Items from Conrad Schure's collection for auction at IM2021

1. Calculigraphe pocket watch style slide rule, by "H.C. Paris".

The Calculigraphe is a pocket watch style circular slide rule that was made by Henri Chatelain in Paris from approximately 1878 until at least 1907. It was often marked with other dealer's names, and frequently described as being "Systeme Boucher" or "Boucher's System with Improvements". It was made in two versions, a "fat" (20 mm thick) and a "thin" (16 mm thick) model. This is an example of the fat Calculigraphe. The internal mechanicals are notably different between the two models, with the fat model having the smoother and more durable mechanism. The card and pointers rotate smoothly in both directions on this one. The case is nickel-plated brass, and there is considerable loss of the nickel plating around the edges, indicating that this Calculigraphe spent a lot of time in someone's pocket. The crystals both appear to be glass, not plastic, but one is flat and the other domed, indicating that at least one of them has been replaced. There are a number of black specks underneath the glass, especially on the front (the "H.C. Paris" side). Some of the specks stay put, others move around when you tap on the side of the case. Overall, I would rate this Calculigraphe as being in good condition.

2. Dietzgen model 1760 Mannheim 25 cm. slide rule, no case.

The 1760 was Dietzgen's standard Mannheim slide rule. This one may have been manufactured by K&E for Dietzgen…those four screws on the back are for adjusting the upper stator to set slide tension, a K&E patented feature. The other interesting thing about this slide rule is the wood, or rather the color of the wood. While the stators appear to be made from mahogany, the slide is made from a much lighter colored wood, possibly a fruit wood.

3. K&E 4053-2 8" slide rule.

This is the uncommon 8" version of K&E's "Polyphase" slide rule, a Mannheim type with some enhancements. The combination of cursor style and scale arrangement dates this one to 1916-1921. The slide rule is in excellent condition, however if you look very closely at the back (see picture #3) you can see evidence that at one time there was something written or scratched on it. Part of that "excellent" rating is that the leather flap is still attached to the case, the cursor glass is undamaged, and the celluloid cursor blocks show no sign of rot, all of which are common faults on K&E slide rules this old.

4. Dietzgen model 1772B Union 25 cm slide rule.

The Dietzgen Union slide rules were inexpensive but fully functional Mannheim slide rules. This slide rule achieved low cost by, among other things, using a single piece of celluloid to cover the back and connect the two stators. That's it, a single piece of celluloid, 0.027 inches thick (0.66 mm), is all that's holding the slide rule together. I've seen this construction before, on slide rules attributed to John Davis & Sons in the UK. The Pi character on this one makes me think it was made by Nestler. This slide rule is in excellent condition, and is in its original box, which is in very good condition.

5. Mechanical Engineer pocket watch style slide rule by Scientific Publishing Co.

The Mechanical Engineer Calculator is a pocket watch style circular slide rule. When it was initially offered for sale by Scientific Publishing Company, around 1900, it was sold in two sizes, with case diameters of 3 inch and 2.1 inch. Later, sometime between 1905 and 1910, it was sold in only one, in-between size, with a 2.4 inch diameter case. Whether large, medium, or small, the scale set was always the same: (from outside to inside) L, D, a 2-revolution square root scale, and S. This particular Mechanical Engineer is quite unusual in that it is the later "middle" size, but it only has a single scale on its face, a single-cycle logarithmic scale. I have never seen this model mentioned in SPC's advertisements or instruction books.

This Mechanical Engineer is in excellent condition. The domed glass crystal appears to be original, and there are no marks or scratches in the case near the groove where a watchmaker's knife would be inserted to open the case (see pictures 3 & 8). Both the very short fixed pointer and the rotating pointer are also in excellent condition, and if you get the light to reflect just right (harder than you think) you can still see their blued steel color. The scale and rotating pointer rotate smoothly in both directions. You may be wondering why this one doesn't say "Mechanical Engineer" in the center of the dial. By far the majority of Mechanical Engineer calculators you will see have nothing at all printed in the center of the dial, but they are still easy to recognize: the scale arrangement, the side knob at the 2:30 position, and the case with rounded sides and back that is clearly adapted from a real pocketwatch case, not made specifically for the calculator. There's a theory that the ones sold by third parties were blank in the center of the dial, and the ones sold by Scientific Publishing Company said "Mechanical Engineer", but no one really knows. The name, "The Mechanical Engineer" comes from the magazine of the same name that was published weekly by Scientific Publishing Company. When printed on the calculator it was both the name of the calculator and an advertisement for the magazine. For what it's worth, the medium size Mechanical Engineers, like this one, are more likely to have "Scientific Publishing Company" printed on the dial than the large or small models.

The Mechanical Engineer calculator is significant in slide rule history because it is the immediate predecessor of the well-known Fowler calculators, which replaced it sometime between 1910 and 1913.

6. Pickett 103ES Mark-Up Calculator, with case, instructions, original box.

This Pickett 103ES Mark-Up Calculator is a business slide rule for merchants. One side is used to calculate mark-up problems using either cost or selling price as the basis, and the other side is a more general-purpose slide rule for interest and other calculations. The slide rule is constructed with an aluminum disk 4.2 inches in diameter, and on the mark-up side it has a circular plastic disk overlay and a single clear plastic cursor. On the slide rule side the scales are C, CI, A, A with the numbers expressed as fractions, L, and fractions of an inch to 1/64 inch resolution, using the L scale for the decimal equivalent. The slide rule, instruction book, and leather case all look brand new. The box shows some shelf wear but is completely intact.

7. Molter small circular slide rule, pocket watch size.

The Molter slide rule was made in Germany in the 1920s. Not much more than that is known about it with any degree of certainty. It is generally called the Molter, whatever name is actually

on it, because Wilhelm Molter appears to have been at the nexus of the supply chain for these slide rules. It is very possible that Molter designed it, but most people doubt that he had the manufacturing capability to produce it. Most likely someone made it for him, and nobody knows who that was. Four, possibly five variations of it have been seen in a surprisingly small number of samples in collector's hands. This one appears to be somewhere between early and late in the device's evolution: the knurled rings in the center are 1 cm diameter on both sides (instead of 1.5 cm as on the late version), and while the cursor hairline on one side is only as long as necessary to cover the scales, on the other side it goes all the way to the center.

The Molter slide rule is used in the same manner as the more common Halden Calculex: pinch the center knobs between thumb and middle finger, and turn the outer rim with your other hand. To turn the clear plastic faces which the hairlines are scribed on, there are small circular dots to give your fingernail some purchase on the plastic. There are two dots on each side for this purpose. The diameter is 2.55", 65 mm.

This particular Molter is in very nice overall condition. The fifth picture, the edge-on view, doesn't show it, but one side of the slide rule is slightly dished, while the other side slightly bulges up. It doesn't affect operation. In that fifth picture you'll also see how the two halves of the metal ring around the outside are joined. They appear to be trying to come apart in one area, but you can push them back together if you want. The slide rule gets stiffer to operate when you do. This slide rule has advertising for Maskin A. B. on it, others have been seen marked "A. Leitz", "Gebr. Wichmann", and "Schact U. Westerich".

8. Pickett 111-ES Circular Slide Rule, with case and instructions.

The Pickett 111-ES slide rule was made for Pickett by Concise in Japan. Except for the Pickett yellow color and Pickett markings, this is the same slide rule as the SIC 1610 (not the 1610-D). Functionally this slide rule is at least the equivalent of a 25 cm duplex log log slide rule. The slide rule is 5 inches in diameter, with 4 log log scales at the outer edge on each side. This gives the log log scales impressive range and resolution, with the scales for $n>1$ covering the range 1.00100 (yes, you can read that last digit and interpolate one more) to 20,000, and for $n<1$, 0.000050 to 0.998980. The trig scales are similarly impressive, with both the sin and tan scales making three revolutions and covering the range from 0.1° to 80° (sin) or 84° (tan).

The central structure of the slide rule is a 1 mm thick aluminum plate, to which are bonded 1 mm thick plastic facings on both sides. On one side there is an inset rotating disk, on the other side the facing is solid, with no rotating disk. The cursor consists of two clear plastic pieces with the scale labels marked on them. The cursors rotate on a raised boss, and no matter how much you tighten the knurled screws, the cursors don't bind. At the outer edge the two plastic cursor pieces are joined with an aluminum spacer. That spacer has a groove that rides on the aluminum disk, and this keeps the cursor's plastic parts from contacting the faces of the slide rule.

This Pickett 111-ES is used but in excellent condition, and includes the leather case and instruction book, which are both in very good condition.

9. Tavernier-Gravet Mannheim Slide Rule with Chisel Cursor

The first Mannheim slide rules were made by Gravet Lenoir in 1851. The Mannheim design was the first modern slide rule, and the first slide rule to require a cursor (to read squares and square roots). The Mannheim also incorporated trig scales on the back of the slide, although strictly speaking, the Mannheim arrangement only specified the layout of the A, B, C, and D scales on the front. Mannheim slide rules were in continuous production from 1851 until slide rules were no longer made. This Mannheim slide rule is by Tavernier Gravet, the successor to Gravet Lenoir. The address, 19 Rue Mayet, indicates it was made between 1881 and 1939.

As you can see from the pictures, this 25 cm Tavernier Gravet boxwood Mannheim slide rule is in very good condition. There is only minor dirt and blemishes, and the loss of some of the paper label on the back is very common. A previous owner's name, "E. C. ATKINSON" has been scratched into the lower stator on the back, and filled in with black ink. There are no cracks or pieces missing from the wood, and surprisingly the fingernail nicks at the ends of the slide are not torn out. The all-brass cursor has thankfully been left unpolished. The slide moves only a little stiffly when in the normal position, but the friction is much higher when the slide is inverted to use the trig scales.

10. Timber Contenting Slide rule by W. C. Cox

The timber contenting slide rule dates from the early part of the 19th century. It is for calculating the volume of both finished boards and unfinished logs, one side of the slide rule being dedicated for each of those tasks. It provides the answer in cubic feet because that was the unit of the day for timber merchants. The timber contenting slide rule was made by many instrument makers to a very standard pattern of scales, and almost always 2 feet long (occasionally 3 feet). This slide rule follows that standard pattern, but it is by a maker I had not heard of before, "W. C. Cox DEVONPORT". William Charles Cox worked from 1822 to 1857 in Devonport and Plymouth, major port towns on England's south coast. Following the 1914 merger of Plymouth, Devonport, and East Stonehouse, Devonport became a district in the County Borough of Plymouth, later the City of Plymouth. Cox is known to have made mathematical instruments, philosophical instruments, compasses, and to have been a sales agent for several clock and chart makers. So, a dealer of nautical instruments in a port town. Cox would have had a ready market for a timber slide rule, what with the local shipbuilding industry, timber merchants, and customs and excise agents. It is very possible, likely even, that Cox did not make this slide rule himself, and merely put his name on it. Timber slide rules were frequently sold with no name on them, so the dealer could stamp their name on it. For more information on this type of slide rule, see Measuring the Volume of Logs: The Timber Contenting Slide Rule, Journal of the Oughtred Society, Vol 6, No. 2, Fall, 1997.

This slide rule is in rough condition, with all the scratches, gouges, and stains appearing to be very old. It is hard to read in places. Still, it is an interesting slide rule from a seldom seen maker/dealer.

11. Tavernier-Gravet Mannheim slide rule with Glass Cursor and case.

Another Mannheim slide rule from Tavernier-Gravet, this one somewhat later although still made at the 19 Rue Mayet address, so the date cannot be established any more accurately than between 1881 and 1939. This slide rule appears to be brand new, with only some corrosion on the metal frame of the glass cursor (see picture #4) keeping it from being in perfect condition. The slide moves quite stiffly, so stiffly that I did not move it more than an inch in either direction, just enough to verify that it moved at all. I did not want to take a chance that I would damage it. The cardboard tube is almost perfect, but it is open at both ends. It looks like the bottom of the tube has been neatly cut off. Something odd that I can't explain is the matching number on the right end of the slide and stators. These are for keeping *that* slide and *that* stator together during manufacturing. They are marked with the number 260, but the "0" has been turned 90 degrees. Was that a particular workman's way of signing his work, or something T-G did all the time? I don't know.

12. Universal Trigonometric Combination, by George R. Flynn.

It is a rare device that calls itself "universal" that actually lives up to that rather grand claim. George Ryan Flynn's *Universal Trigonometric Combination Semi-Circular Slide Rule – Protractor – Sine Table – Angle Formula Finder* may have succeeded. In fact, he may have been modest. The sine table gives not only the sines of angles, but cosines, tangents, and cotangents as well. This device is constructed entirely from two thin sheets of celluloid and one rivet, was printed on only one side, and was manufactured by The Whitehead & Hoag Co., in Newark, New Jersey. Whitehead & Hoag were known for manufacturing novelties from celluloid. The Universal Trigonometric Combination was patented by Flynn in 1922, and given its scarcity, it was probably not made for very long. The most remarkable thing about this one is that it has survived. Celluloid is not a stable plastic, as evidenced by the very familiar K&E rotting cursor bars. The only hint of age on this piece is a slight warp. The original leather case is included, and is also intact! For more information on Flynn's Universal Trigonometric Combination, see Ed Chamberlain's excellent article in the Spring 2014 issue of the Journal of the Oughtred Society.

13. 25 cm Boxwood Mannheim Slide Rule with Chisel Cursor, Maker Unknown

This is a very nicely made boxwood Mannheim slide rule, but with no maker's identifying marks anywhere on it. There is also no pi character on it, so I am denied my favorite clue for identifying mystery slide rules. In spite of that, I will stick my neck out and say that this is probably a Nestler, because they supplied so many English retailers. The cruciform style chisel cursor points to Germany as the source, and the inch rule on the beveled edge and paper label in English on the back points to England as the destination. The part-matching number 30 stamped into the end of both the slide and stator indicates that this was a major manufacturer, not a small shop. The slide rule is in excellent condition and the slide moves freely, though a bit stiffer when inverted.

14. Clementson Steam Pipe Sizing Slide Rule

The Clementson Steam Pipe Sizing Slide Rule, and a similar one for water pipes, were made by A. G. Thornton in the UK, although they did not put their familiar PIC trademark on it, only

marking the back of the slide with “Made in England”. The slide rule appears to be for calculating the required diameter of pipe to deliver a specific quantity of steam which is supplied at a specified pressure. Some examples of this slide rule have been seen with a paper label on the back giving instructions for its use. Not this one, only beautiful bare wood on the back. The slide rule has no cursor, and never did. There are no grooves on the top or bottom for a cursor to run in. This slide rule is in excellent condition.

15. Small Calculator

The “Small” Pocket Calculator lives up to its name; it is just under 2” diameter, the size of a pocket watch. The Small calls itself a calculator, but it is in fact a circular slide rule, with the full complement of scales from a Mannheim slide rule. The C and D scales are on the ‘rim’ or outer edge, giving scales nearly 6” long. The S, ST, L, CI, and square root scales are distributed between the two flat sides. Exact production dates for the Small Calculator are unknown, although the 1920s would be a safe bet. There was a patent for a similar device filed in 1900 by Roger W. Conant, though that design appears to have never been built. Gilbert Small incorporated many improvements into his design, not least of which is a much improved cursor, and applied for his own patent in 1913, which was finally issued in 1918. The Small is a beautiful and intricately made device, consisting mostly of cast and machined parts. In use, the top and bottom disks are rotated with respect to each other, and to facilitate this, the edge of each disk is coin milled, to provide grip. The scales on the flat sides are half porcelain and half engraved into the metal. The C & D scales around the rim are celluloid bands, and the cursor “window” appears to be celluloid as well.

This example is in great condition except for the celluloid bands, both of which have shrunk due to age and broken. There is also some verdigris (the green corrosion that appears on copper alloys) on most of the metal parts, which wipes off easily. Although the cursor is dirty, you can easily read “Model (S) NO-1” on one side and “G SMALL [logo] BOSTON” and “PATENT PENDG” on the other side. There is no case or instructions.

16. Charles Hoare slide rule made by Aston & Mander

This slide rule was intended to accompany the book, “The ABC of Slide Rule Practice” (1872) by Charles Hoare. The scale layout is Hoare’s own idea for the best way to present the slide rule to beginners. There are four scales, two on each side, but this is not a true duplex slide rule and there is no cursor. The four scales are the familiar scales of the Soho slide rule. Hoare felt that putting all four scales on one side of the slide rule would overwhelm a beginner, and this layout was to facilitate teaching each pair of scales separately. Hoare’s slide rule was made by Aston & Mander, and the scales are an odd length, 11 inches. The idea of using a simplified slide rule to teach beginners how to use a slide rule didn’t catch on in the UK or USA, although it does appear to have gained some traction in Germany, where A. W. Faber slide rules “For School Use” can be found. This slide rule is in excellent condition except for the name, “G. Smith” that was written on it in pencil hard enough to emboss the wood. It looks like someone has erased most of the pencil lead, and it is hard to see unless the light is from just the right angle. I have attempted to highlight the part of the slide rule where the name is written in picture #3.

17. Early steel Gilson Midget circular slide rule

This is a Type 1 Version 2 Gilson Midget, according to Henry Aldinger and Ed Chamberlain's classification, which is in the Vol 9 No 1 (Spring 2000) issue of the Journal of the Oughtred Society. The scales are printed on paper and glued to a steel disk. The overall diameter is 3 5/16 inches (84.1 mm), and the cursors, which were called "arrows" in Gilson terminology at the time, are steel and are only on the front side. This model is believed to have been made from approximately 1915 to 1918, when it was replaced with a model having the scales printed directly onto an aluminum disk. The scale set is quite limited with only C and L scales on the front and trigonometry scales – without a cursor - on the back. This Midget is in very good condition for its age. There are some discoloration spots on the paper, and a few small places on the trig side where abrasion has rubbed the scales away. What appears to be a varnish coating to protect the paper has cracked with age, which is entirely expected.

18. Farmar Slide Rule, Desk Size, 15th Edition

As written on the front of this slide rule, "Farmar's Rule, The Standard Slide Rule for the Entire Wine & Spirit Trade" makes a fairly bold statement that this large (20.5" long, 2.5" wide) slide rule probably does live up to. When calculating proof reductions (i.e., watering down the booze) this slide rule can either allow for contraction (i.e., 1 liter of water + 1 liter of alcohol = less than 2 liters of mixture) or not. It has numerous other scales for calculating profits, blending, gauging, fortifying, etc. From 1902 to 1921 the Farmar slide rule went through 15 editions, each one accompanied by a matching instruction book. The 15th edition of 1921 must have been a winner because Farmar didn't come out with the 16th edition until 1958. That would explain why most of the Farmars you see, like this one, are 15th edition. The cursor on all Farmar slide rules is fairly crude, just two pieces of celluloid screwed to two pieces of wood, but it is usually the cursor that determines the condition. This slide rule is in excellent condition, which means that the cursor is 1) present, 2) all screws are there, and 3) it has only yellowed slightly so you can still see through it easily. With the cursor being in such great condition, you can be 99% sure that the rest of the slide rule is too, and that is indeed the case with this one.

19. Maison Richer, Guyard & Canary stadia slide rule, boxwood.

This slide rule has no maker's mark on it anywhere, and the wooden box doesn't either. There is a single folded sheet of instructions which appears to be a photocopy. However, the style and scales of this slide rule are enough to tell you that it was made by Henri Morin and sold by Richer or his successors, Guyard & Canary, probably to accompany a theodolite that they had made. Stadia or tachymetric slide rules are used in surveying to correct slant range (distance measured up or down a slope) to true horizontal range. The Morin slide rules differed from most other stadia slide rules in that angles were measured down from the vertical rather than up or down from the horizontal. As with most slide rules, these stadia slide rules are now obsolete, along with the theodolite itself, replaced by fully computerized "total stations" that are fast, accurate, and extremely efficient, with all the class and elegance of a kitchen blender. But I digress. This slide rule is in superb condition, with only very slight warps in two directions: when looking at it face-on, the ends curve up, and when resting on a table it rocks end to end. The slide moves stiffly, but it does move over its full range in both directions. The scales are 400 mm long (16") and the slide rule is 425 mm long overall (17"). The construction of this

slide rule is a little unusual in that it is only two pieces of wood. The upper and lower stators and the back of the slide rule are carved from a single piece of wood, and the slide is a single piece. The slide and one stator are stamped with a "0" at one end, a number used to keep the matching parts together during manufacturing.

20. Maison Richer, Guyard & Canary stadia slide rule, nickel-plated brass.

First of all, let's clear up any confusion about all the names associated with this slide rule. The label on the lid of the box says "M.^{on} Richer, Guyard & Canary Suc.rs, Paris" The actual maker of this slide rule was Henri Morin, as determined by Otto van Poelje. See his excellent paper on stadia/tachymetric slide rules here: http://www.rechenschieber.org/stadia.pdf. These nickel-plated brass, German silver, or boxwood slide rules were originally sold under the Richer name. Guyard & Canary were nephews of Emile Richer that were brought in as apprentices and, by 1870, were part owners of the business. After Richer's death (date unknown), Guyard and Canary continued the business, adding "successors" to the label but keeping Richer's name. The label in the lid of the box is to be interpreted as: Guyard and Canary, successors to Maison Richer [English: House of Richer], Paris. In 1890 Guyard & Canary followed the example of their former boss and made two apprentices, L'Hermite and Lejard, part owners. In turn, when L'Hermite and Lejard took over the business, they followed the example of their former bosses and kept Richer's name at the top of the masthead, dumping the Guyard & Canary names. Just business sir, don't take it personally.

The slide rule, which is in excellent condition, has no maker's mark at all. There is a single sheet of instructions, in French, in the box, which appears to be a high-quality photocopy, exactly like the sheet that comes with item 19, the boxwood version of this slide rule. The nickel plating on this slide rule is so good that I initially thought it was made of solid German silver. But when I removed the slide I could see the brass on the dovetails in the well where the motion of the slide has worn off the nickel plating. The slide rule is 430 mm long (16.9") and weighs an impressive 861 g (30.4 oz.). Like the boxwood version, this slide rule is made of only two pieces (4 pieces if you include the small knobs at the ends of the slide), with both stators and the back machined from a single piece of metal. The slide is the other piece. Both the slide and stators are stamped with the number "2" at one end, to keep the matched parts together during manufacturing.

21. Dietzgen model 1759-B Philips slide rule.

There is no brand marking on this slide rule, but the model number, 1759-B, is stamped into one end of the slide, clearly indicating that this is a Dietzgen "Philips" slide rule. The Philips slide rule has a BI scale on the slide, which Dietzgen labeled "R". This was to aid in chain calculations such as A x B x C. This example has some features that I can't explain, such as the piece of card glued over the part of the label on the back that would have had the Dietzgen markings. Also, it has a large "2" stamped into both one end of the slide and into the well under the slide. Finally, it has the wrong cursor. There is a K scale, labeled "E", on the lower edge, and there should be a tab or extension of the cursor for use on that scale. There is no tab on this cursor. This slide rule has no case.

22. Obs. Of Fire slide rule by J. A. Nicholl & Co., aluminum with leather case.

This is a British artillery slide rule, used to correct for the difference in range between the actual impact point of a shell as compared with the range determined by the two-observers method. I have seen these aluminum artillery slide rules with a few different maker's names on them, with J. A. Nicholl & Co. being the most common. The aluminum parts of the slide rule are 0.25" thick, and the overall thickness at the end braces is 0.35". The end braces, which are wrapped around the aluminum of the slide rule, appear be made of a very light-colored brass, or perhaps German silver with less nickel content than usual. The cursor is made of the same material as the end braces. This slide rule is in excellent condition, with just a couple of scratches and scuffs. The dirt will all come off with, at most, a fingernail. The slide rule is dated 1918 and marked with the Ministry of Defense broad arrowhead. The slide and one stator are stamped "39" on the ends, to keep the matching parts together during manufacturing. The leather case is in very good condition, especially considering its age. There are several scuffs, but it still feels solid and completely intact. The case is also marked with the MOD broad arrowhead.

23. Otis King Model K helical slide rule, with original box.

This Otis King Model K comes in its original box and is in very good condition. There is one tiny spot on the cursor where the black paint has been scraped off, some of the chrome has flaked off of the top cap around the hole in the center, and there is some dirt in the knurling around the top cap. Otherwise, it is in excellent condition.

24. Slide Rule for weight of steel, designed by Charles Hoare, made by Aston & Mander.

This slide rule was for calculating the weight of steel sheets or plates. The range of dimensions it will handle are:

Length: 2.3 ft. to 30 ft.
Width: 6 inches to 10 feet
Thickness: 0.15 inches to 5.45 inches

The slide rule is 2-sided, with the same scales on each side but covering a different range of length-width-thickness. There are only 4 scales on each side, but it looks like more because the length scales show both feet and inches, the thickness scales show 100ths, 20ths, and 40ths of an inch, and the weight scale shows hundredweights, quarters, and 7 lb. increments. The operation is very simple: place length opposite width on the lower two scales, and the weight will be opposite thickness on the upper two scales. Overall length of the slide rule is 25.7 inches.

25. Sperry Calculator

The Sperry Calculator went through a few variations since the original patent by Elmer Sperry (yes, that Sperry, of gyroscope autopilot fame) in 1904. No Sperry Calculators have been found that match that patent, and very few have been seen that match Sperry's later (1928) patent, the one with one stem 'winder' and two buttons.

This K&E / Sperry calculator is a type 3A according to Peter Hopp's chronology in his book, "Pocket-Watch Slide Rules" (highly recommended). The dial is labeled "E. A. Sperry's Calculator" on one side and "Keuffel & Esser Co. NY. Pat. Oct. 25, 04" on the other side. It uses Lange's (1911 patent) iconic dual concentric thumbwheels. It is serial number 353. It is in excellent condition with only minor blemishes on the case, and one dial somewhat darker than the other, possibly because of tarnish on the silver-plated dials. Both thumbwheels work smoothly in both directions, although the dial rotation is a little stiff. The diameter is 2.12", or 53.8 mm. If you look very closely at the bottom edge of the glass in picture #2, you'll see what looks like a chip in the glass. It is not a chip; the glass feels and looks perfectly smooth. Upon close inspection it looks like an internal defect in the glass, such as an inclusion or bubble.

26. Rothmill Paper Trade slide rule.

This slide rule makes the Tomlinson's Equivalent Paper Slide Rule, itself an imposing piece, look like a plaything for children. One side of this 2-sided slide rule is for calculating the weight of a given number of sheets of paper of specified length, width, and density. There is a groove with two sliders that appear to serve the function of a cursor in that they "mark" (on the scale along the upper edge) a specific size of paper, and let you change the density while keeping the size constant. The other side of the slide rule is production related, and instructions for its use are written in one long line of very small text along the bottom edge of the rule. The last picture shows it in 7 segments, but since it is hard to read, here it is:

(1) SET DECKLE ON C OPPOSITE SPEED ON D: ABOVE SUBSTANCE ON B FIND PRODUCTION IN LBS PER HOUR (DECKLE 70 SPEED 160 SUBSTANCE 30 = PRODUCTION 1280 LBS PER HOUR || (2) SET SUBSTANCE ON B OPPOSITE PRODUCTION REQUIRED ON A THEN BELOW DECKLE ON C FIND SPEED NECESSARY ON D || (3) SPEEDS ABOVE 1000: SET 250 DECKLE TO 120 FOR 1200. ABOVE SUBSTANCE 14 FIND 1600 X 10 = 16.000 LBS PER HOUR

I told you it was a long line of text. This side of the slide rule also has a groove with two sliding indicators, but their purpose here is not clear to me. The overall length of this slide rule is 25.3 inches.