

On Goldsmith Chandlee

Dr. Richard L. Elgin, LS

Goldsmith Chandlee was one of the most notable American clock and instrument makers of the late eighteenth and early nineteenth centuries. Born August 18, 1751 in Nottingham, Maryland, Goldsmith was the oldest son of Quaker clockmaker Benjamin Chandlee, Jr. (1723-1791) and Mary Folwell Chandlee (died 1806). He was named for his maternal grandfather, Goldsmith Folwell. Of Irish descent, Goldsmith's grandfather was Benjamin Chandlee, Sr. (1685-died c. 1745), known as "the emigrant" who came to Philadelphia from Ireland in 1702.

Characterized as the "Six Quaker Clockmakers" in a 1943 book by that title, the first of the six clockmakers was Abel Cottey (1655-1711). He probably built the first clock in America. A clock, marked "Abel Cottey, Philadelphia" is dated 1709. One of his apprentices and Cottey's future son-in-law was Benjamin Chandlee, Sr. ("the emigrant"), the second Quaker clockmaker. Benjamin, Sr. had six children, one of them being Benjamin, Jr., the third Quaker clockmaker. Benjamin, Jr. had five children, three of which became clock and instrument makers: Goldsmith, Ellis, and Isaac Chandlee. These brothers are considered the fourth, fifth, and sixth Quaker clockmakers.

Goldsmith apprenticed under his father in Nottingham, Maryland and by the time he was 24 years old he was an experienced craftsman. In 1775 he moved to Stephensburg (now Stephens City), Virginia and then on to Winchester, Virginia in 1783. There he built a brass foundry and a shop where he produced clocks, surveying compasses, telescopes, money scales, and other instruments of metal. His business was located on the northwest corner of Cameron and Piccadilly Streets where he owned several buildings and also resided. Besides making clocks and compasses, he was active in many civic activities. He was a mem-

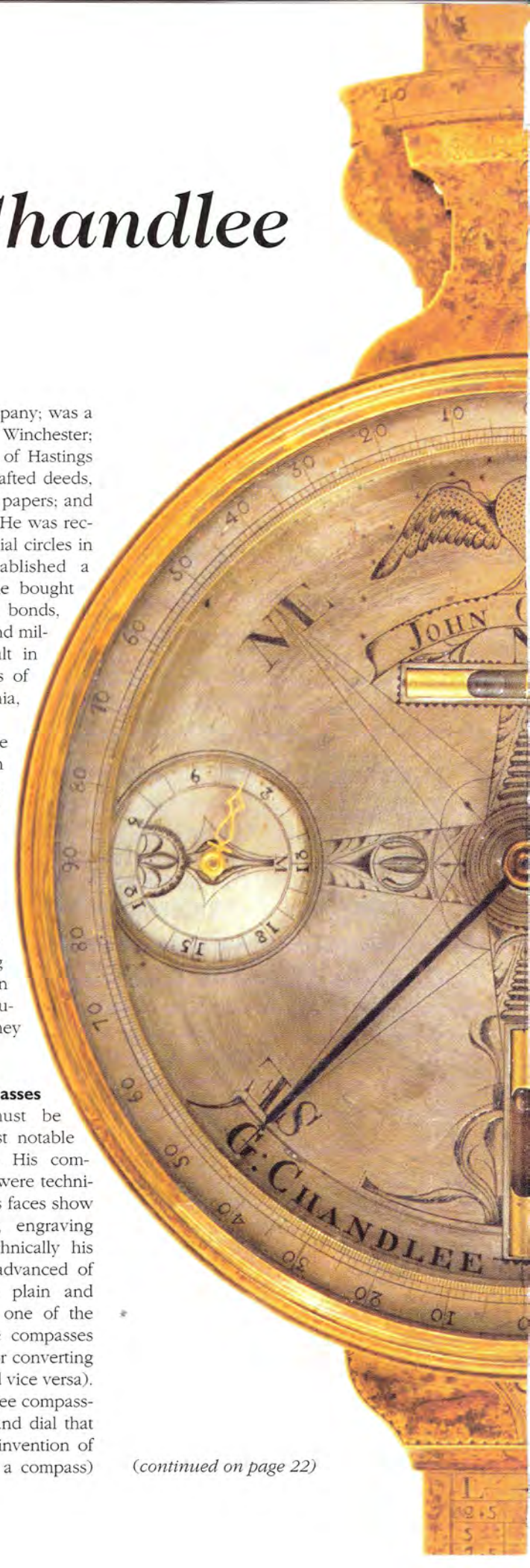
ber of the volunteer fire company; was a justice of the Corporation of Winchester; sat on the Bench of Justice of Hastings Court of that city; and he drafted deeds, mortgages, and various legal papers; and acted as executor of estates. He was recognized as a leader in financial circles in northern Virginia and established a counting house in which he bought and sold bills of exchange, bonds, notes, soldiers' certificates, and military warrants. He also dealt in land and owned large tracts of land in Pennsylvania, Virginia, and Kentucky.

Goldsmith married three times. He first married in 1776 Ann White (died 1781). From this union came three children, one being Benjamin III (1780-1822) who also was an instrument maker. In 1784, Goldsmith married Hannah Yarnall (1750-1810). From this union came four children, one being Goldsmith, Jr. (1788-1842). In 1811, Goldsmith married Eunice Allen (1753-1822). They had no children.

Technically Advanced Compasses

Goldsmith Chandlee must be counted as one of the most notable American compass makers. His compasses are works of art and were technically advanced. The compass faces show fine design, craftsmanship, engraving and ornate decoration. Technically his compasses were the most advanced of their day. He made both plain and vernier compasses. All but one of the known Goldsmith Chandlee compasses have his "L" and "T" table (for converting tenths of perches to links and vice versa). All known Goldsmith Chandlee compasses also have an outkeeper and dial that converts outs to poles, the invention of which (or its application to a compass)

(continued on page 22)



we can attribute to him. Some of his compasses also have a counter where the surveyor could tally the miles chained. All known Goldsmith Chandlee compasses are marked with at least "G. Chandlee," with that inscription being followed with "Winchester" or "W" (for what today is Winchester, Virginia). Most Goldsmith Chandlee compasses also are marked (following the lettering given above) with the name of the person for whom the compass was made. Probably the most notable person for whom Chandlee made a compass (but not the most elaborate known Chandlee compass) was Laurence Augustine Washington, nephew of another surveyor, George Washington. That compass is displayed at Mount Vernon.

Compass Production Records Not Available

Goldsmith has been described as a small, sparse man with dark brown hair. He is said to have been fond of company and "much given to entertaining." He died in Winchester on March 4, 1821 and was buried in Center Meeting graveyard on the Valley Pike. After his death his personal property was sold at auction. Sixty-six items, mostly tools, compasses, clocks, and compass parts were purchased by his apprentice, George Graves (1792-1873). There are only a few known Graves compasses, and they have the same features as the Goldsmith Chandlee compasses. (Goldsmith's son, Benjamin III, also was an instrument maker. His known compasses have the same features as his father's.) In the 1950s, Goldsmith Chandlee's body was relocated to the Hopewell Centre Meeting graveyard north of Winchester where his grave is today marked with a simple headstone marked "G. Chandlee."

Collectors and researchers are always curious as to how many compasses Goldsmith Chandlee may have produced. There are no known Goldsmith Chandlee production records and his compasses are not numbered. Through various sources, the author knows of sixteen Goldsmith Chandlee compasses, although he probably made many more.



Note: All photos of the Chandlee instrumentation in this article courtesy of Jeffrey D. Lock.

DR. RICHARD ELGIN standing next to the Goldsmith Chandlee headstone. Photo taken September 23, 1999.

Goldsmith Chandlee's Outkeeper

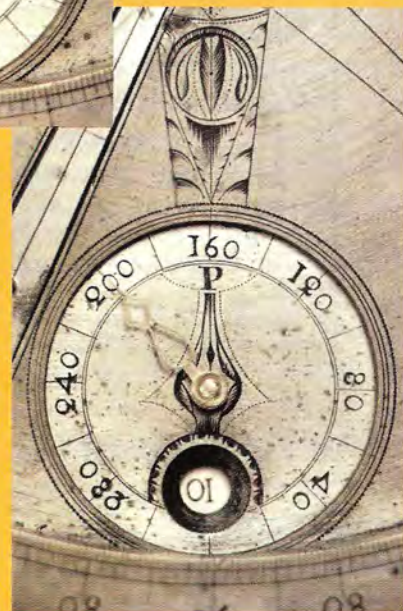
Goldsmith Chandlee placed an outkeeper on his compasses like none other. But first, what's an *out*? "Out!" is what the head chainman yells when he is out of chaining pins. Perhaps I should digress.

Chaining is performed using eleven chaining pins. When

a distance is to be measured, the head chainman starts off with ten chaining pins on a ring. The eleventh pin is used to mark the beginning point of the distance to be measured. The rear chainman has no pins on his chaining pin ring. The distance of the chain or tape is laid off, the head chainman placing a chaining pin from his ring at the end (or some mark) of his



chain, and yells "Stuck!" when the chaining pin is in the ground. On hearing "stuck" the rear chainman pulls his chaining pin and places it on his ring. Once the chain is again ready (straight, pulled tight, horizontal) the rear chainman yells "Good!" and the head chainman places another chaining pin in the ground and again



yells "Stuck!" Again, on hearing that, the rear chainman pulls his chaining pin and places it on his ring. And so the chaining progresses. Note that using this procedure, the number of chain units measured, or, the location of the chaining pin in the ground, equals the number of chaining pins the rear chainman has on his ring. For example, if the crew is using a 66-foot chain and the rear chainman has eight chaining pins on his ring, then the

pin in the ground is at eight chains from the beginning point. The chaining progresses until, after sticking the last chaining pin on his ring, the head chainman yells "Out!" (out of chaining pins) which is an explanation of the "out" mentioned above. It's ten pulls of the tape or chain, whatever is its length.

The early instructions for the survey of the public lands called for the use of a two-pole chain (33 feet). An "out" (ten pulls) would therefore be 20 poles (330 feet). The usual outkeeper found on most compasses by practically all makers, from the late 1700s until as late as the 1940s, shows the integers 1 through 16. As the head chainman yelled "Out!", the compassman clicked the outkeeper another unit until the number 16 was reached. At that point the chainman had measured 16 outs, or, if using a two-pole chain, 320 poles (2 poles x 10 x 16), or one mile.

Goldsmith Chandlee was not satisfied with an outkeeper that merely counted from 1 to 16. He apprenticed to his father, Benjamin, Jr. who was a noted clock and instrument maker. Because Goldsmith was a clockmaker himself, the development of an elaborate outkeeper was easily within his ability.

The outkeeper that Goldsmith Chandlee invented and developed had no equal. Chandlee's outkeeper is operated from the bottom of the compass. As the knob is advanced, the integers 1 through 16 can be viewed through a window as seen from above the compass. At the same time the knob advanced, a pointer or hand moved to point to the numbers 0 through 320, engraved on the face of a dial in 20-unit increments. So, as the number of "outs" is counted from 1 through 16, the dial/hand arrangement converted the "outs" to poles. Thus we had our first automatic data collector, which is so popular in today's electronic/computerized world of surveying.

No other maker used this advanced form of outkeeper, and we may be able to attribute the invention of the outkeeper in general to Chandlee. An informal examination by the authors of known early (pre-1800) American compasses shows only Goldsmith Chandlee placing an outkeeper on a compass—with one exception: there is a Benjamin Rittenhouse compass which is dated 1786 that has a simple 1-16

outkeeper. Chandlee began crafting compasses somewhere between 1775 to 1783.

Actually, Goldsmith Chandlee had two forms of outkeepers or counters on some of his compasses. One, as described above, which is labeled with a prominent "P" (poles) on its dial. The other is a more simple dial operated by a knob (on the underside of the compass) that turned a hand on the compass face. The dial, prominently marked "M" (miles) is graduated in single units from 0 through 21, and is marked in units of 3: 3, 6, 9 . . . 21. Using this counter, the surveyor could count the miles surveyed. Choosing the increment of 21 miles seems peculiar because 21 miles is not indicative of any land division in the U.S. Public Land Survey System. Of course when this counter was invented, the Public Land System was in its infancy, "An Ordinance for Ascertaining the Mode of Locating and Disposing of Lands in the Western Territory" was passed by the Continental Congress on May 20, 1785. (This "Ordinance of 1785" began what we know today as our system of sections, townships and ranges, or the U.S. Public Land Survey System.)

It seems that Goldsmith's less elaborately engraved and decorated compasses only have the one "P" (poles) outkeeper. His more extravagant compasses have both the intricate "P" outkeeper and the "M" counter.

As an accomplished clockmaker, artisan, mechanic, and craftsman, Chandlee's invention of the outkeeper should not be a surprise. What is surprising is that essentially no other makers copied and continued his elaborate "P" outkeeper. George Graves, Goldsmith's apprentice and successor, placed this same outkeeper in at least one of his compasses. Also, there is a compass by Goldsmith's son, Benjamin, that has this same "P" outkeeper. And, there is a compass plate by B.K. Hagger & Son, South Street, Baltimore (1824-1838) that has Chandlee's "P" outkeeper in the compass face. Unfortunately the form of the outkeeper digressed to the simple 1 through 16 dial that many makers adopted and placed on compasses into the 1940s.

Goldsmith Chandlee's "L" and "T" Table

All of the known Goldsmith Chandlee compasses except one have a peculiar "L" and "T" table on the south blade or limb of the compass. A facsimile is illustrated on page 26.

Only five other known compasses bear this table: one by Benjamin Chandlee (Goldsmith's son), two by George Graves (apprentice and then successor to Goldsmith Chandlee), an 1836 patent model (Patent No. 99) for a modified surveyor's compass by Francis Whiteley, and compass by B.K. Hagger & Son, South Street, Baltimore. These makers were all later than Goldsmith Chandlee. Whiteley was located in Stanardsville, Virginia in 1836. Stanardsville is only about 60 miles south of Winchester where first Goldsmith Chandlee (who died in 1821) and then George Graves produced compasses. Whiteley's patent model is made of brass, shows excellent workmanship, and is a working instrument. George Graves or someone else working for Chandlee probably made Whiteley's instrument

and placed Chandlee's "L" and "T" table on it. No other makers who would have been contemporaries of Goldsmith Chandlee placed this table on their compasses. We can attribute this table to Goldsmith Chandlee, but what is the table's purpose?

Reviewing the literature of the period, in John Love's *Geodaesia: or, The Art of Surveying and Measuring of Land Made Easie*, 13th edition, 1796, there is a similar "L" and "T" table. A facsimile is illustrated on page 26.

In his discussion of Goldsmith Chandlee on page 27 of *The Makers of Surveying* Instruments in America Since 1700*, Charles Smart "surmises" that "the linear table marked L and T refer to paces L (1-1/2 feet) and T to the number of paces 1 to 9." (Smart's 1-1/2 feet is a misprint—the first tabulated "L" is the number 2.5.) So, according to Smart, this table converts paces to feet using a multiple 2.5. This explanation seems weak for three reasons: 1) "L" and "T" don't seem indicative of feet and paces; 2)

Goldsmith Chandlee must be counted as one of the most notable American compass makers. His compasses are works of art and were technically advanced. The compass faces show fine design, craftsmanship, engraving and ornate decoration. Technically his compasses were the most advanced of their day.

The conversion of 2.5 feet per pace may be nearly correct for some people, but certainly not all; and 3) What surveyor needs a conversion table to convert paces to feet anyway? We can discount Smart's explanation.

Some have hypothesized that the "L" and "T" is for computing offset for some angle or variation (see *With Compass and Chain*, by Silvio Bedini, pp. 375, 376). Benjamin Platt (1757-1833) used a "Lks." and "Var." table for that purpose (see pages 124-127 in Smart's book). Also for that purpose see Table VII, "Correction of Randoms—Links and Minutes of Arc" in *Manual of Surveying Instructions for the Survey of the Public Lands of the United States, 1894*. These tables serve a different purpose than Chandlee's "L" and "T" table.

A common calculation problem of the late 1700s and early 1800s was to survey or place on the ground a metes and bounds description given in perches and tenths of perches. (A perch or pole or rod are all the same, 16.5 feet.) The measuring device of the day being a chain, there arose the need to convert perches and tenths to chains and links. One perch is 16.5 feet or a quarter of a chain or 25 links. So, one-tenth of a perch is 2.5 links. Chandlee's "L" and "T" table is an exact conversion for that use. (Tenths of perches multiplied by 2.5 equals links.) For example: to measure off a distance of 18.5 perches, the surveyor would measure four whole chains (16 perches), then measure an additional chain (two perches for a total of 18), then he would look at the table to find the remaining 0.5 perches equals 12.5 links and he would have measured the desired 18.5 perches.

We have a peculiar "L" and "T" table with a contemporary explanation for its use published in Love's *Geodaesia*. We certainly can attribute its use to Goldsmith Chandlee.

Boundary retracement surveyors today practicing in the mid-Atlantic states who are familiar with the chains/links to perches/tenths conversion and vice versa (and make that conversion today) have no doubt as to the use of Chandlee's "L" and "T" table. It is just as John Love published, it converts links to tenths of perches. ▼

DICK ELGIN is a second-generation surveyor and President of *Elgin Surveying & Engineering, Inc.* of Rolla, Missouri. Along with Drs. Knowles and Senne, he coauthors the *Sokkia Ephemeris*. He also teaches seminars on surveying practice and is Adjunct Professor of Surveying at the University of Missouri-Rolla. He can be reached by e-mail at elgin@rollanet.org



Links	Perches	Parts of a Perch
1	0 . 04	
2	0 . 08	
3	0 . 12	
4	0 . 16	
5	0 . 20	
6	0 . 24	
7	0 . 28	
8	0 . 32	
9	0 . 36	
10	0 . 40	
20	0 . 80	
30	1 . 20	
40	1 . 60	
50	2 . 00	
60	2 . 40	
70	2 . 80	
80	3 . 20	
90	3 . 60	
100	4 . 00	

L	T
2.5	1
5	2
7.5	3
10	4
12.5	5
15	6
17.5	7
20	8
22.5	9

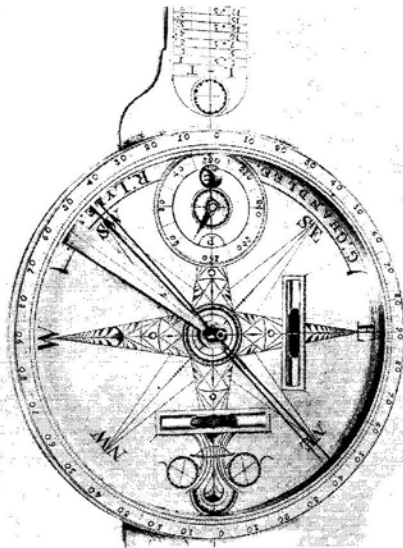
(above) Facsimile of Goldsmith Chandlee's "L" and "T" Table, as engraved on limb of Chandlee compass.

(left) Facsimile of "L" and "T" Table from John Love's *Geodaesia*.

Mr. Frank Mason, Sales Manager of Teledyne Gurley (formerly W. & L.E. Gurley Company) of Troy, New York has graciously asked us to inform the readers of the *Collectors' Corner* that if they wish information about Gurley instruments having serial numbers, they may write to the company and a prompt reply will be forthcoming. Inquiries should be addressed to Frank Mason, Sales Manager, Teledyne Gurley, 514 Fulton Street, P.O. Box 88, Troy, NY 12181. However, inquiries concerning instruments lacking serial numbers are more appropriately addressed to the Surveyors' Historical Society, PO Box 160502, Fort Sutter Station, Sacramento, CA 95814.

In a description of surveying compasses made by Goldsmith Chandlee and George B. Graves in the November 1984 issue, we attempted to explain the "L. & T. Table" and the "outkeeper" featured on many of the compasses made by Goldsmith Chandlee. There has been much uncertainty and speculation about the function of this table and the "outkeeper." Over the years I have discussed these features with the late Charles E. Smart and others, without reaching a satisfactory solution. My inadequate explanation brought responses from two readers, which provide further enlightenment, and appear to resolve the question. The advantage of a *Collectors' Corner* is that it not only informs collectors among our readers, but occasionally the informer as well!

Mr. J.L. "Larry" Young of Hot Springs, Arkansas provided a fascinating account too long to reproduce in full but from which the following is extracted. In explanation of the circular dial he writes "Beginning with Tiffen's instructions of 1815, the contractor was directed to use a 2-pole chain of 50 links (33 feet). This was in effect until late in the century when the 4-pole [chain] was permitted in level terrain. He was also to use 'tally rods' (chaining pins) and, although the number was not at first specified, it is believed that 11 was universal. The rear chainman was to be left one and the forward chainman was to leave one at each pull of the chain. As today he was to place the last one at the end of ten pulls and to yell 'Out.' At that point the compassman would advance the Outkeeper to 1 in the opening and the pointer would indicate 20. Ten pulls of a 2-pole chain is 1.5 chains, 2 20 poles. It is also 330 feet, 20 rods, perches, 1/2 furlong (for racing fans) 16 'Outs' and 320 poles is 80 chains



or a mile, and the unit of the rectangular system of surveying."

With reference to the "Linear Table," Mr. Young states "the table begins not with 1 1/2 but with 2 1/2 with the ensuing figures 5, 7.5, 10, 12 1/2, 15, 17 1/2, etc. 'L' does not refer to paces nor does 'T' to the number of paces, for such interpretation would not have any meaning or use for the surveyor. 'L' stands for 'Links/Mile' and the 'T' for 'Traverse.' The accepted or commonly used for 1 Minute at 80 chains was 2.5 links. This was soon refined to 2.3 links. However, neither value has any real meaning when one considers that a compass can only be esti-

mated to 1/4 degree, and no standard of accuracy has been specified by the government prior to the letter of instructions sent by the Surveyor General at Little Rock. This linear chart is the forerunner to the *Standard Field Tables* published by the Government Land Office in about 1910. In a second edition of 1913 and in the 8th edition of 1956, "Table 3—Traverse Table for the Correction of Random Lines" is used for the same purpose. All of the above was peculiar to the survey of the public lands in the early years and was probably passed on from one deputy surveyor to another, and in all probability had never been included in the training of most surveyors and engineers within the past century."

David Krehbiel, professional engineer of Camdentown, Missouri, also pointed out that the L/T Table should be corrected to read 2.5 rather than 1 1/2. In his opinion the "L" represents "links" of deflection in one mile, and the "T" the "tangent" angle in minutes corresponding to that deflection. He believes that the practice at that time supported the use of such a table. Although it was generally believed that these features appeared only on instruments made by Goldsmith Chandlee, he notes further that he owns a surveying compass with the name of Jonathan Simpson that has a similar dial, and another circular dial marked 10 through 90 with singular marks between the increments of 10. Mr. Krehbiel's "Justification of the L/T Table" is herewith illustrated, as well as a detailed view of the dial

continued on page 44

LINKS (L)	CONVERSION TO FEET	DEFLECTION PER MILE	COMPUTED TANGENT	TANGENT ANGLE (T)	ACTUAL TANGENT
2.5	× 0.66	1.65/5280	.00031	1 ¹	.00029
5.0	× 0.66	3.3/5280	.00062	2 ¹	.00058
7.5	× 0.66	4.95/5280	.00094	3 ¹	.00087
10.0	× 0.66	6.6/5280	.00125	4 ¹	.00116
12.5	× 0.66	8.25/5280	.00156	5 ¹	.00145
15.0	× 0.66	9.9/5280	.00187	6 ¹	.00175
17.5	× 0.66	11.55/5280	.00219	7 ¹	.00204
20.0	× 0.66	13.2/5280	.00250	8 ¹	.00233
22.5	× 0.66	14.85/5280	.00281	9 ¹	.00262

Dr. Richard L. Elgin, of Rolla and Nevada, Missouri, P.E. and registered land surveyor, owns surveying compasses made by GOLDSMITH CHANDLEE and GEORGE B. GRAVES and requests information about them.

Goldsmith Chandlee was one of the most notable American clock and instrument makers of the late eighteenth and early nineteenth centuries. Born in Nottingham, Maryland in 1751, he was the oldest of four sons of the Quaker clockmaker Benjamin Chandlee, Jr. His grandfather, Benjamin Chandlee, had emigrated to Philadelphia from Ireland and served an apprenticeship with the

clockmaker Abel Cottey. Goldsmith Chandlee and his brothers Ellis and Isaac served apprenticeships with their father; they also became clock and instrument makers.

At the age of twenty-four, having completed his apprenticeship, Goldsmith Chandlee with two friends moved to Virginia near Stephensburg (now Stephens City) and may have been associated at first with the silversmith William Richardson. He was married in 1776 and probably at about this time purchased land in Winchester, where he built a brass foundry and a shop in which he made clocks, surveying and surgical instruments, sundials, compasses, apothecary and money scales, steelyards, and various other related items. Of particular importance were his clocks and his plain and vernier surveying compasses.

Chandlee became a leader in financial circles of the region and he bought and sold bills of exchange, soldiers' certificates, bonds and notes and was also extremely active in the community. After his death in 1821 a sale was held of his property, the records of which survive. To be noted therein is the purchase by George B. Graves of the major part of the tools, instruments, parts and stock in Chandlee's shop, including brass castings.

Little is known about Graves except that he worked as a clock and watch repairer in Winchester. Apparently he was not a clockmaker, for no clocks made by him are known. He was born in Loudon County in June 1792 and died near Winchester in January 1873. It is believed that Graves produced surveying instruments by completing the castings and utilizing other parts he purchased from Chandlee's estate. A comparison of compasses signed by Chandlee and Graves reveals a remarkable similarity in metal, design and dimension. The instruments signed by Graves are excessively decorated with additional engraved motifs on the dial and often on the blade as well. He frequently followed Chandlee's practice of engraving on the dial plate the name



Figure 1. Surveyor's vernier compass made by Goldsmith Chandlee for John Orndorf. This particular instrument is unusual because of the additional dial and the fact that the outkeeper appears at the east point instead of at the south end of the dial plate. Also unusual is a symbolic American eagle featured at the north point. The original owner, John Orndorf, has not been identified. Photograph courtesy of Dr. Richard L. Elgin.

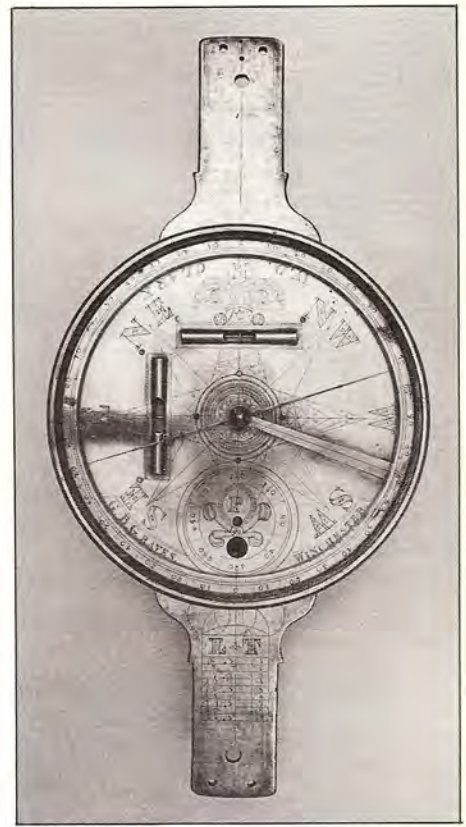


Figure 2. Plain surveying compass signed by George B. Graves and made for W. D. Clark. The outkeeper appears at the south end of the dial. Photograph courtesy of Dr. Richard L. Elgin.

of the individual to whom the instrument was sold.

Chandlee's surveying compasses are distinguished by a linear table marked "L" and "T" engraved at the south end of the blade and a circular table engraved on the south end of the compass dial. The "L" refers to paces (1-1/2 feet) and "T" to the number of paces 1 to 9. The "outkeeper" or circular dial is useful for recording the number of chains of 66 feet as the rod man called them out to the surveyor. These features were original and perhaps unique to Chandlee, for they are not to be found on instruments by other makers, except those signed by Graves, which were probably incomplete instruments purchased from the former's estate.

CONTINUED FROM PAGE 48

David King, land surveyor of Uncasville, Connecticut, has requested information about a level made by the firm of K & E of Hoboken, New Jersey. It is Model # 5010 and Serial No. 49039.

We do not have information about dates of production of specific serial numbers or models. The firm of Keuffel & Esser was established on July 19, 1867 in Hoboken, New Jersey and incorporated on February 16, 1889. The founders were Wilhelm J.D. Keuffel, a native of Walbeck, Thuringen, Germany, where he was born on July 21, 1838, and Herman Esser, of Wuppertal-Elberfeld, Germany, born on December 30, 1845.

The firm first began the manufacture of surveying instruments in 1885. In the spring of 1902, Esser resigned from the firm and returned to Germany, to Bad Godesberg am Rhein.

Dale Beeks of Coeur d'Alene, Idaho has recently acquired a surveying compass inscribed on the dial plate with the maker's name, "GOLDSMITH CHANDLEE," of Winchester, Virginia, as well as the name "I. Jackson."

The dial includes Chandlee's characteristically decorated North point, elaborate central decoration and two subsidiary dials at the East and West points. The dial at the East point is labeled "M" and graduated into 21 divisions marked at every 3 points, and its pointer has a non-reversible counterclockwise motion. The opposite dial at the West point is marked "P," graduated into 320 parts in divisions of 20 and marked at every 40. The pointer is missing. A window within the dial circle reveals the numbers 1 through 16 on a wheel revolving underneath the dial face. Both dial counters are operated by a knob on the underside of the compass. The terminal of the needle lifter is inscribed with the letter "S." The cover, which appears to be original, is elaborately inscribed with the monogram and date "J.J. 1801" within an inner border, and within a second foliated border are the words in script "Benjamin Hough's compass."

In accordance with Chandlee's standard practice, the name "I. Jackson" on the periphery of the dial plate opposite the maker's name and place is the name of the client for whom Chandlee originally made the instrument. The monogram "J. Jackson," which appears on the cover, indicates that the original owner was named "J. Jackson." In that per-

iod, the letter "I" was interchanged with "J." Most of the surviving compasses made by Chandlee bear the client's name as well as his own on the compass dial. For example, a Chandlee compass in the writer's collection features the name "R. Lyle" in that position. Lyle has been identified as a Virginia surveyor, whose first name was Robert, and who was active in about 1775. Another compass in private hands bears the name "Thomas Ashby."

Benjamin Hough appears to have been a surveyor who became the second owner of the instrument, and who may have acquired it from Jackson. The engraving on the compass cover, which is substantially different from that on the dial plate, was added by, or for, Hough. The date appearing with the monogram on the cover suggests the year in which the instrument was acquired by Hough, although it may have been the date it was made.

A substantial number of surveying compasses by Goldsmith Chandlee have survived, many of them in private hands. In public collections, there is a fine example of a Chandlee compass, recently acquired by Colonial Williamsburg Foundation, Inc.; two others are in the Ohio State Museum bearing the clients' names "R. Lucas, Jun." and "G. Smith." On loan from a private collector to the new W. &

L.E. Gurley collection in Troy, New York, is another with the client's name "A. T. Mason." A surveying compass made by Chandlee for Laurence Augustine Washington, George Washington's nephew, is on display at Washington's home, Mount Vernon.

Goldsmith Chandlee's surveying compasses are among the finest produced and most highly prized. He was one of the most prolific and wide-ranging of the early American mathematical instrument makers, for in addition to surveying compasses he also made clocks, surgical instruments, sundials, traveling compasses, telescopes and apothecary scales. He also operated a bank and served in many civic position in his community.

Comments from our readers on this instrument, and information on J. Jackson and Benjamin Hough, will be greatly appreciated.

A comprehensive account of the career of Goldsmith Chandlee and other Chandlee makers of surveying instruments will be featured in a forthcoming *Collectors' Corner*. **PS**

Silvio A. Bedini is an historian at the Smithsonian Institution in Washington, D.C. and a contributing editor to Professional Surveyor.



NOTE TO READERS

It is often desirable to illustrate instruments about which you inquire, because they are of interest to other readers as well. For this purpose we request that you send clear black and white, color or snapshots in which the instrument is clearly delineated. We appreciate your support and your interest in *Collectors' Corner*. Thank you.

Brass surveying compass with dial cover made by Goldsmith Chandlee for J. Jackson c. 1801. Courtesy of Dale Beeks.

Detail of compass dial of surveying compass made by Goldsmith Chandlee. Courtesy of Dale Beeks.



plate of a Goldsmith Chandlee compass in the writer's collection in which the outkeeper and L/T table are more clearly visible.

Jonathan Simpson (1787-1863) was a native of Virginia who established himself as a silversmith and clockmaker in Bardstown, Kentucky, and later moved to Madison, Indiana. In addition to works in silver and clocks, he also produced surveying instruments, examples of which are owned in the Kentucky Historical Society and the Missouri Historical Society.