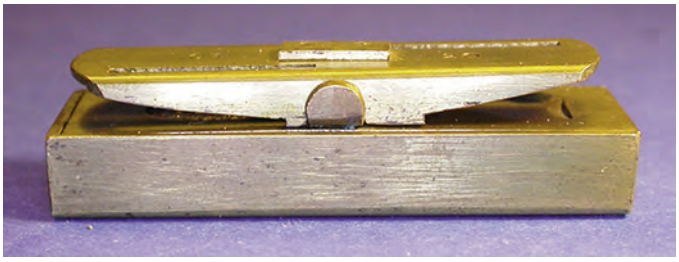
> No. 302 - Small patent rocking balance for sovereigns and half-sovereigns. This consists of a neat rectangular box (2 ½ X 5/8 in.) of brass which when placed in position for use rocks on a brass ridge crossing the upper side of the lid. The coins are pushed up towards a rectangular piece of brass in the centre of the beam, on one side marked '20', for weighting sovereigns, on the other side marked '10' for weighing half-sovereigns. The beam is perforated on the respective sides for testing the thickness of sovereigns and half-sovereigns. On the lid is an oval stamp of a crown and the letter G.R. between the words 'PAINE & SIMPSONS PATENT'.

The only recorded example of this small patent Rocking Balance is shown in the following photos:



Payne & Simpson Sovereign Rocking Balance

Payne & Simpson Sovereign Rocking Balance Box



Payne & Simpson Sovereign Rocking Balance
Dimensions: Length: 55 mm, Width: 18 mm, Height: 25 mm

Paine and Simpson stamped their brass box with their maker mark a Crown with GR:

Paine & Simpson maker mark Crown between G and R

Brass Box lid stamped label: 'PAINE & SIMPSON'S / . PATENT. . '
around Crowned GR

From the Crown with G.R. on the box lid this rocker was most likely made during the reign of George IV (1820-30).

Paine & Simpson's shop at 29-31 High St., Borough, London Bridge is illustrated in the 1830 picture below:

Picture (1830): Paine & Simpson, comb makers & hardwaremen,
29-31 High St, Borough, London Bridge

Directory and Newspaper listings on Paine & Simpson:

Paine & Simpson

1816 Paine & Simpson, Comb makers and hardwaremen, 29 High St, Borough, London Bridge, Reference: *Kent's London Directory 1816*.

1827 Paine & Simpson, Comb makers and hardwaremen, 29 High St, Borough, London Bridge, Reference: *Post Office London Directory, 1827.*

1838 *London Gazette*, Tuesday February 20, 1838, p.16. Partnership Dissolved, Paine and Simpson, Wellington St., Southwark, hardwaremen.

NOTICE is hereby given, that the Partnership heretofore subsisting between us the undersigned, carrying on business at Wellington-street, in the borough of Southwark, as Hardwaremen, under the style of Paine and Simpson, hath been dissolved, by mutual consent, as from the 1st day of January last; and that all accounts due to and owing from us will be received and paid by the undersigned Thomas Bridge Simpson.—Witness our hands this 19th day of February 1838.

John Paine.
Thos. B. Simpson.

1839 Paine & Simpson, Comb makers and hardwaremen, 57 High St, Borough, London Bridge, Reference: *Post Office London Directory, 1839*.

1839 Paine & Simpson, Comb manufacturers and hardwaremen, 3 Wellington St, Borough, London Bridge. Reference: *Robson's London & Birmingham Directory - part 1* [London], (1839), p.669.

Follow-on company listings:

Thomas B. Simpson & Co.

1841 Simpson Thomas B. & Co., hardwaremen, wholesale, 156 Leadenhall St., London, Reference: *Post Office London Directory* (1841), p.729.

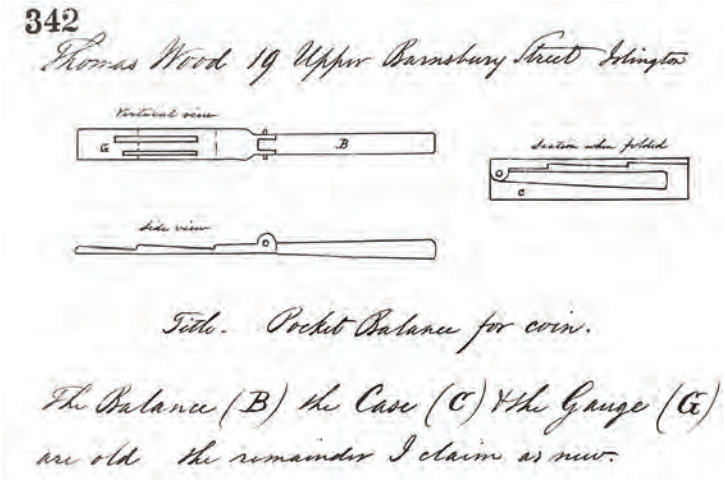
Thomas Simpson Jun. & Co,

1845 Simpson Thomas, Jun. & Co, (Successors to Paine & Simpson), comb & brush manufacturers, hardwaremen & cutlers, dressing case, writing desk & workbox makers, 156 Leadenhall St., London, Reference: *Post Office Directory of London and Birmingham with Warwickshire - Part 1*: London (1845), p.462.

Thomas Wood

A second style of miniature portable Balance for coin found in a brass box was made by Thomas Wood, Commercial traveller, inventor, and scale-maker of 19 Upper Barnsbury St, Islington, London, 1845. Wood submitted a Design Registration for a non-standard folding sovereign balance in a brass case.

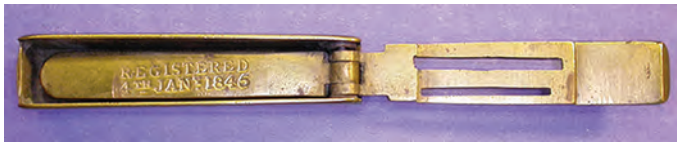
The design was originally registered No. 342 by Thomas Wood on Jan. 4, 1845, as a "Pocket Balance for coin":



Copy of 1845 Design Registration

A very rare example of the Pocket Balance described and illustrated in the Design Registration is shown in Variant 1:

Variant 1: Poise label reads: 'REGISTERED 4TH JANY 1845'



Variant 1: Open Top View

Variant 1: Open Side View

Dimensions: Length (Closed): 51 mm, (Open): 98 mm Width: 10 mm, Height: 13 mm

A second version of the Thomas Wood Pocket Balance is shown in Variant 2 with in-line slot gauges in the machine rimmed sovereign and half-sovereign platters. The label on the side of the brass box implies that this design was perhaps registered the next day, Jan. 5, 1845. The machined circular platters with gauge slots are more in keeping with the style of portable rocker being produced in Birmingham in 1845.

Variant 2: Brass box label reads 'REGIST'D JANY 5 1845'

Variant 2: Closed Top View

Variant 2: Open Top View

Dimensions: Length (Closed): 51 mm, (Open): 98 mm Width: 10 mm, Height: 13 mm

There is no record of a 2nd Design Registration by T. Wood on January 5, 1945, according to the Design Registration reports found in The *London Journal of Arts, Sciences, and Manufactures, and Repertory of Patent Inventions*, W. Newton, Vol. XXVI, London, 1845, p.59.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1845.

Jan. 1. *David Gordon Laing*, of 2, Villiers-street, Strand, for a valve-cock.

2. *John Warner* and *Sons*, of 8, Crescent, Jewin-street, Cripplegate, for a glass holder and air deflector for spirit and other lamps.

4. *Thomas Wood*, of 19, Upper Barnsbury-street, Islington, for a pocket balance for coin.

6. *James Ward* and *William Colbourne*, of Stratford-on-Avon, and *John Gillett*, of Brails, Warwickshire, for an improved chaff-cutting machine.

Design Registration Report for Jan. 1 to 6th, 1845

There are only three known examples of the Thomas Wood Pocket Balance for coin. Two are illustrated in this article.

Directory and Newspaper listings and the Crawforth Index provide some known dates on Thomas Wood beyond the 1845 Design Registration:

Thomas Wood

1845 Thomas Wood, 19 Upper Barnsbury St, Islington, London. Design Registration No. 342. Jan. 4, 1845.

Reference: *The Journal of Arts, Sciences, and Manufacuters, and Repertory of Patent Inventions*, W. Newton, Vol. XXVI, London, 1845, p.59.

1852 Thomas Wood, Scale maker, 29 Allen St, Goswell Rd., London, Reference: Post Office Directory, London, 1852, p.1075

1865 Thomas Wood Deceased. Reference: Diana Crawforth-Hitchins

Thomas Wood (junior?)

1883 Thomas Wood, Scale-beam and machine forger, 23 Shopton St, Hackney Rd, London E., Reference: *Morris Directory of London, 1883*.

The 1883 reference is most likely the son of Thomas Wood.

Showcase

This small seed scale is contained in a wooden box measuring 8³/₈" by 1½" by 1½". The cup is contained in a tin container 2¼" in diameter. The scale is of 3 parts: 1. A brass post 4¹/₈" high on a brass base which is engraved W. Packer Inventor. The brass base holds the fold-down post. The post is held upright with a spring. When in upright position, it will hold the ivory inlaid beam. 2. The ivory inlaid beam is 7⁷/₈" long and ¾" wide. 3. A brass seed cup which is 2" in diameter and 1½" high. The ivory inlay in the beam is numbered 100 to 304. The seed cup is suspended from the beam with a fine jack chain. The scale is believed to be English. A striker is included. Lesley N. Firth Collection

Showcase

This partners' scale was made by S Mordan & Co, probably about 1880. It is the only example of a partners' scale known. It is made of gilded brass with matching Bristol-blue ink bottles. It was designed to sit in the center of a large desk at which partners sat facing each other. Each partner had a pen rest and a set of weights on his side of the scale as well as a Bristol-blue bottle of ink on his right of the scales. The blue glass contrasts with the gilded brass making a striking centerpiece for the partners' desk. The two sets of weights are identical.

Judy & Eric Soslau Collection

S Mordan & Co, London is engraved on the beam of this postal scale. The scale has an oblong base measuring 6¾" long by 4" wide. It has blue & white circular Wedgwood plaques in the center of highly engraved diamond shaped plates. The simple oval base holds 5 weights marked oz ½, F, 1P, 2P and 4P.

Larry Press Collection

H. Troemner, Philad is marked on the poise of this CCD. It was made circa 1850, but no patent has been found. It measures 5¼" long by 1" wide and is used for determining diameter, weight and thickness of silver U.S. quarters and half-dollar coins.

Private Collection