

Ry.  
When you need more files,  
Please let me know.

*Saul*

# Historical Technology, Inc.

SAUL MOSKOWITZ, President

6 Mugford Street

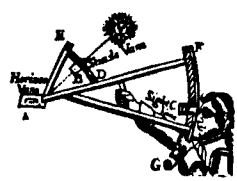
Marblehead, Massachusetts, 01945. U.S.A.

(617) 631-2275



ITEM 120

THE SMALLEST ASTROLABE IN THE WORLD



Catalog 130  
Spring, 1987  
Six Dollars

# Old, Rare, & Interesting Books

## ASTRONOMY

1. Andreae Argoli, "PTOLEMAEVVS PARVVVS, IN GENETHLIACIS IVNCTVS ARABIBVS.", Ioann. Antonii Hvgvetan & Marci Antonii Ravavd, Lugdoni (Lyons), 1659. Modern full leather binding 9 1/8" h, 6 3/4" w; pgs. (6), 211, (44), some text tables and astrological diagrams. Fine overall condition, some light yellowing of pages. Rees describes the author as "an Italian mathematician, was born at Tagliacozzo, in the Kingdom of Naples, whence he removed to Venice. Here his merit was acknowledged, and he was appointed professor of mathematics in the university of Padua; and in 1636 distinguished by the title of chevalier. He died in 1657, and left a treatise "De diebus criticis," printed in 1652, 4to.; and "Ephemerides," from 1620 to 1700, 4 vol. in 4to." Thorndike points out (Vol. VII) that Argoli's major interest was in astrological medicine, that is the astrological prediction of the coming train of events of the human body, including one's death. It appears that Argoli believed that only a skilled mathematician had the ability to make accurate predictions since only such a person would be able to calculate the true future motion of the planets. Towards this end he incorporated the hypotheses of Tycho Brahe and Copernicus (the new Ptolemy!) into his formulations. (In Latin) (postpaid) \$ 235

### Discoverer of the Integer Ratios of Planetary Spacing

2. Johann Elbert Bode, "Anleitung zur Kenntniß des Gestirnten Himmels", (4th Ed), Christian Friedrich Himgurg, Berlin & Leipzig, 1778. Early 19th c boards binding 7 3/4" h, 5" w; pgs. (16), 680, engraved frontis plate of the starry night, 16 folding engraved plates, 12 of which depict (with the figurative constellations) the monthly night skies, the other 4 include a very large celestial planisphere, an astronomical quadrant, the Moon's surface, and planetary orbits. The book is in very fine condition although the binding shows edge wear and surface aging, and an owner's name has been cut off the bottom of the title page. The author (1747 - 1826) was astronomer for the Berlin Academy of Sciences, 1772 - 1825, director of the Berlin Observatory, 1786 - 1825, elected FRS in 1789, and was founder (1774) and editor, until his death, of the Berlin Astronomisches Jahrbuch. In 1772 he devised the empirical arithmetical formula (Bode's Law) for representing the distances of the planets from the Sun. The 1st ed of this very sophisticated "handbook of the heavens" was published in 1768, but could not then include his planetary law. This edition does, and is of the greater interest for this very reason. (In gothic letter German) (postpaid) \$ 265
3. Claude Buffier, "NOUVEAU TRAITÉ DE LA SPHÈRE Exposé En Differentes Méthodes.", Pierre-François Giffart, Paris, 1760. Original leather binding 6 3/8" h, 3 3/4" w; pgs. (6), 74, (1). Fine to very fine overall condition except for water stains to the first and last few pages. This is a non-mathematical presentation of the geometrical parameters and representations of the globe. Originally it was written as a supplement to the author's work on geography and included in his collected works published in 1732 under the title, "Cours des Sciences, sur des Principes nouveau et simples.". This book on the sphere was then prepared for separate issue by P. Germain in 1740. Its popularity led to its reissue several times; an 1801 ed is known which was expanded to 347 pages so as again to include geography, containing 16 engraved maps. Buffier was born in Poland, of French parents, in 1661, joined the Jesuits at Paris in 1679, and was noted as a scholar and author on religious, philosophical, and scientific subjects. He died in 1737. (In French) (postpaid) \$ 95

### Planetary Position Prediction by Graphical Computation

4. (Bonaventura Cavalieri) Silvio Filomantio, "TRATTATO DELLA RVOTA PLANETARIA PERPETVA E DELL' VSO DI QVELLA Principalmente per ritrouare i loughi de' Pianeti alla Lansbergiana; E per fare la Figura celeste, & anco le Direttioni, asseruata pur la larghezza, secondo la via Rationale.", Giacomo Monti, Bologna, 1646. Original vellum binding 9" h, 6 1/2" w; pgs. (6 leaves), 86, large (17" h, 16" w) folding engraved plate after p. 14, large folding table numbered as p. 87, (1). Generally fine overall condition except for heavy worming of binding carried into the first and last few pages and 2 large wormholes in p. 51 affecting the text. This book describes a circular scale (ruota) which can be used for the generation of future positions of the planets as an aide to astrological prediction. (Quite a number of astronomers and mathematicians of the period had this preoccupation.) Silvio Filomantio was a pseudonym used by Cavalieri (see Ricardi columns 328 & 329) for this work which, according to Rees', "was the more surprising, as he was an enemy of judicial astrology". He was an Italian mathematician (1598-1647) who had studied under Galileo's disciple Benedetto Castelli, became professor of mathematics at Bologna, and was the author of a number of books. He was one of the first in Italy to recognize the value of logarithms, determined the focal lengths of glass lenses, and used Kepler's idea of infinitely small geometrical quantities to develop his "method of indivisibles" which has been considered a forerunner of the integral calculus. (In Italian) (postpaid) \$ 365
5. William Emerson, "A SYSTEM OF ASTRONOMY", 1st (and only?) Ed, J. Nourse, London, 1769. Early leather binding (labeled Vol. 8 from a collected set of his works, although a complete book by itself, owner's label within front cover) 8 1/2" h, 5 1/4" w; pgs. xii, 368, (1) errata, (3) book catalogue, 16 folding engraved plates. Very fine overall condition except for cracked, but repaired and tight, front hinge. This work includes sections on descriptive, spherical, and positional astronomy; that is, the observed universe, positions and motions as perceived on a reference sphere about the earth, and the motion of planets, their satellites, and comets in (perturbed) central force field orbits. It is contemporary with Ferguson's "Astronomy", but has a different point of view and so provides interesting comparisons. The author (1701 - 82) of this, and a number of other extremely well written books on the physical sciences and mathematics, may very well have been the archetype of the English individualist. He turned down his election as a Fellow of the Royal Society. His cynical comment on this honor was, "The little encouragement there is in this nation for promoting these sciences, is the reason that few people go any length this way. If they have gained so much knowledge as to be able to teach a common school to get a living by, they think it sufficient. Few make any further progress, and if they do they get the pleasures and pains of their labor. Or when a man is eminent for his discoveries, perhaps he is dignified by the title F.R.S. but he has to pay a quarterly cess for the honor of it. This is the way that ingenuity is rewarded in England.". It seems that despite his great efforts (and indeed the quality and quantity of his publications attest to this) his earnings were slight and he lived most of his life on the edge of poverty. Rees' biography of him remarks, "Mr. Emerson was singular in his behavior, dress, and conversation. His manners were rough, coarse, and often very disagreeable. In conversation, he was positive, dogmatical, and impatient of contradiction." But maybe he was also right and not sufficiently politic to be acceptable to those who were not. (postpaid) \$ 135

Items marked "postpaid" are so shipped, without restriction, only to street addresses within the 48 states. Those of value less than \$ 400 will be shipped by U.S. Mail to Alaska and Hawaii. There is a \$ 1 per volume surcharge on all books shipped by U.S. Mail within the 50 states. Full postage and insurance must be paid on all shipments outside the country.

6. Dominiqu' Jacquinet, "L'USAGE DE L'ASTROLABE, AVEC VN PETIT TRACTE DE LA SPHERE, plus est adioufté vne Amplification de l'usage de l'Astrolabe, par Jaques Baffentin Efcoffois", (2nd Escossois Ed, 3rd issue), Guillaume Cauellat, Paris, 1598. Finely tooled 19th c leather binding 7" h, 4 1/2" w; pgs. (8 leaves), 99 leaves, (1 leaf, allegorical coat of arms), many text woodcut figures including complete detailed illustrations of all the components of the astrolabe. Very fine overall condition except for the loss of the upper outside corner of the front blank and first 4 leaves. The 1st ed of this French revision of Stofler's basic text was published in 1545 with Escossois' amplification in 1554. A first issue of Escossois' 2nd ed was printed in 1559, a second issue in 1573. A 3rd Escossois ed, as augmented by D. Robert, appeared in 1617. (In French) (postpaid) \$ 555

South American Astronomical - Surveying Expedition for Ascertaining the Shape of the Earth

7. Jorge Juan & Antonio de Ulloa, "OBSERVACIONES ASTRONOMICAS, Y PHISICAS HECHAS DE ORDEN DE S. MAG. EN LOS REYNOS DEL PERU . . . DE LAS QUALES SE DEDUCE LA FIGURA, Y MAGNITUD DE LA TIERRA, Y SE APLICA A LA NAVEGACION.", Juan de Zuniga, Madrid, 1748. Modern full leather binding 10 3/4" h, 8" w; pgs. half title, engraved allegorical frontispiece of 4 buxom women with dividers, astrolabe, plumb bob, etc, hanging out about a large terrestrial globe, title pg in red & black with engraving of allegorical coat of arms, (12), xxviii, 396, (10), 7 (of 8) engraved foldout plates (no. 5 of the zenith sector missing). A crisp, very fine copy, most pages perfect, but some at the ends and some plates stained at their lower inner corners. Cassini's measurement of the arc of the meridian through France (completed in 1718) led to his calculation of a polar elongation of the Earth's spheroid, in direct contradiction of Isaac Newton's prediction of polar flattening. Louis XIV, convinced of the importance that the true shape of the Earth could have on navigation and would have on determining the relative validity of Cartesian versus Newtonian mechanics, ordered two expeditions to set forth, one to the polar circle in Lapland (results published by Maupertuis in 1738) and the other to the equator in Peru (now actually Ecuador), not published by La Condamine until 1751, and then with a correlation of the findings of Maupertuis. The King of Spain, not to be slighted, ordered the authors of the book here to Quito to join and work with the French expedition. However, 2 parties were formed and these worked independently. The results of the Spanish group are described here. Interestingly, most of the individuals involved returned to Europe by pretty much the same outward routes; all but La Condamine who decided to travel eastward, across the Andes and down through the basin of the Amazon. Unbelievably, not only did he survive but returned to France in 1745, a year ahead of Juan and de Ulloa. (In Spanish) (postpaid) \$ 240
8. Thomas Keith, "A NEW TREATISE ON THE USE OF THE GLOBES. OR A PHILOSOPHICAL VIEW OF THE EARTH AND HEAVENS:", 5th Ed, Longman, Hurst, Rees, Orme, & Brown, London, 1818. Original leather binding (with repaired hinges, some edge wear) 7" h, 4 1/4" w; pgs. xxiii, (blank), 359, (1), 6 engraved foldout plates. Contents in fine condition. The author (1759 - 1834), son of a working man, advanced by his own efforts to become the author of a number of highly regarded works in the mathematical sciences. By the time he was 50, he was appointed professor of geography to the Princess Charlotte of Wales in recognition of his accomplishments. This treatise, 1st ed in 1806, is his best known book and was the standard reference, and source (see Item 10, below) on the subject during the first part of the 19th century. Many editions, and revised editions, appeared on both sides of the Atlantic. (postpaid) \$ 55
9. Joseph Jérôme Le François de La Lande, "ABRÉGÉ D'ASTRONOMIE", (1st Ed), Desaint, Paris, 1774. Modern full leather binding 8 1/4" h, 5 1/4" w; pgs. xxxvi, 507, 16 folding finely engraved plates. Very fine overall condition except for one plate fold which was half slit by original binder (outside of plate mark). The author (1732 - 1807), a noted French astronomer was appointed professor of astronomy, College de France, in 1762, F.R.S. in 1763, and Director of the Paris Observatory in 1795. The work here was intended as a non-mathematical version of his "Traité d'Astronomie" (2 vol ed in 1764, 3 vol revision in 1771). It was issued simultaneously in Amsterdam as a "Nouvelle Edition, Revue et Corrigée" but with the same content. In a sense, it is the French equivalent of Ferguson's "Astronomy". La Lande also wrote "Abrégé de Navigation" (1793), "Histoire Céleste Française" (1801), "Bibliographie Astronomique" (with history of astronomy 1781 - 1802), and many scholarly papers. He was editor of the nautical almanac, "Connoissance des Temps", 1759 - 74 and 1794 - 1807, calculated (with Clairaut) the return of Halley's comet (1759), provided what were considered the best planetary tables of the 18th century, and observed Neptune 50 years before Leverrier, but did not realize that it was a major planet. (In French) (postpaid) \$ 145
10. John Lathrop, "A COMPENDIOUS TREATISE ON THE USE OF Globes & Maps; COMPILED FROM THE WORKS OF KEITH, FERGUSON, ADAMS, HUTTON, BRYAN, GOLDSMITH, AND OTHER EMINENT AUTHORS; BEING A PLAIN AND COMPREHENSIVE INTRODUCTION TO THE PRACTICAL KNOWLEDGE OF Geography and Astronomy.", (1st Ed, later issue), Wells & Lilly and J. W. Burditt, Boston, 1821. Original leather binding 7" h, 4 1/2" w; pgs. xx, 13-183, 3 engraved foldout plates. Very fine overall condition except for extensive relatively uniform light foxing. The author (1772 - 1820), lawyer, poet, teacher, prepared the 1st ed of this work in 1812 for use at the Salem Street Academy in Boston. A graduate of Harvard in 1789, he read law in the office of Christopher Gore, but was known to the public more as a poet than a lawyer, which did not help his legal business. In 1799 he left for India to make his fortune, did not, and returned to Boston in 1809. Here he taught at the Salem Street Academy, edited almanacs, delivered a course of scientific lectures, made speeches (4th of July, etc) and finally moved to Washington, D.C. obtaining a position in the U.S. Post Office. (postpaid) \$ 45

Sacro Bosco Revised by the Copernican, Erasmus Reinhold

11. "IOHANNIS DE SACRO BVSTO LIBELLVS DE SPHAERA. ACCESSIT EIVSDEM AVTORIS COMPVTVS ECCLE-fiafticus, Et alia quaedam, in ftudioforum gratiam edita.", Petrus Seitz, Vitebergae, 1574. Modern leather binding 6 1/2" h, 4 1/4" w; 267 pgs, 2 folding charts, many text woodcut figures, and the (usually missing) folding sheet containing all the volvelles for the text figures. Very fine overall condition with light uniform foxing, leaf Q-5 missing its lower outside corner, and the volvelle sheet rebacked. The preface to the Sphere by Philip Malanchthon bears the 1531 date of his first ed of this work. The half title to Sacro Bosco's "Computus Ecclefiasticus", the second work included in this volume, is dated 1558 while Malanchthon's preface to it is dated 1538. The last page is signed "Autore Erafmo Reinholdo Saluedenfi" and contains the publication data listed above. Johannes de Sacro Bosco (John of Holywood) born in England sometime in the 2nd half of the 12th century, was possibly the most influential writer on astronomy in all Medieval Europe. He seems to have spent his teaching career in Paris, dying there sometime in the 13th century. His chief works were elementary texts in mathematics and astronomy. The basic text of his Sphere, although Ptolemaic in concept, is rather logical and rational. His proofs for a spherical Earth are simple and correct, and are believed to have influenced Columbus. This book served for almost half a millenium, augmented, enlarged and, of course, confounded by a series of commentaries, some quite superstitious, and clouded by astrological leanings. In its later days it was used as an arguement against Copernicanism. Thus this edition is of more than passing interest. Erasmus Reinhold of Wittenberg (1511-53) was the first noted scholar to adopt the theory of Copernicus and calculated the 1st tables of planetary position therefrom, published in 1551 as the "Tabulae Prutenicae Coelestium Motuum". (In Latin) (postpaid) \$ 345

12. Giovanni Santini, "ELEMENTA DI ASTRONOMIA Con Applicazioni ALLA GEOGRAFIA, NAUTICA, GNOMONICA E CRONOLOGIA", Tipographia Del Seminario, Padova, 1819. Two volumes in one, original board covers 9 3/4" h, 7 1/4" w; pgs. L vii, 284, 2 folding engraved plates; II. 299, (1), 2 large folding engraved plates. Very fine overall condition with minor edge wear to the binding. The author (1787-1877), a noted Italian astronomer and teacher was named director of the Padua Observatory in 1814 after having become professor of astronomy at the University of Padua in 1813. He was named Rector of the university in 1824 and Director of Mathematical Studies in 1856. His main research was on the orbits of comets and he produced a catalog of stars between declination plus 10° and minus 10° to aid in the search for new comets. (In Italian) (postpaid) \$ 95
13. Samuel Vince, "THE ELEMENTS OF ASTRONOMY: DESIGNED FOR THE USE OF STUDENTS IN THE UNIVERSITY.", 3rd Ed, J. Smith, Cambridge, 1810; and "THE PRINCIPLES OF HYDROSTATICS: DESIGNED FOR THE USE OF STUDENTS IN THE UNIVERSITY.", 4th Ed, J. Smith, Cambridge, 1812. Original leather binding 8 3/4" h, 5 1/4" w; pgs. I (4), 297, (blank), (1); II (4), 120, 29, many text figures. Hinges cracked and weak although covers still attached, end papers lacking, some foxing, and the last few pages stained on the lower inside corners; fair to good overall condition. The author (1749-1821) was a noted teacher (professor of astronomy at Cambridge University 1796-1821), mathematician, and practicing astronomer. He was elected F. R. S. in 1786. His "Treatise on Practical Astronomy" of 1790 contained detailed descriptions and illustrations of many of Ramsden's major astronomical instruments. The first work here with its sections on observational and dynamical astronomy (orbital motion) served as a high level introduction to his 3 volume "A Complete System of Astronomy" (1797-1808) which was held in great esteem in its own time. He designed a special instrument, constructed by Edward Troughton, to study atmospheric refraction. This 'Refractor Sector' was later adapted by Dr. Wollaston for the first of the North Polar Expeditions which commenced in 1827. (postpaid) \$ 85
14. Edward Wells, "THE Young Gentleman's ASTRONOMY, CHRONOLOGY, AND DIALLING, Containing such ELEMENTS of the said Arts or Sciences, as are most useful and easy to be known.", 2nd Ed, James Knapp, London, 1718. Original leather binding 7 3/4" h, 4 3/4" w; pgs. title, astronomy half title, (4), 148, 16 engraved plates (some folding), chronology half title (dated 1717), (6), 86, dialling half title (dated 1717), 6, 53, (1), 9 engraved plates (most folding). Very fine condition except for cracked but tight hinges and extensive light foxing of first 4 leaves, all others clean and crisp. The author (1667-1727), mathematician, geographer, and churchman, seems to have combined the peculiar mentality of one who was at the same time interested in the benefits of scientific education and the narrow mindedness of religious factionalism. The DNB notes, "On 28 March 1716 he was instituted to the rectory of Bletchley, Buckinghamshire, on the presentation of his former pupil, Browne Willis. He took advantage of the pulpit there to mark out by slander his benefactor, the very man who by mistake, in an uncommon manner, gave him the stand and opportunity of his behavior." Fortunately, the value of his scientific books (such as this one) more than balances his tracts attacking those with religious beliefs other than his own, leaving for him a positive note in the historical record. (postpaid) \$ 145

#### MARINE NAVIGATION

15. Francis Baily, "REMARKS ON THE PRESENT DEFECTIVE STATE OF THE NAUTICAL ALMANAC.", John Richardson, London, 1822. Modern cloth binding 9 1/4" h, 6 1/4" w; 72 pgs uncut and unopened. Dust staining to title page, otherwise very fine condition. This booklet contains a reprint of the public attack (by Thomas Young?) on Baily for his efforts to correct the errors and format of the Nautical Almanac, and Baily's reply. According to Taylor 2, "Thomas Young was Foreign Secretary of the Royal Society, and also Secretary to the Board of Longitude. In this second capacity he was Superintendent of the Nautical Almanac, and there was a growing uneasiness that this publication was deteriorating. After Young's death in 1829 representations were made to the Board, and eventually a strong committee of the new Royal Astronomical Society was formed for its revision, while a naval officer was appointed Superintendent." This committee included G.B. Airy, Peter Barlow, Sir William Hamilton, Sir John Herschel, Captain (later Admiral) W.H. Smyth, Sir James South, Edward Troughton, and Charles Babbage and, it seems, Baily's criticisms formed the initial basis for their work. (postpaid) \$ 55
16. Edmund M. Blunt, "THE AMERICAN COAST PILOT", 9th Ed, E. M. Blunt, New York, Jan. 1817. Modern leather binding, 9 1/2" h, 6" w; pgs. xvi, 328, 85, (23) (advertisements), 17 plates (most dated New York 1816 or 17 but two, Newburyport, 1809). Generally very good condition with foxing and staining, mostly at the front, and missing outer 25% of the chart of the coast of North Carolina, opposite p. 177. It is lacking the 18 page supplement which was loosely placed within and which is missing from almost every known copy. (postpaid) \$ 120
17. Edmund M. Blunt, "THE AMERICAN COAST PILOT", 11th Ed, Edmund & George W. Blunt, New York, Sept. 1827. Original leather binding (with red label) 9" h, 5 1/4" w; pgs. xvi, 676, 4, 20 plates. Covers in very good condition, binding sound but bottom 2" of front hinge split, contents clean with some light foxing and stains and neat repairs to front hinge, title page, last page, 2 plates. The lower inside corners of two leaves are missing as well, but with no loss of text. This copy has been to sea but was reasonably well preserved (under the circumstances) and is still quite useable without further deterioration. (postpaid) \$ 110
18. Edmund M. Blunt, "THE AMERICAN COAST PILOT", 19th Ed, E. & G.W. Blunt, New York, June, 1863. Original leather binding, recently rebacked, 9 3/4" h, 6 1/4" w; pgs. frontis plate, title, (2), 78, 837, (2), 4 very large folding plates. Fine condition with repaired tears in the 4th plate. This is Campbell's last issue with the pasted-in appendix dated November 1863. The original red leather label has been applied to the new back. This, and the 20th eds are the only ones to have a frontis plate. (postpaid) \$ 95
19. Nathaniel Bowditch, "THE NEW AMERICAN PRACTICAL NAVIGATOR", 1st Stereotype (4th) Ed, E.M. Blunt & Samuel A. Burtus, New York, Aug. 1817. Original leather binding (with original black title label) 9" h, 5 1/2" w; pgs. xiv, (2), 274, 280 (tables), 555-597, (13), folding frontis chart, 11 engraved plates. Ex library copy (Franklin Institute, Philadelphia) in good to very good condition; some binding wear, partly cracked front hinge, library marked title page, and some foxing of the contents which are otherwise complete and sound. Some of the ads at the rear are dated Sept. 1817 and pg. 264 is numbered correctly making this copy different from the common issue listed in Campbell, according to whom, "This is the first and only time the name of Samuel Burtus appears as co-publisher." The very early editions of the "Navigator" (such as this) have become quite rare. (postpaid) \$ 165
20. Nathaniel Bowditch, "THE NEW AMERICAN PRACTICAL NAVIGATOR", 27th Ed, E. & G.W. Blunt, New York, 1857. Original leather binding, newly rebacked, 9 1/2" h, 6" w; pgs. (2), 8, iii-xix, (1), 319, 460, 2, (1), folding frontis chart, 13 engraved plates (one more than called out by Campbell, a folding Mercator chart, opposite pg. 452, showing great circle courses as approximated by rumb lines). Ex library copy in almost fine overall condition with stamp on title page and original owner's name cut off its top. Contents are fine plus. Campbell notes that this edition, except for dates, is the same as the 26th. (postpaid) \$ 110

#### MASSACHUSETTS RESIDENTS

Please remember to add the 5% sales tax to the purchase price of your order.

21. (J. Ingersoll Bowditch), "BOWDITCH'S USEFUL TABLES", 4th Ed, E. & G.W. Blunt, New York, 1863. Original half leather binding, newly rebacked, 9 1/2" h, 6" w, 188 pgs. (erratic pagination). Very fine condition. Both J.L. Bowditch's preface and Benjamin Pierce's remarks are dated 1849. Karpinski lists a (1st ?) ed dated 1844. This work seems quite rare and not very well known. Campbell does not mention it at all, yet it is an important adjunct to any 'Navigator' collection. (postpaid) \$ 75

#### Star Charts for Celestial Navigation

22. Henry Brooke, "A GUIDE TO THE STARS, . . . IN EITHER HEMISPHERE, Particularly Those That Are Useful For Finding The Longitude And Latitude At Sea. WITH TWELVE PLANISPHERES", Taylor & Hesse, London, 1820. New half leather binding 12 3/4" h, 10" w; pgs. xi, 101, with the 12 full page engravings called for in the title. Extremely fine condition. Each of the 12 star charts depicts the celestial hemisphere as viewed at a particular latitude at a selected time and date as an aid to the navigator in the location of his reference stars. The author writes, "Should this my first attempt prove in any way conducive to the improvement of navigation and the safety of our extensive and valuable commerce, the fulfilment of my most ardent wishes will be accomplished." (postpaid) \$ 145
23. Thomas S. Davies, "GEOMETRICAL INVESTIGATIONS CONCERNING THE PHENOMENA OF TERRESTRIAL MAGNETISM", author's reprint from the PHILOSOPHICAL TRANSACTIONS, London, 1835. From the library of Admiral W.H. Smyth with the note on the title page "Received from the Author". Modern cloth binding 10 3/4" h, 8 1/2" w; 126 pgs and 7 engraved plates of elaborate diagrams. Davies (1795-1851), mathematical master at the Royal Military Academy, Woolwich, F.R.S., had done extensive work in spherical and solid geometry as well as in the field of geomagnetism. Here, in the author's words, "The present series of papers is chiefly intended to deduce the mathematical consequences of the theory of two poles situated arbitrarily within the earth, and especially to investigate the angular points and lines which result from the intersection of the earth's surface relative to the magnetic poles." This 'permanent magnet' approach provides an interesting comparison with Peter Barlow's theory (published in 1831) of circulating electrical charges. (postpaid) \$ 55
24. F. Ernst Fournier, "DÉVIATIONS DES COMPASS-EXPOSÉ THÉORIQUE & PRACTIQUE D'UNE MÉTHODE NOUVELLE . . .", Library Maritime et Scientifique, Paris, 1873; followed by E. Fasci, "THÉORIE ANALYTIQUE DE LA DÉVIATION DES COMPASS SUIVIE DE RÈGLES PRACTIQUES . . .", same publisher; followed by E. DuBois, "DE LA DÉVIATION DES COMPAS A BORD DES NAVIRES . . .", same publisher. Original half leather binding 9 1/4" h, 6 1/2" w; pgs. vii, (1), 215, folding plate, 40, viii, 56. Very good overall condition with the upper corner (1 1/4" by 1 1/4") of the rear cover broken off and missing. This is a rather comprehensive theoretical (including mathematics) and practical presentation of the subject - the determination of the effect that an iron ship has on its magnetic compass and correction of same. (In French) (postpaid) \$ 25
25. James F. Imray & W. H. Rosser, "THE LIGHT AND TIDES OF THE WORLD, TOGETHER WITH THE VARIATION AND DIP OF THE MAGNETIC NEEDLE", (2nd Ed), Imray & Son, London, 1869. Original cloth binding, embossed with gold lighthouse, 9 1/4" h, 7 1/2" w; pgs. (6), 20, xl, 208, 55 (Catalogue of charts, books and instruments), 2 folding charts, plus 18 pgs of addenda covering Jan 1872 - Jan 1874 have been pasted in after the body of the text. Covers good with edge wear, fading, and some rubbing, contents in fine condition. Robert Blachford, son-in-law of John Hamilton Moore, took Imray in as a partner in 1836 (Blachford & Imray), later acquiring full title to the firm. In 1899 Imray & Son merged with Noire & Wilson. (postpaid) \$ 50
26. Thomas Lynn, "NEW STAR TABLES, Adapted to Practical Purposes for Twenty-Two Years, Commencing January 1843 FOR THE USE OF MARINERS, AMATEUR ASTRONOMERS, CHRONOMETER MAKERS, & c: . . . APPENDIX . . . For Determining THE LATITUDE AND LONGITUDE AT SEA," W.H. Allen, London, 1843. Original half leather binding 9 3/4" h, 6 1/4" w; pgs. xviii, 84, 25, 32. Generally very good to fine condition although end papers partly defaced by pencil scrawls. (postpaid) \$ 45

#### Lunar Distances by Margett's Nomographs

28. George Margett, "Longitude Tables for Correcting the Effect of PARALAX and REFRACTION, On the Observ'd Distance taken between the MOON and the SUN, or a fixed STAR, whereby the True Distance is Accurately Obtain'd and the Corresponding Time at Greenwich, FOUND BY INSPECTION", (1st Ed ?), for the author, London, (engraved plates dated 1790). Very early (original ?) leather binding 11 1/2" h, 9 1/4" w; pgs. xiv, 70 engraved plates. Ex library copy (Franklin Institute, Philadelphia) with marked title page, contents reattached to binding, but except for paper strip reattaching engraved title page and some light marginal stains, in very fine condition. The engraved charts are nomographs, or graphical parametrical solutions to the problem of clearing the lunar distance. That is, the correcting of the observed lunar distance (angular measurement between the edge of the Moon and a selected star, or the Sun) for atmospheric refraction and parallax (the vector displacement of the observer from the Earth's center). The inputs to each graph are the altitudes (angle above the horizon) of the Moon and star, or Sun, in the range of 5 to 80 degrees. There is one graph (or chart) for each integer value of the observed lunar distance from 20 to 120 degrees. First and second corrections are read out in minutes of arc; the former on the vertical scale of the graph and the latter on a second set of curves superimposed on the set of stellar altitude curves. The instructions also refer to tables (graphs) for interpolating within the 2nd correction curves, from one plate to the next, conversion between decimal fractions of a degree and arcminutes, and interpolation in the Nautical Almanac where data is presented in 3 hour increments. This set of graphs is not present in the volume here, although usually found in the 1793 reissue, but are not actually needed since the same operations may be done by simple calculation, and that to a greater accuracy. The plates were re-engraved in 1793 (2nd ed ?) in a larger format (18 1/2" x 11 1/2") and to which were added parametric graphs of "HORARY TABLES for Shewing by Inspection, the Apparent Time from Altitudes of the SUN, MOON, AND STARS, The Latitude of a Ship, & the AZIMUTH, TIME, OR ALTITUDE, Corresponding with any Celestial Object". These actually perform the same function as the classical astrolabe.

The author (1748-1804) is best known as an extremely clever watchmaker who eventually died in a lunatic asylum. Gould describes several of his more complicated watches, ones having 3 dials (hours, minutes, seconds) which in the center of each is a smaller dial, which gradually rotate backwards, so that the hand of each dial indicates simultaneously the mean solar time on the outer fixed one and sidereal time on the inner moving one. He made several others, even more complicated, which showed the tide at various ports, the age and place of the Moon, the place and declination of the Sun, the stars visible at any time above an observer's horizon, and even the time. Gould also describes one of his most complicated of all designs, a watch with a chronometer escapement which reproduced the motions of the heavens. As he put it,

"This machine, which is not really a chronometer, but an attempt to produce a mechanical "Nautical Almanac", is, I believe, unique - and certainly for perverted ingenuity it would be difficult to surpass. Putting aside for a moment its enormously increased cost as compared with a chronometer of ordinary pattern, and the extra work imposed upon the mainspring by having to drive such a complicated motion-work, it is open to the fatal objection that its indications would have to be

corrected for rate before they could be used, and that this calculation would take at least as long as the time required for looking out the same information in the tables, while the latter method would be far more reliable."

The nomographs here are no less ingenious, but in no way perverted, really one of the most clever solutions to lunar distances ever conceived. The Board of Longitude awarded him £100 for his work, but made no great effort to see that it was placed in use. Margett also invented a 4 ft long navigational slide rule (praised by the navigation author Mackay), and improved Mudge's lever escapement. He was clearly a genius, who not only died mad, but may have lived mad as well. This is one of the rarest of the significant books on lunar distances, important not only to the student of celestial navigation, but to that of horology as well. (postpaid) \$ 295

#### The Rare First Edition of the Rebel Navigator

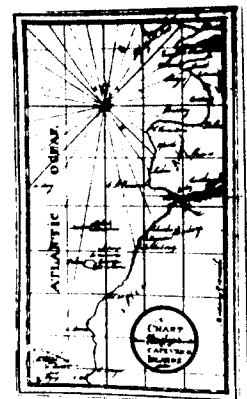
29. Matthew F. Maury, "A NEW THEORETICAL AND PRACTICAL TREATISE ON NAVIGATION: IN WHICH THE AUXILIARY BRANCHES OF MATHEMATICS AND ASTRONOMY . . . ARE TREATED OF. ALSO, The Theory and most Simple Methods of finding TIME, LATITUDE, AND LONGITUDE, BY CHRONOMETERS, LUNAR OBSERVATIONS, SINGLE AND DOUBLE ALTITUDES, ARE TAUGHT", (1st Ed), Key & Biddle, Philadelphia, 1836. Original leather binding 8 3/4" h, 5 1/4" w; pgs. viii, 216, 174 (tables), bound-in errata slip (at end), 9 engraved plates including the large folding frontis plate. Fine overall condition except for occasional foxing and library markings (Franklin Institute, Philadelphia) on the title page. The author, born in Fredericksburg, Virginia in 1806, became a midshipman in the U.S. Navy in 1825, Lieutenant in 1836 (the same year as the publication of this book), Commander in 1858, and then - Commander of the Navy of the Confederacy 1861-65, spending much of this time in England as a special agent of the Confederacy. At the conclusion of the Civil War he stayed on in England, returning in 1868 to become Professor of Meteorology at the Virginia Military Institute. The author notes in his Preface, "THE object of the present volume, is to place in the hands of students, and especially of the Midshipmen of the United States Navy, a Text Book, in which the theory as well as the practice of Navigation, is explained and taught." (postpaid) \$ 195
30. Pierre-François-André Méchain, "CONNOISSANCE DES TEMPS, À L'USAGE DES ASTRONOMES ET DES NAVIGATEURS, AVEC DES ADDITIONS, Pour l'Année Biffextile 1792", L'Imprimerie Royale, Paris, 1790. Original paper wrappers 7" h, 4 1/2" w; 393 pgs, folding engraved plate of the moon. Extremely fine condition except for wear to the paper backstrip. In addition to the tables of this French nautical almanac, there are extensive text sections elaborating upon the tables and explaining their use. Méchain (1744-1804) was an active astronomer as well as a member of the Royal Society, French Academy of Sciences and Director of the Bureau of Longitudes. He and Delambre measured the meridian arc from Dunkirk to Barcelona in 1791 as a basis for establishing the metric system. He also discovered 11 comets and calculated their orbits. (In French) (postpaid) \$ 45
31. John Hamilton Moore, "THE SEAMAN'S COMPLETE DAILY ASSISTANT, BEING An easy and correct METHOD of Keeping a JOURNAL at SEA", 3rd Ed, Law, Robinson, Sayer & Bennett, London, 1785. Original leather binding 8 1/2" h, 5 1/4" w; pgs. 84, (102, tables), (2). Ex library copy (Franklin Institute, Philadelphia) with well worn, but tight binding, library marking of title page, lacking front endpapers, name cut from top of pg. 1, contents with slight stains, but otherwise clean and sound. This book by the author of the "Practical Navigator" ("New Practical Navigator" in 1798) was first published as a separate book in 1778 after having started out as part of the "Practical Navigator and Seaman's New Daily Assistant" (1st ed, 1772). (postpaid) \$ 60
32. John William Noire, "EXPLANATION AND USE OF A SET OF CELESTIAL MAPS, INTENDED TO ASSIST Students in Astronomy IN ACQUIRING A KNOWLEDGE OF THE PRINCIPAL FIXED STARS IN THE HEAVENS: AND PECULIARLY ADAPTED TO THE PURPOSE OF FINDING THE STARS PROPER FOR ASCERTAINING THE LATITUDE AND APPARENT TIME AT SEA; THE LONGITUDE BY LUNAR OBSERVATIONS, & c.", J.W. Noire & Co., London, 1825. Old boards binding 9" h, 5 3/4" w; 44 pgs. Ex library copy with stamp on title page, otherwise fine condition. This booklet was intended for use with a separate set of star charts. Taylor 2 lists 1833 as the date of publication (of the earliest copy known to her). It is probable that although the content remained the same, the date was changed as new batches were printed up. The one here may not be the earliest either. However, despite the multiple printings, this booklet is not particularly common. (postpaid) \$ 65

#### The Original Source of Bowditch's "Navigator"

33. John Robertson, "THE ELEMENTS OF NAVIGATION; CONTAINING THE THEORY and PRACTICE, With the necessary TABLES, And COMPENDIUMS for finding The LATITUDE AND LONGITUDE at SEA. To which is added, A TREATISE OF MARINE FORTIFICATION. . . . IN TWO VOLUMES (bound as one) . . . revised and corrected by WILLIAM WALES," 5th Ed, C. Nourse, London, 1786. Modern leather binding 9 1/4" h, 6 1/4" w; pgs. (iii)-xii, (8), xxxii, 400, (4), 392, 76, 16 engraved folding plates. The book is complete except for a missing half title to Vol. I. Overall fine condition even with some stains and some light foxing. The contents are quite crisp. The 1st edition was published in 1754. Campbell details how the 3rd edition of 1772 served as the source for Moore's "Practical Navigator" (1st ed in 1772). Moskowitz in "Three Studies" notes this as well and has actually been able to trace many paragraphs from Robertson through Moore to Bowditch which remain (essentially) unchanged. Interestingly, Moore's work was a step backwards, leaving out a significant amount of the material to be found here, to be augmented once more by Bowditch starting with the second edition of his 'Navigator'. Still, Moore complained about those "persons in Scotland, Ireland, and other places" copying his books which have then "been distributed in different parts of the world, particularly in the East Indies and America" without pointing out to his readers that he took much of his text from an earlier edition of the work here. (postpaid) \$ 175

#### Book in Manuscript

34. Joseph Russell, "Navigation", Green Row Academy, (London), October 27th, 1815. Original boards, newly rebacked with leather, 10 3/8" h, 8 1/2" w; 310 text pages with many text diagrams, some full page, full page drawing (heightened with original color) of the "Mariners Compass" and large hand-drawn folding plate, "A CHART from England to the CAPE VERD ISLANDS". Very fine overall condition with some edge wear to the covers. The text is in a particularly fine 'copperplate hand'. The subjects covered include: Plain Sailing, Traverse Sailing, Parallel Sailing, Middle Latitude Sailing, Mercator's Sailing, To work an Celestial Observation or to find the Latitude of a Place, Variation of the Compass, Keeping a Ship's Reckoning, and a sample "A Journal of a Voyage from London to Madeira and Teneriffe". This is a particularly complete and well done example of a "Navigation School" work book. (postpaid) \$ 375



35. A. Schwerer, "ÉTUDE SUR L'EMPLOI DU SEXTANT POUR LES OBSERVATIONS DE PRÉCISION", extract from the Revue Maritime et Coloniale, Tome Cent-Cinquième, L. Baudoin & Cie, Paris, 1890. Old half leather binding 9 1/4" h, 6 1/4" w; pgs. 79-149, text figures and tables. Very fine overall condition. (In French) (postpaid) \$ 25

#### Yankee Ingenuity Revolutionizes Celestial Navigation

36. Thomas H. Sumner, "A NEW AND ACCURATE METHOD OF FINDING A SHIP'S POSITION AT SEA, BY PROJECTION ON MERCATOR'S CHART.", 3rd Ed, Revised, Thomas Groom & Co., Boston, 1851. Original cloth binding 9 5/8" h, 6" w, with the gold embossed Yankee sea captain on deck with his quadrant, on the front; pgs. 90, (2), folding frontis plate of altitude circles projected on a Mercator chart, Plates II through IX on 5 sheets. Fine condition, except for some chipping at the ends of the spine and some spots of light foxing. The publication of Sumner's 'lines-of-position' (1st ed in 1843) marked the end of British dominance of the science of navigation (an end begun by Nathaniel Bowditch in 1799). The author, son of Charles Sumner (noted U.S. Senator from Massachusetts and great innovator in maritime law), graduated from Harvard, went to sea, and eventually assumed his own commands. His new approach to the solution of the problems of celestial navigation - replacing elaborate error prone calculation with a simple combination of straight forward calculation and graphical plotting - formed the basis for all subsequent work on the subject. Indeed, the nullification of systematic observation errors (in the later 3 star fix version) was a major improvement over all previous schemes. (postpaid) \$ 95
37. William Walker, "THE MAGNETISM OF SHIPS, AND THE Mariner's Compass; BEING A RUDIMENTARY EXPOSITION OF THE INDUCED MAGNETISM OF IRON IN SEA-GOING VESSELS, AND ITS ACTION ON THE COMPASS. IN DIFFERENT LATITUDES, AND UNDER DIVERSIFIED CIRCUMSTANCES", Piper Bros. & Co., London, 1853. Original cloth binding 7" h, 4 1/2" w; pgs. xx, 207, (1), frontis plate of the author's patent compass (as sold by W. Heath of Devonport). Covers with some water staining, otherwise in very good condition, contents in fine condition. This appears to be a presentation copy, inscribed "With Commr. Walker & the Publisher's Compliments". There is a good deal of material on the author's invention and the unfair reception it has received at the hands of the Admiralty. (postpaid) \$ 40
38. Henry Wilson, "Navigation New Modelled: OR, A TREATISE OF Geometrical, Trigonometrical, Arithmetical, Instrumental, and Practical NAVIGATION;" 8th Ed, W. & J. Mount, T. Page & Son, and W. Meadows, London, 1760. Original leather binding 8" h, 5" w; pgs. xvi, 527, (1), 10 foldout plates, 2 of which have had missing outer sections supplied in facsimile. This ex library copy (Franklin Institute, Philadelphia) although sound, has a worn binding, repaired cracked front hinge, and has seen hard use at sea. The front end paper is inscribed, "James Easton Jr His Book Bought in Philadelphia Decemr. 1760". Wilson (1673-1741) is best known for his attempt to make great circle sailing practical through the means of a new GLOBULAR PROJECTION which was to be the basis for a new Marine Atlas to be published by Senex. Unfortunately, the navigational teachers of the day, with a vested interest in the status quo, were able to block the effort. The 1st ed of the work here was published in 1715 and, after Wilson's death, William Mountaine prepared revised editions, as he did for the other Mount & Page navigation books - "Atkinson", "Wakely", etc. This copy, because of its condition, is intended for the scholar rather than the collector of fine bindings, but is priced accordingly. (postpaid) \$ 55
39. Henry Wilson, John Adams revision, "WILSON'S EPITOME OF Geometrical, Trigonometrical, Arithmetical, Logarithmical, Instrumental & Practical NAVIGATION;" 10th Ed, Mount & Page, London, 1783. Later (19th c ?) half leather binding 8 1/4" h, 5 1/4" w; pgs. 22, xviii, 396, 140, 10 foldout engraved plates (bound in an erratic order). Fine overall condition with the contents particularly clean and very fine. Adams (1757-1807) was the last reviser to attack Mount & Page's library of texts before they were finally abandoned due to old age. The copy here would look well in anyone's library, scholar or collector. (postpaid) \$ 155

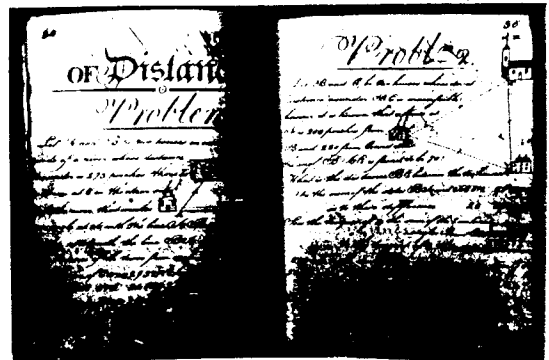
#### LAND SURVEYING

##### The Definitive Biography

40. William Barton, "MEMOIRS OF THE LIFE OF DAVID RITTENHOUSE, LLD, F.R.S. . . . INTERSPERSED WITH VARIOUS NOTICES OF MANY DISTINGUISHED MEN: WITH AN APPENDIX, CONTAINING SUNDRY PHILOSOPHICAL AND OTHER PAPERS, MOST OF WHICH HAVE NOT HITHERTO BEEN PUBLISHED.", Edward Parker, Philadelphia, 1813. Modern leather binding 8 3/4" h, 5 1/4" w; pgs. frontis portrait, lxxviii, 79-614, and the fold-out letter opposite p. 436. Generally fine condition except for minor foxing, edge wear to some pages, and a hole worn in the title page from an attempt to remove an old reading room stamp. David Rittenhouse (1732-96) was one of America's first universal men of science. He was a surveyor, astronomer, mathematician, horologist, manufacturing chemist, member of the Pennsylvania General Assembly and Board of War of the Continental Congress, first director of the U.S. Mint, President of the American Philosophical Society (1791-96), F.R.S. (1795), and experimental physicist. He made surveying and astronomical instruments, clocks, and his famous Orrery which was designed to illustrate solar and lunar eclipses and other phenomena for a period of 5000 years, either forward or backward in time. (postpaid) \$ 185
41. C.L. Berger & Sons, "HAND-BOOK AND ILLUSTRATED CATALOGUE OF THE Engineers' and Surveyors' INSTRUMENTS OF PRECISION", Boston, 1903. Original printed board covers 9" h, 5 3/4" w; pgs. (18), 7-212, hundreds of text illustrations. Fine plus condition. (postpaid) \$ 40

##### Surveying Book in Manuscript

42. William R. Brown, (No Title), Nine Partners, 1814. Original leather backed boards, 8 1/4" h, 6 1/2" w; pgs. title, 41, (54), (31 blanks), diagrams on many pages. Some wear to binding, some (blank ?) pages removed at rear, otherwise fine condition. The subjects covered include plane geometry, trigonometry, surveying by chain, rectangular surveying, the surveying field book, division of land, variation of the compass, followed by the beginning of a section on navigation. Although no origin is given within the book, those problems which involve latitude have values which correspond to England. The book appears to be typical of those prepared by students attending one of the 'mathematical' academies. It is a particularly nice example of a work primarily related to land surveying. (postpaid) \$ 175



43. Arthur Burns, "GEODAESIA IMPROVED; OR, A NEW AND CORRECT METHOD OF SURVEYING MADE EXCEEDING EASY", (1st, and only ?, Ed), for the author, Chester, 1771. Original leather binding 8 1/8" h, 5 1/4" w; pgs. (12), iv-x, 353, (2), 5 engraved folding plates, and some text figures. Contents in fine plus condition with a few pages foxed, front hinge cracked but cover still tightly attached, otherwise showing only minor wear. Taylor 2 lists the author as being from Tarporley, Cheshire, where he kept a boy's school which emphasized a whole range of practical mathematics. The level and detail of the text suggests that Burns must have been a practicing surveyor as well. This is not a book for a boy's school. (postpaid) \$ 95

44. Abel Flint, "A SYSTEM OF GEOMETRY AND TRIGONOMETRY: TOGETHER WITH A TREATISE ON SURVEYING . . . LIKEWISE, RECTANGULAR SURVEYING;", 4th Ed, Cooke & Hale, Hartford, 1818. Original leather binding (some surface wear but otherwise in sound, very good condition) 8 1/2" h, 5 1/4" w; pgs. 80, 88 (tables), 4 engraved folding plates. Contents fine except for some light foxing. The 1st edition was issued in 1804 and Karpinski lists 15 separate issues through 1854. Changes, sometimes significant, were made from edition to edition, representing changing American practice over the 1st half of the 19th century. (postpaid) \$ 45

Includes the Large Plate of the Instrument - Not Found in the First Edition

45. Octavio Fabri, "L'VSO DEL LA SQVDRRA MOBILE", Andrea Gattella, Padova, 1673. Later board covers 8 1/4" h, 5 3/4" w; pgs. engraved title, 8" x 11" fold out plate of instrument (dated 1670), (2), 9-100, with 2 different leaves numbered 13 & 14, 24 engraved plates printed on text pages. The 12 pgs of preliminary material of the 1st ed were not printed in this edition but the page numbering was not adjusted. A second state version of pgs 85 and 86 (with the one plate which would have otherwise been missing from this edition) bound between pgs 14 and 15. Thus the book is complete and contains additional material as well. Generally fine condition although 3 pgs trimmed too close when it was rebound, just affecting the text. The 1st ed was printed in 1598. The Squadra Mobile was a portable instrument of Fabri's innovation. Level was determined by a plumb line and a pair of pivoted alidades with peep sights were used for sightings. Readout was on dual function circular and rectified scales so that either angles, or trigonometric functions thereof could be obtained directly. The quality of the engravings (many of them pictorial) is excellent. This is a beautiful as well as interesting book. (In Italian) (postpaid) \$ 260

Third American Edition

46. Robert Gibson, "A TREATISE OF Practical Surveying: WHICH IS DEMONSTRATED FROM ITS FIRST PRINCIPLES. WHEREIN EVERY THING THAT IS USEFUL AND CURIOUS IN THAT ART, IS FULLY CONSIDERED AND EXPLAINED. . . . WITH ALTERATIONS AND AMENDMENTS, ADAPTED TO THE USE OF AMERICAN SURVEYORS.", 6th Ed, Joseph Cruikshank, Philadelphia, 1792. Modern full leather binding 8 1/4" h, 5 1/4" w; pgs. viii, 288, 64 page section of tables dated 1794, 12 foldout engraved plates. Generally very good condition except for some staining and foxing, deterioration of the outside edged of the plates (particularly Pl. 7). The 1st American edition (called the 4th) was published in 1785, taken directly from one of the London versions (4th Ed?) of the period. The 1st edition may have been issued in Dublin c. 1750 and Taylor 2 notes a 2nd London edition of 1767. The author may well have been the Dublin surveyor (fl. 1731-61?) who held the post of examiner of applicant surveyors to the Surveyor General of Ireland, and was also a teacher of mathematics (Temple Lane, Essex St., Dublin, 1752 and Anglesey St., 1754). (postpaid) \$ 140

The Rare First Edition

47. John Gummere, "A TREATISE ON SURVEYING, CONTAINING THE THEORY AND PRACTICE: TO WHICH IS PREFIXED, A PERSPICUOUS SYSTEM OF PLANE TRIGONOMETRY.", (1st Ed), Kimber & Richardson, Philadelphia, 1814. Original leather binding with red label 8 3/4" h, 5 1/2" w; pgs. v, (5), (9)-202, 152 (tables dated 1814), 8 foldout engraved plates. A foxed and stained copy, lacking front flyleaf, the binding worn and front hinge partially cracked, suggesting extensive field use under adverse conditions. This was possibly the most popular American book on surveying ever written for it continued to be published for more than a century, Karpinski noting that there was an edition as late as 1917. The author (1784-1845), although largely self-taught, was recognized as one of the ablest mathematicians in the United States of his time. He was an active contributor to the Transactions of the American Philosophical Society (Philadelphia). His source of income was, primarily, from teaching and running schools: Horsham, Pa., 1803-05; Rancocas, N. J., 1806-11; Burlington, N. J., 1814-33; Haverford, Ma, 1833-44; and then back to Burlington, N. J. He was also the author of an "Elementary Treatise on Astronomy", 1822. This is not the nicest of copies (see Cat. 128, Item 44 for better), but it is rare as well as significant in the history of American surveying. (postpaid) \$ 95

48. John Gummere, "A TREATISE ON SURVEYING, CONTAINING THE THEORY AND PRACTICE: TO WHICH IS PREFIXED, A PERSPICUOUS SYSTEM OF PLANE TRIGONOMETRY.", 4th Ed, Kimber and Sharpless & John Richardson, Philadelphia, 1825. Original leather binding (weak hinges, partially cracked at upper ends) 8 1/2" h, 5 1/4" w; pgs. vi, (2), 9-216, 152 (tables), 8 engraved plates. Contents in fine condition except for light foxing. The student of American surveying will find it of value to track the changes in surveying practice over the century of editions of this work. (postpaid) \$ 70

49. W. & L. E. Gurley, "Manual y Catalogo Gurley INSTRUMENTOS de INGENIERÍA para Trabajos de Campo y de Oficina, . . . Adaptacion al espanol y el sistema métrico por Alexander Ramoneda, Ing.", W. & L. E. Gurley, Troy, N. Y., (1915). Original full leather binding 9 1/2" h, 6 1/4" w; 167 pgs with many illustrations. Contents in very fine condition, binding with some edge and spine wear. This catalog was prepared for the Latin American market. (In Spanish) (postpaid) \$ 45

Revised Edition of the Best 17th Century English Work on Surveying

50. William Leybourn, "THE COMPLEAT SURVEYOR: Or, the WHOLE ART of SURVEYING OF LAND, BY A NEW INSTRUMENT lately invented: As also by the Plain Table, Circumferentor, the Theodolite as now improv'd, or by the Chain only . . . Every Operation both Geometrical & Arithmetical being examine'd, AND AN Appendix Added to the WHOLE, Confisting of Practical Observations in Land Surveying, By SAMUEL CUNN.", 5th Ed, Ballard, Ward, & Woodward, London, 1722. Original paneled leather binding, newly rebound, 11 3/4" h, 7 1/2" w; pgs. title in red and black, (10), 100, 166, 155, (1), 14 foldout engraved plates. A crisp copy in very fine overall condition except for the last plate which has been repaired poorly. Like some copies of earlier editions, this one seems to have been issued without the frontis portrait of Leybourn (no sign of it ever having been bound between the front flyleaf and title page). However, copies of this and other editions are known with the portrait and so it must be considered lacking here. Otherwise the book is complete. There are major sections on the use of instruments of the period. There are separate sections on "Dialling" and "The Legal Part of Surveying". Leybourn (1626-1716) was a noted teacher of astronomy, navigation, mathematics, surveying (he was one of the surveyors of London after the Great Fire of 1666), and dialling. This book was first published in 1653 with editions in 1657, 1674, 1679, and 1722 (this one). There were significant changes from edition to edition; only 5 engraved plates in the 3rd, 6 in the 4th, and 14 in this one. Samuel Cunn's Appendix of 51 pages appears here only. This is one of the major works on surveying in the English language. (postpaid) \$ 365



51. Louis Puissant, "TRAITÉ DE GÉODÉSIE, OU EXPOSITION DES MÉTHODES TRIGONOMÉTRIQUES ET ASTRONOMIQUES, APPLICABLES SOIT A LA MESURE DE LA TERRE, SOIT A LA CONFECTION DES CANEVAS DES CARTES ET DES PLANS TOPOGRAPHIQUES", 2nd Ed, Mme Ve Courcier, Paris, 1819. Modern full leather bindings 12" h, 8 1/2" w; pgs. L xx, 376, (30, tables), 11 large folding engraved plates; II. viii, 360, (20, tables), 2 large folding engraved plates. Very fine overall condition, the contents clean (except for stains to the outer edges of a few pages) and crisp with the edges of the pages still untrimed. Nine of the plates of Vol. I depict design details and complete assemblies of a de Borda double telescope repeating circle. This edition has been expanded to just over double the 1st of 1805, particularly in the areas of astronomical observations and their use in determining the actual shape of the geoid. The titles of the 3 original sections (books) are "NOTIONS DE LA SPHERE ET DU MOUVEMENT DES CORPS CÉLESTES", "ANALYSE DES DEUX TRIGONOMÉTRIES", & "OPÉRATIONS ET CALCULS GÉODÉSIQUES", while those of the 3 new sections are "PROBLÈMES D'ASTRONOMIE", "OBSERVATIONS ASTRONOMIQUES", & "QUESTIONS DE HAUTE GÉODÉSIE". In 1827 a supplement was added with new derivations as well as amplifications of existing sections. A 3rd ed was issued in 1842. This appears to be the most comprehensive treatise on exact surveying published in the 1st half of the 19th century. (In French) (postpaid) \$ 225

Altitude Determination by Ramsden's Barometer

52. Colonel William Roy, F.R.S., "EXPERIMENTS AND OBSERVATIONS MADE IN BRITAIN, IN ORDER TO OBTAIN A RULE FOR MEASURING HEIGHTS WITH THE BAROMETER.", author's reprint from the Philosophical Transactions, J. Nichols, London, 1778. Early (original ?) half leather binding 11 1/2" h, 9" w; pgs. 142, (1), 2 full page plates of instruments and 2 double page plates. Some edge wear to the binding, contents fine plus. Colonel, later Major-General, Roy (1726-90), Director of the Royal Engineers from 1783, is best known for the first successful triangulation across the English Channel using Jesse Ramsden's Grand Theodolite. Ramsden also designed and built the mountain barometer used on this earlier program. Indeed, Ramsden's instrument was such an improvement that, according to Middleton, "This construction was copied or reinvented with changes in detail by J.B. Haas and Friedrich Korner. Gehler wrongly ascribes the tripod construction to Nicolas Fortin, who indeed made use of it." One of the important results of Roy's work was the development of improved compensation equations and an accurate relationship between differential pressure and altitude. (postpaid) \$ 175

THE PHYSICAL UNIVERSE

53. Charles Bossut, "TRAITÉ ÉLÉMENTAIRE D'HYDRODYNAMIQUE: OUVRAGE DANS LEQUEL LA THÉORIE ET L'EXPERIENCE s'éclaircissent ou se suppléent mutuellement;", 2 Vols., Claude Antoine Jambert, Fils aîné, Paris, 1775. Original full leather bindings 8" h, 5" w; pgs. L xxxvii, (1), 369, 9 folding engraved plates; II. 444, 7 folding engraved plates. Binding has weak hinges, worn corners, chipping at top and bottom of spine, contents however, are crisp and in fine to very fine condition. This self contained work is the 5th part of the author's 7 volume "Cours de Mathématiques". However, it seems to have been first issued as a separate book in 1772. Although the title calls it "elementary", the use of differential and integral calculus in its mathematical sections suggests otherwise. It is actually a rather comprehensive study of hydrodynamics combining theory with experimental results. The plates include illustrations of machinery as well as experimental apparatus and diagrams for the mathematical derivations. Bossut (1730-1821?), French mathematician and physicist held a number of academic posts of high rank including examiner for the (Paris) École Polytechnique, 1768, and president of the French Academy of Sciences, also 1768, all of which he lost during the French Revolution. However, his work did not stop and he continued to write and publish important scientific books. (In French) (postpaid) \$ 135

54. James Ferguson, "LECTURES ON SELECT SUBJECTS IN MECHANICS, PNEUMATICS, HYDROSTATICS, AND OPTICS. WITH THE USE OF THE GLOBES, THE ART OF DIALING, AND The Calculation of the Mean Times of NEW and FULL MOONS and ECLIPSES.", 9th Ed, J. Johnson, et al, London, 1799. Original leather binding, rebacked some years ago, 8 1/2" h, 5 1/2" w; pgs. half title, title, (10), 396, (6, index), 48 (Supplement), 23 & 13 folding engraved plates. Fine overall condition with some binding wear and light foxing to a few pages. The Supplement was a 1767 addition to the 1st ed of 1760. The plates contain elaborate depictions of various scientific instruments. The author (1710-76), self-educated as a boy, was sent to the University of Edinburgh by several leading Scottish intellectuals, including the well known Newtonian scholar, Colin Maclaurin. He became a prolific and good writer of scientific works, and one of Britain's leading lecturers in natural philosophy. He designed and made many of his own instruments and lecture apparatus. In the 19th century the great Scottish scientist, David Brewster, revised this work still further, adding another quarter century to its usefulness. (postpaid) \$ 125

Gravitational Waves Before General Relativity

55. J. Fraser, "THE MYSTERY OF GRAVITY, THE SOLUTION OF WHICH GIVES THE KEY TO VARIOUS OTHER MYSTERIES, viz., COMETS' TAILS, THE LOW DENSITIES OF THE SUN and "GIANT PLANETS", SHOOTING STARS AND METEORITES, STAR DRIFT, and last though not least THE ORIGIN OF THE PRESENT STATE OF THE UNIVERSE, AND HOW IT WILL END.", Wyman & Sons, London, 1887. Original printed wrappers 8 1/2" h, 5 1/2" w; title and 31 pages. Fine condition.

"For it has been shown that unless the force of gravity traversed distances with far greater velocity, nay with many times the velocity of light (187,000 miles per second), the whole mechanism of the solar system would long since have gone wrong."  
 "It has always seemed to me . . . that heat is the cause of the force called gravity, . . ."  
 "A planet increasing its distance from its primary resists and consequently gives out energy to the gravitation-waves, and which energy it abstracts by decreasing the same;"  
 ". . . gravity shall one day cease!!! . . . When all the bodies in the universe, or in a very large part of space, cool down to the same temperature, the shelter afforded to each other from the heat of space will be of no avail as a generator of gravity, as they shall then receive from each other the same degree of heat as they would otherwise receive from space;"

There are marginal notes in pencil which appear to be by the author. Could this be his own copy? (postpaid)

\$ 35

AS A CONVENIENCE TO OUR CUSTOMERS

We will accept hold requests by telephone pending your prompt written confirmation with payment. We expect to hear from residents of the U.S. within 4 business days, and from our overseas customers within a reasonable time span.

56. Benjamin Martin, "A PLAIN and FAMILIAR INTRODUCTION TO THE NEWTONIAN PHILOSOPHY, . . . Designed for the Use of such GENTLEMEN and LADIES As would acquire A competent Knowledge of this SCIENCE, without Mathematical Learning; And more especially those who have, or may attend the AUTHOR'S COURSE OF SIX LECTURES and EXPERIMENTS On these Subjects", (1st Ed), W. Owen, London, 1754. Modern leather binding 8" h, 5 1/4" w; pgs. (8), 164, (4), 6 engraved foldout plates. Very fine condition. The author (1714-82) was well known as a superb instrument maker, lecturer, and author. The finest instruments acquired by Harvard College during the 18th century were those made by Martin. A set of his mechanical demonstration apparatus was recently sold at London auction for £ 10,000. Yet when he took his son into partnership in 1780, the firm went bankrupt. Taylor 2 notes that Martin wrote over 30 books. Possibly, he should have directed this energy toward increasing the size of his instrument making business. (postpaid) \$ 175

57. Colin Maclaurin, Published from the Author's Manuscript Papers, By Patrick Murdoch, "AN ACCOUNT OF SIR ISAAC NEWTON'S Philosophical Discoveries, IN FOUR BOOKS", 2nd Ed, A. Millar, London, 1760. Modern leather backed, mottled boards binding 8 1/4" h, 5" w; pgs. (10), xxvi (biography of the author), 412, 6 folding engraved plates. Very fine overall condition except for a few spots of light foxing and covers which may be too bright for some tastes. The author (1698-1746) was a noted Scottish mathematician who played an important role in the development of Newtonian mechanics (as well as providing generous encouragement to young Scottish students of science such as James Ferguson and James Short). He ranked with continental mathematicians of his day, carried out the development and extension of Newton's calculus, introduced "Maclaurin's" method for generating conics, and was the first to give the correct theory for distinguishing maxima from minima. One may suspect that this book was originally published so as to provide an income for his family. However, it proved to be such a fine presentation of Newtonian concepts that it was reprinted several times. (postpaid) \$ 165

Definitive Edition of the First Scientific Study of The Aurora

58. Jean Baptiste D'Ortous de Mairon, "TRAITÉ PHYSIQUE ET HISTORIQUE DE L'AURORE BORÉALE", 2nd Ed, L'Imprimerie Royale, 1754. Modern full leather binding 10" h, 8" w; pgs. (12), 570, xxii, 17 folding engraved plates. Superb condition except for library stamp on title page. The 1st ed of this long forgotten work, from the Mémoires de l'Académie Royal des Sciences for 1731, published in 1733, presented the observational data then available on the aurora and the zodiacal light. The author then demonstrated that the zodiacal light could be considered to be a visual aspect of a solar atmosphere, the main part of which extends just past the perihelion region of the Earth's orbit. He then concluded that the aurora were produced by the interaction of this solar atmosphere and the upper edges of the Earth's atmosphere. No wonder that this work and its author (1678-1771), a French philosopher and scientist well regarded in his own time, perpetual secretary of the French Academy of Science in 1740, was soon forgotten. His theories make sense only after the development of modern atomic theory and quantum mechanics, experimental results from interplanetary spacecraft detecting the existence of a solar wind, and knowledge that sunspot activity increases the free electron component of this wind. It seems that his initial disclosure met stiff opposition and he may also have suffered significant personal abuse (implied in this 2nd edition). He continued his observations and re-examined earlier records to obtain more evidence (included in the second half of the 2nd ed, "ECLAIRCISSEMENTS"). Euler seems to have been his most highly placed critic. The author uses his original and augmented data to refute the many objections, one by one, providing additional support for his theories. This second section of the book is as long as the entire 1st edition. (There are 2 more plates as well.) This is the most historically important book ever published on atmospheric physics. (In French) (postpaid) \$ 290

Splendid Two Volume First Italian Edition

59. Pieter von Musschenbroek, "INTRODUCTIO AD PHILOSOPHIAM NATURALEM", Editio Prima Italica, Joannem Manfre, Patavii (Padua), 1768. Original soft cardboard bindings 10 1/2" h, 7 3/4" w; pgs. I (16), 477, (1), 30 engraved plates; II. 652, 35 engraved plates. A clean crisp copy in near excellent condition. The author (1692-1761), a Dutch physicist of great renown, was a member of many of the learned institutions of Europe (F.R.S. in 1734, French Academy of Sciences in the same year). He was acquainted with Isaac Newton and held posts of professor of physics and mathematics at Duisburg, Utrecht, and Leyden. His "Elementorum Physico-Mathematicorum" was first published in 1726, elaborated in following editions, and finally appeared in 1762 (posthumously edited by Johann Lulofs) under the title of the edition here. This treatise in Newtonian physics has sections on gravity, statics, dynamics, atmospheric, optics, electricity, hydrostatics, acoustics, heat, etc., but without covering astronomy or motion in central force fields, subjects best left to a separate presentation if to be covered in the same detail as exhibited here. (In Latin) (postpaid) \$ 325

Second Edition, Second Issue

60. Sir Isaac Newton, Knt., "OPTICKS: OR, A TREATISE OF THE Reflections, Refractions, Inflections and Colours OF LIGHT.", 2nd Ed with Additions, W. & J. Innys, London, 1718. Modern full leather binding 8" h, 5" w; pgs. title, (4), (1), (1), 382, (2) [book catalogue of W. Innys], 12 foldout engraved plates. The work is complete according to Gray's no. 176. Very fine overall condition except for minor foxing. Only very slight alterations to the text, the resetting of the first 2 pages of the Advertisement to the 1st edition, and a new title page differentiate this book from the 1st issue of the 2nd edition of 1717. (postpaid) \$ 750

The Cambridge 'Abridged Principia'

61. (Isaac Newton), "EXCERPTA QUÆDAM E NEWTONI Principiis Philosophiæ Naturalis, CUM NOTIS VARIORUM", J. Bentham, Cambridge, 1765. Old boards binding with new cloth backstrip and label, 11" h, 8 1/2" w; pgs. ix, (1), 180, 12 engraved folding plates. Gray no. 20. Very fine condition except for edge and corner wear to binding. Gray notes that John Jebb edited this edition, who, according to the DNB, was quite someone in his own right. A lecturer in mathematics, scholar in Arabic, Jebb turned to medicine at the age of 40 when his advanced political views (he believed in democracy) resulted in the loss of his university position. He worked with John Cartwright for parliamentary reform and universal suffrage. He was elected a Fellow of the Royal Society in 1779 and during the illness which led to his death (at the age of 50 in 1786) he took up the study of Anglo-Saxon. (In Latin) (postpaid) \$ 195

Please Refer to GUARANTEES AND TERMS OF SALE Before Placing Any Order

62. Jean Antoine Nollet, "L'ART DES EXPÉRIENCES, OU AVIS AUX AMATEURS DE LA PHYSIQUE. SUR LE CHOIX, LA CONSTRUCTION ET L'USAGE DES INSTRUMENTS"; 2nd Ed, Durand, Paris, 1770. Original half leather bindings 6 3/4" h, 4" w; pgs. L xxiv, 509, (1), 13 engraved plates; II (4), 548, 23 engraved plates; III (2), 524, (4), 10 (book catalog), 20 engraved plates. Generally very fine internal condition, bindings sound but with partial hinge cracks, and a little edge wear. The plates are bound at the ends of the 3 volumes instead of within the text as called for in the table of contents. They are finely drawn and contain a wealth of detail. This work is truly the 'Bion' of the physical sciences. It was prepared by the author (1700-70) to complement his "Leçons de Physique Expérimentale" (1st ed in 1743). Nollet was elected F.R.S. in 1734, started teaching experimental physics in 1735, and became professor of physics at the University of Paris in 1738. He discovered osmosis about 1748, invented the electroscope about 1747, and was an active worker in the fields of fluidics, electricity, and optics. (In French) (postpaid) \$ 245
63. Thomas Parkinson, "A SYSTEM OF MECHANICS AND HYDROSTATICS, BEING THE SUBSTANCE OF LECTURES UPON THOSE BRANCHES OF NATURAL PHILOSOPHY", (1st Ed), University Press, Cambridge, 1789. Cloth backed and cornered library boards binding 11" h, 9" w; pgs. (10), 255, (1), 192,, 34 well engraved numbered foldout plates plus unnumbered multifold "MAP of the WINDS". Ex library copy with binding and title page marked, binding sound but soiled, contents fine to very fine. The author (1745-1830) was a Fellow and Tutor of Christ's College, Cambridge at the time he prepared this comprehensive work. Interestingly, his father did not approve of him entering the university (because students there lost all respect for the old values ?) and denied him financial aid. To support himself he worked under the direction of Israel Lyons on the calculations for the tables of parallax and refraction which the Board of Longitude commissioned for the solution of the problem of clearing the lunar distance. (postpaid) \$ 145

The Definitive Text on Cartesian Physics

64. Jacques Rohault, "TRAITÉ DE PHYSIQUE", 2 Vols, 2nd Ed, Eugene Henry Fricx, Paris, 1708. Original leather backed boards bindings 6 3/4" h, 4 1/4" w; pgs. L (22), 334, (2), 11 folding engraved plates; II. 345, 2, 5 folding engraved plates. Ex library copy with stamped title pages. Bindings sound but with surface and edge wear (originally intended as temporary only), contents in fine condition although pages untrimmed. The 1st edition was in 1671, thus predating Newton. The author (1620-75) was a leading proponent of Cartesianism and worked on the correction and completion of Descartes' proofs. Much of their physical theory was in direct contradiction of Newtonian mechanics. In fact the strength of the Cartesian movement was primarily responsible for the rejection of Newtonian concepts in France. The most visible difference between the two lay in the prediction of the shape of the Earth; Descartes calling for polar elongation while Newton predicting a polar flattening. It was not until the French polar and equatorial expeditions of the 1730's and Maupertuis' documentation in 1738 of the results, did the conflict get resolved in Newton's favor. The book here is of the greatest importance in the history of the physical sciences because it is a comprehensive and accurate representation of an important, though fallacious, approach to physical theory. (In French) (postpaid) \$ 195

Descartes versus Newton

65. "ROHAULT'S SYSTEM OF NATURAL Philofophy, ILLUSTRATED WITH Dr. SAMUEL CLARKE'S Notes moftly out of Sir ISAAC NEWTON'S Philofophy. Done into ENGLISH By JOHN CLARKE", 2 Vols, 3rd Ed, J, J, & P. Knapton, London, 1735. 19th c half leather marked library bindings (Franklin Institute, Philadelphia) 7 3/4" h, 5" w; pgs. L (32), 285, (3), 12 of 13 engraved plates (no. 1 missing and supplied in facsimile); II. 292, (24), 14 engraved plates. Ex library copy in almost fine condition except for library stamps on title pages, a number of plates, and several pgs throughout the book, and edge wear to the bindings. Samuel Clarke (1675-1729) was a Newtonian, but not totally, it seems. According to the DNB, "He became familiar with Newton's discoveries, and gained credit by defending one of the Newtonian principles in the act for his B.A. degree (1695). His tutor, Mr. (afterwards Sir John) Ellis, set him to make a fresh Latin translation of Rohault's 'Physics' to replace that already in use (by Théophile Bonnet, 1674). Rohault was a follower of Descartes, and Newton's 'Principia' (1st ed, 1687) had not yet been accepted at Cambridge. Clarke, though a disciple of Newton, thought that he could best propagate the new doctrine by publishing Rohault, with notes suggestive of the necessity of modifying Descartes' theories." The Latin version (1st ed, 1697) was used as a text book at Cambridge. In 1723 his brother, John, published an English translation (the book here), which proves to be a strange work. Rohault's text is presented (essentially) unaltered, interspersed with Clarke's notes offering a Newtonian view on the subject discussed. The contradiction between the two approaches becomes most obvious, for example, in the section on comets. There is no way to modify Descartes' theory to have it conform with Newton and the actual situation. Newton was correct and Descartes was dead wrong. Clarke's notes do indeed introduce the Newtonian approach but fall far short of presenting the evidence which would contradict every aspect of Rohault's text. On this subject, you cannot have it both ways. One may wonder at how such a book was used at Cambridge, the Newtonian center of the world, for so long. This book is absolutely essential to any one studying the rise of Newtonianism. (postpaid) \$ 135

First Edition in French of this Major Treatise on Newtonian Mechanics

66. Guillaume Jacob s'Gravesande (Elie de Joncourt, translator), "ELEMENS DE PHYSIQUE DEMONTREZ MATHÉMATIQUEMENT, Et Confirme Par Des Experiences; OU INTRODUCTION A LA PHILOSOPHIE NEWTONIENNE.", 2 Vols, Langerak and Verbeek, Liège, 1746. Original boards bindings 10 3/4" h, 8 1/4" w; pgs. L lxxiii, (1), 534, foldout engraved plates 1-62; II. (12), 460, (18), foldout engraved plates 63-127. Very fine overall condition although the top corners of some of the pages of volume I are water stained, the bindings show edge wear, and the pages are uncut. This is the format issued by the printer and before the buyer had them put in a fine library binding. This work was originally issued in Latin in 1720-21 with the first English translation printed in the same year (with 32 plates). Further editions in English were expanded in content and plate count until the 6th of 1747 was a large 2 volume work with 127 plates. Some of the apparatus described and illustrated in it did not even exist in 1720. This first edition in French matches the content, plate count, and quality of engraving of the aforementioned English version of 1747. W. J. s'Gravesande, Dutch mathematician, had come to London in 1715 as Secretary to the Dutch Ambassador, and it was there that he listened to the lectures of Whiston and Desaguliers, and made the personal acquaintance of Isaac Newton. He was elected to the Royal Society in 1715 and 2 years later became professor of mathematics at Leyden where he delivered the course of lectures with experiments which were used as the basis for his book. Desaguliers then provided an English translation as already mentioned. This Dutch translation into French, however, had to wait another 16 years before the Continent seemed ready to accept such new concepts. (In French) (postpaid) \$ 355

Elegant Presentation of Newtonian Physics

67. Adam Walker, "A SYSTEM OF FAMILIAR PHILOSOPHY: IN TWELVE LECTURES", for the author, London 1799. Modern half leather binding 10 3/4" h, 8 3/4" w; pgs. xviii, 571, 47 large folding engraved plates. Very fine condition. The subjects covered in-

clude the properties of matter, magnetism, mechanics, chemistry, the atmosphere, hydrostatics, electricity, optics, and dynamical and descriptive astronomy. There are some very interesting sections on applied mechanics; various machines including a steam engine, fire pumper, etc., several of them the author's own inventions. The plates are well drawn and the typography of the book quite elegant. The author (1731?-1821), son of a woolen manufacturer and pretty much self-educated, carried on several careers including that of lecturer in natural philosophy and inventor. He planned the rotary lights on the Scilly Isles, erected on St. Agnes' Island in 1790 under his personal supervision. He took out a patent for a harpsichord capable of producing continuous tones (No. 1020 of 1772). The work here was his major publication and it was reissued in 2 volumes in 1802. (postpaid) \$ 225

## THE MICROSCOPE

(Books in this section for sale only to current purchasers of microscopes.)

68. Henry Baker, "EMPLOYMENT FOR THE MICROSCOPE. IN TWO PARTS. I. An Examination of Salts and Saline Substances, their amazing Configurations and crystals, as formed under the Eye of the Observer. . . . II. An Account of various ANIMALCULES never before described, and of many other Microscopical DISCOVERIES: With OBSERVATIONS and REMARKS. LIKEWISE A Description of the MICROSCOPE used in these Experiments, and of a new Micrometer serving to show the Size of magnified Objects.", (1st Ed), R. Dodsley, London, 1753. 20th century full leather binding 8" h, 5 1/4" w; pgs. xiv, 442, (10), 17 engraved plates including the large folding one of Cuff's microscope. Fine overall condition although light foxing throughout. Baker (1698-1774), F.R.S. in 1740, was the leading authority and writer on the microscope of the 1st half of the 18th century. Both this work and his "The Microscope Made Easy" (1st edition in 1742) were reissued a number of times. (postpaid) \$ 275
69. Henry Baker, "A Report concerning the Microscope Glasses, sent as a Present to the Royal Society, by Father di Torre of Naples, and referred to the Examination of Mr. Baker, F.R.S.", extract from Vol. 56 of the Philosophical Transactions of the Royal Society, London, 1766. Old wrappers 8 1/2" h, 6 3/4" w; 5 pgs. This is a review of 3 extremely small glass spheres intended to be used as lenses for a Wilson type microscope. They had calculated magnifications of 640 x's, 1280 x's, and 2560 x's. Yet as the author notes, they were virtually useless and indeed, in any attempt to see through them, "there are very few, who would not have been nearly blinded thereby". A very interesting example of 'empty magnification'. (postpaid) \$ 50
70. Conrad Beck, "THE MICROSCOPE / A SIMPLE HANDBOOK PART I", 3rd Ed, R. & J. Beck, London, 1930. Original cloth binding 8 1/2" h, 5 1/4" w; 151 pgs with 154 text figures. Contents in fine plus condition, binding very good with minor spine wear. The 1st ed of 1921 had 144 pgs with 131 figures. This is a well written book describing instrumentation and its application, at a more basic level than is found in Part II, each book being complete in itself. (postpaid) \$ 25

### Second Edition of the Dallinger Revision

71. William B. Carpenter, "THE MICROSCOPE AND ITS REVELATIONS", 8th Ed, J. & A. Churchill, London, 1901. Original cloth binding 9" h, 5 3/4" w; pgs. xx, 1181, 14, (2), 23 plates (some in color), 817 text figures (some of those of instruments, full page in size). Extremely fine condition. The first Dallinger revision was the 7th ed of 1891. This, the last edition of 'Carpenter' has the greatest content of them all and is an absolute 'must' for every serious student of the history of the microscope. (postpaid) \$ 85
72. Alfred C. Coles, "CRITICAL MICROSCOPY HOW TO GET THE BEST OUT OF THE MICROSCOPE", J. & A. Churchill, London, 1921. Original cloth binding, slight spine wear, 10" h, 6 1/4" w; pgs. viii, 104, 4 plates. Binding in very good condition (weakening hinges), contents fine. This book was an updating supplement to the earlier, massive works such as 'Carpenter'. (postpaid) \$ 22
73. Simon Henry Gage, "THE MICROSCOPE DARK-FIELD EDITION", 14th Ed, Comstock Publishing, Ithaca, N. Y., 1925. Original cloth binding 9 1/4" h, 6" w; pgs. ix, 517, 277 text figures, plate with portraits of 9 great innovators in optical design. Very fine condition. The first edition of this major American work on microscopy was published in 1881. This edition contains a large amount of technical information relative to instrument design. (postpaid) \$ 35
74. Philip Henry Gosse, "EVENINGS AT THE MICROSCOPE; OR, RESEARCHES AMONG THE MINUTER ORGANS AND FORMS OF ANIMAL LIFE.", American reissue of 1st ed, D. Appleton, New York, 1896. Original half leather binding 7 3/4" h, 5 1/4" w; pgs. xii, 480, over 110 text illustrations. Fine to very fine overall condition. This detailed book for the amateur microscopist was first printed in England in 1859. (postpaid) \$ 33
75. Jabez Hogg, "THE MICROSCOPE: ITS HISTORY, CONSTRUCTION, AND APPLICATION", 6th Ed, George Routledge & Sons, London, 1867. Original cloth binding 7 3/4" h, 5 1/4" w; pgs. xx, 752, 34 (priced catalogue of Charles Baker, London), 8 colored plates, 355 text figures. Fine plus overall condition except for some binding edge wear. This edition was a major revision over the 5th and so is important to anyone wishing to obtain a complete sequence of distinct editions of Hogg (starting with the 1st of 1854). The 7th, however, is virtually unchanged from this one and so you do not need both. This sequence, and those by Carpenter and by Beale, present a comprehensive picture of microscopy during the 2nd half of the 19th century. (postpaid) \$ 70

### Studies With The Petrological Microscope

76. A. Michel Lévy et Alf Lacroix, "LES MINÉRAUX DES ROCHES / 1<sup>o</sup> APPLICATION DES MÉTHODES MINÉRALOGIQUES ET CHIMIQUES A LEUR ÉTUDE MICROSCOPIQUE / 2<sup>o</sup> DONNÉES PHYSIQUES ET OPTIQUES", (1st combined Ed), Librairie Polytechnique, Paris, 1888. Presentation half leather binding (marked "ÉCOLE NATIONALE SUPÉRIEURE DES MINES - PRIX RIVOT 1901") 10" h, 6 1/2" w; pgs. xi, (blank), 334, (2), large folding colored plate, and 218 text figures. Covers show slight edge wear, otherwise very fine overall condition. This was the major French work of its time on microscopic crystallography. (In French) (postpaid) \$ 65

### First Four Years of American Magazine

77. "THE MICROSCOPE AND ITS RELATION TO MEDICINE AND PHARMACY", 4 Vols bound in 2, Ann Arbor (Michigan), 1881-4. Old 3/4 leather bindings, rebacked, 8 1/2" h, 5 3/4" w; pgs. 197, (3), 211, (3), 240, 5, 285, and many text illustrations. All but Vol. III have separate indexes. Generally fine condition with a little edge wear to the covers. This magazine was edited and published by Charles H. Stowell, M.D., and F.R.M.S. (postpaid) \$ 70

78. John Phin, "PRACTICAL HINTS ON THE SELECTION AND USE OF THE MICROSCOPE. ABRIDGED FOR THE USE OF BEGINNERS.", Industrial Publication Co., New York, 1879. Cloth backed printed board covers 6 1/2" h, 4 3/4" w; 130 pgs with 31 text figures. Generally fine condition except for weak (but not split or detached) hinges. This is a condensed version of the author's "How To Use The Microscope", with many (but not all) of the illustrations from the latter. Phin was editor of "The American Journal of Microscopy". (postpaid) \$ 25

ON THE MATHEMATICS  
APPLICATIONS AND CALCULATING INSTRUMENTS

79. Bernard Forest de Belidor, "NOUVEAU COURS DE MATHÉMATIQUE, A L'USAGE DE L'ARTILLERIE ET DU GENIE", Nouvelle Ed, Jombert, Paris, 1757. Original leather binding 10 1/4" h, 8" w; pgs. xxxij, (2), 656, 34 large folding engraved plates. Extremely fine overall condition although some cracks beginning to appear in the hinges. The author (c. 1693-1761) was an expert on artillery, fortifications, and large scale civil engineering. He had been the Royal Professor of Mathematics at the Artillery School of la Fere, member of the French Academy of Sciences, and held several military positions as a Colonel of the infantry. The 1st ed of this large and impressive work - basic mathematics and then detailed considerations of fortification, ballistics, mechanics, and hydraulic engineering - was published in 1725. The author also wrote books on ballistics (1731), fortification (1735), and hydraulics (4 vols 1737-53). (In French) (postpaid) \$ 190
80. William Crakelt, "A NEW AND COMPLETE TREATISE OF SPHERICAL TRIGONOMETRY: . . . contained . . . SOLUTIONS OF THE SEVERAL CASES OF SPHERICAL TRIANGLES, . . . A COMPREHENSIVE THEORY OF the FLUXIONS of thefe TRIANGLES . . . TRANSLATED FROM THE FRENCH OF MR. MAUDIT", (1st and only? ed), W. Adlard, London, 1768. Modern leather binding 8 1/4" h, 5 1/8" w; pgs. xv, (1), 216, 2 folding engraved plates. Generally fine condition although some staining, particularly the 2 plates. Crakelt (1741-1812), known as a classical scholar, was also master of Northfleet grammar school and (from 1774) vicar of Chalk. He edited and published various editions of Entick's dictionaries. (postpaid) \$ 65

Including the Theory of Dialling

81. Antoine Deparcieux, "NOUVEAU TRAITÉS DE TRIGONOMETRIE RECTILIGNE ET SPHERIQUE . . . avec UN TRAITÉ DE GNOMONIQUE", Guerin & Guerin, Paris, 1741. Original leather binding (later rebacked) with gold embossed arms of the French "Academie Royale des Sciences", 10" h, 8" w; pgs. xii, (6), 118 (on trigonometry), (204, tables), (2), 169 (on dialling), (1), 17 engraved foldout plates, 13 of which are on dialling or of direct application to dialling. Extremely fine condition. The author (1703-68), a member of the French Academy of Sciences in 1746, spent most of his efforts in the fields of probability & statistics and dialling. The former led to his 1746 "Essai Sur les Probabilités de la Vie Humaine". He set up the world's first mortality tables. Known also as a maker of sundials, the book here includes this aspect of his work. (In French) (postpaid) \$ 195

An Analog Linkage to Solve Geometrical Problems

82. Giouanfrancesco Fiamelli (Fiorentino), "LA RIGA MATEMATICA Dove Si Tratta Del Misvrare con la vista di lontano senza strumenti cioe con vna sola riga, e leuar piante de citta, di eserciti, d'armate di mare, e profundita di fiumi.", (only edition), Carlo Vullietti, Roma, 1605. Early (original ?) leather binding 8 1/2" h, 6 1/2" w; pgs. (14), 103, (12), with 40 text woodcut diagrams including some of the linkage 'strumenti'. Very to extremely fine overall condition with crisp pages even though there is some worming into corners of the text and light water stains. The first section of the book examines a series of geometrical problems which reduce to solutions of triangles. This is followed by a description of the linkage with examples of its use in solving various demonstration problems. Ricardi gives this as the only edition of the work and lists Fiamelli's book of 1604 on fortifications as well. (In Italian) (postpaid) \$ 275

Paradoxes, Enigmas, & Other Strange Problems

83. Samuel Fuller, "MATHEMATICAL MISCELLANY IN FOUR PARTS. I. An ESSAY towards the probable Solution of GORDON's Forty five Surprizing Geographical Paradoxes, . . . II. Fifty five New and Amazing Paradoxes and AEnigmas, fome in Verfe, fome in Profe, . . . III. ANSWERS to the Hundred Queftions, . . . IV. Miscellaneous Rules about forming AEnigmas, Queftions, & c. . . .", 3rd Ed, Isaac Jackson, Dublin, 1770. Modern full leather binding 7" h, 4" w; pgs. frontis plate "MATHESEOS Emblemata", 190, (2), engraved folding plate of sundials, engraved plate of solar system. Almost fine condition, top of title page repaired where an owner's name has been cut off. This book was originally published as the 2nd part of Fuller's 1732, "Description of the Globes and Telescopes". Now for the good part. Do you know why? - "There is a certain Hill, in the South of BOHEMIA, on whose Top, if an Equinoctial Sun-Dyal be duly erected, a Man that is Stone-blind may know the Hour of the Day by the fame, if the Sun fhines." or, "There is a certain EUROPEAN Ifland, the Northernmost Part thereof, doth frequently alter both it's Longitude and Latitude." or, "That the Matter of a Body, when rarefy'd, doth poffefs no more of true Place than the Matter of the fame Body condenfed.". The answers will surprise and astound you, and the other questions possibly even more-so, or less-so, as the case may be. (postpaid) \$ 99

Galileo's Invention of the Sector

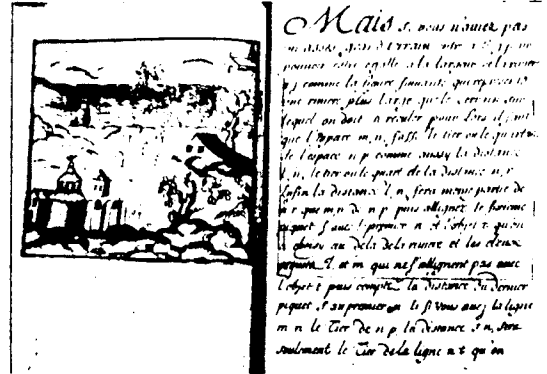
84. Galileo Galilei, "LE OPERAZIONI DEL COMPASSO GEOMETRICO, ET MILITARE", Terza (3rd) Ed, Paolo Frambotto, Padova, 1649. 19th century vellum backed boards binding 9 3/4" h, 6 3/4" w; pgs. title, (6), 80, folding engraved plate of the sector, and many text woodcut illustrations. Fine overall condition except for lack of flyleaves, stained inner edges of last 7 leaves, and light staining of some lower outside corners. Galileo seems to have invented his "compasso geometrico", also called compass of proportion, or sector (in the English speaking world) about 1597 and disclosed it about 1598. The first edition of this, his first book, was published in 1606 with, it seems, less than 60 copies issued. It was reprinted in 1619. A second, improved edition was issued in 1640 by the same publisher of the third, which is offered here. The instrument itself with linear, square, cube and other scales upon it, made it possible to calculate the ratios between linear dimensions of planar and solid bodies by setting the angle of the sector to desired ratios of the areas or volumes of such bodies, and the inverse. Edmund Gunter was then to add his logarithmic scales to Galileo's sector and further extend its use. This is a major book in the history of computers. (In Italian) (postpaid) \$ 595
85. Sylvestre François LaCroix, "TRAITÉ ÉLÉMENTAIRE DE TRIGONOMETRIE RECTILIGNE ET SPHÉRIQUE, ET D'APPLICATION DE L'ALGÈBRE A LA GÉOMÉTRIE.", 3rd Ed, Courcier, Paris, AN XII (1803). Old hard vellum binding, later vellum rebacked, 8" h, 5 1/8" w; pgs. xxviii, 265, (1), 5 foldout engraved plates. Fine plus overall condition. The author (1765-1843) studied under Monge

(noted for his textbook on the construction of cannons written for the Committee for Safety of the French Revolution), held a number of educational posts including professor at l'École Militaire and the Collège de France, becoming a member of the French Academy of Science in 1796. Author of several books in mathematics, he provided the first definition of definite and indefinite integrals and worked on the theory of differential equations and functions of a real variable. (In French) (postpaid) \$ 70

86. Charles Leadbetter, "THE Young Mathematician's COMPANION, BEING A COMPLEAT TUTOR TO THE MATHEMATICKS;" 2nd Ed, J. Hodges, London, 1748. Modern leather binding 6 3/4" h, 4" w; pgs. frontis plate with allegorical scene (with catalogue of books by Benjamin Martin on its reverse), title, iv, 354, many text diagrams. Fine overall condition with all pages mildly yellowed with age. There are sections on arithmetic, geometry, use of the sector, trigonometry, astronomy, 'dyalling', and surveying. Thus this book is both a generalized course in applied mathematics and an introduction to the author's more specialized works on astronomy and gauging. The content seems to be unchanged from the 1st ed of 1739. (postpaid) \$ 125

300 Year Old Manuscript Book with Magnificent Drawings

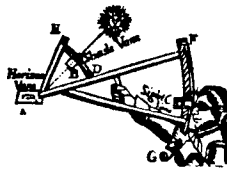
87. Legros, Professor en Mathematiques, "Essay De Longimetrie", (France), 1690. Ex library Robert Honeyman IV. Original leather binding 9 1/2" h, 7 1/4" w (in modern slipcase); 52 leaves (only 1 blank, 2 added folding plates in ink and grey wash, 8 more text drawings in ink and grey wash, and a number of text diagrams in ink. The hinges of the binding are cracked but covers are still tight, the contents are in very fine condition. The main part of the book is on Longimetry, the remote determination of distance or size of a body through the application of geometry and trigonometry to sighting angles and measured base lines. There is also a significant section on calculation by Napier Rods, together with appropriate diagrams. The drawings are well done (see illustration) and the text is in a very legible hand (not always the case with 17th c handwriting). Early manuscript treatises such as this are not too common. (In French) (postpaid) \$ 325



88. Jacques Ozanam, "USAGE DU COMPAS DE PROPORTION, ET DE L'INSTRUMENT UNIVERSEL. Pour résoudre promptement & trèsexactement les Problèmes de la Géométrie pratique, tant sur le papier que sur le terrain, sans aucun calcul. Avec un Traité de la Division de Champs.", Nouvelle Édition, Claude-Antoine Jambert, Fils, Paris, 1769. Modern full leather binding 6 3/4" h, 4" w; pgs. xx, (4), 240, 12 foldout engraved plates. Extremely fine overall condition. The first edition of this work was published in Paris in 1688 becoming the standard text on the sector in France during the next half century. Ozanam (1640-1717) was one of the leading French mathematicians of his time. Not only did his books go through many editions in France, but a number were also translated into English by Moxon, Raphson, Desaguliers and others. (In French) (postpaid) \$ 170

The Gauger's Slide Rule

89. Robert Shirlcliffe, "THE THEORY and PRACTICE OF GAUGING, Demonstrated in a SHORT and EASY METHOD. CONTAINING . . . The Method of Computing Decimally . . . Construction and Use of the SLIDING-RULE . . . CONIC SECTIONS . . . MENSURATION . . . Measuring by Approximation.", (1st Ed), for the author, London, 1740. Original leather binding 8" h, 5" w; pgs. xiii, (1), 283, 7 folding engraved plates. Gold tooled binding in very good condition with tight covers despite cracked hinges, text pages very fine, plates clean but with frayed edges and the first with a long repaired tear. Gauging is the practice of determining the volumetric content of all shapes of containers holding alcoholic beverages with the objective of collecting taxes thereby. According to the author, this book, "The whole being originally design'd for the benefit of the Officers of the Excise, that they might not only be acquainted with the most easy and exact Methods for Practice, but be at the same time certain of the Truth of the Rules made use of." The 3-sided gauging slide rule is illustrated, its use is explained, and the author describes additional computation lines which he has developed to aid in certain calculations. (postpaid) \$ 155





127. **EARLY SUNDIAL FOR BALTIMORE** - English, 18th c, probably pre-American Revolution, signed "DOLLOND LONDON LAT 39°-20'". Cast brass base and gnomon, 7 7/8" dia. x 4 1/4" h, with engraved compass rose, chapter divisions, and markings. Fine overall condition with restored lacquer finish. The gnomon was reattached to the base at some time in the past. The marked latitude runs right through the middle of Baltimore, Maryland. The form of gnomon and engraving are typical of the 18th century and since shipment of English instruments, particularly in brass, to America almost disappeared after the Revolution, it is our opinion that this sundial was made during the 3rd quarter of the 18th century. (8 lbs UP) \$ 695

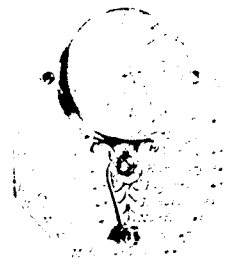
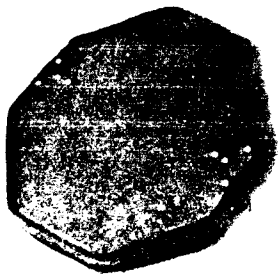
calendar scale) supporting 5 3/4" long pivoted arms and their 1 3/4" dia mounting for a convex lens. The sundial is in extremely fine display condition (under no circumstances should one attempt to set off the cannon), the brass parts have been cleaned and refinished with light gold instrument lacquer, the marble base has minor chipping and weather stains & the incised chapter ring markings have been reinked and this coloring weathered, and the iron screws and brass nuts which attach the parts to the base have been either repaired or replaced because of extensive weathering.

128. **FINE SMALL NOON GUN SUNDIAL** - French, 19th c, unsigned, marked for 48°-50' latitude. White marble base, 6 3/4" dia x 3/4" h, upon which are mounted the brass: 1 3/8" h gnomon, 4 1/2" long muzzle-loading cannon, and 2 1/4" h quadrants (one with a



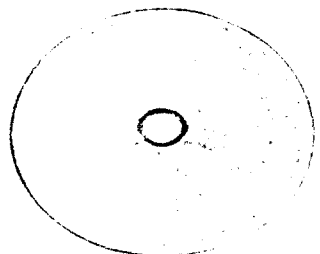
A similar dial at the Museum in Liege is shown as Plate 34 of Rohr, "Sundials". Two more are listed, one illustrated, in Horsky & Skopova, "ASTRONOMY / GNOMONICS". Almost all the known signed examples are of French origin and this one appears to be too. The marked latitude falls within the city of Paris. At noon, the small bright image of the Sun formed by the mounted lens moves to the touch hole of the cannon, setting it off (if loaded with powder). (12 lbs UP) \$ 1,495

129. **SUPERB BUTTERFIELD TYPE DIAL** - French, c. 1700, signed "N. Bion A Paris". Bright brass, restored lacquer finish, octagonal base plate, 2 5/16" across by 2 5/8" long, with 1 1/4" d inset silvered dial compass, original needle, and adjustable bird gnomon with graduated scale from 40° to 60° latitude. The underside is engraved with the latitudes of 29 cities. Original leather covered case 2 7/8" w x 3 1/4" long, now somewhat warped with some shrinkage and edge wear to the covering. There is a chip in the edge of what seems to be the original compass glass, but otherwise the dial is in exceptionally fine condition.



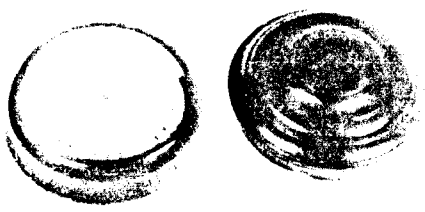
This form of pocket dial was invented (or at least promoted) by Michael Butterfield, made by him (and his workshop), and also by other French instrument makers. Nicolas Bion (1653-1733) has come down in history as the author of the most comprehensive book on instrument making of his time, "Traité de la Construction et des Principaux Usages des Instrumens de Mathematique". His book, and its various editions, have become so famous that it is often forgotten that he was a master of instrument making as well. This dial, of finer quality than even Butterfield's "Premier Cadran" examples, is a good reminder. The engraving is superb. (2 lbs UP) \$ 1,295

130. **GEOMANCER'S COMPASS IN SQUARE SURROUND** - Chinese, 19th c, signed. Made of age darkened and varnished boxwood-like wood, the compass 6 1/2" dia with a 1" dia inset magnetic compass, the surround tray is 7 5/8" sq x 3/4" thk with a 6 1/2" dia depression for the compass and a 1" dia push hole in the bottom. The face of the compass is scribed with 16 concentric rings of markings, in black and red. The innermost ring is divided in 8 and the others in multiples thereof. Very fine overall condition.



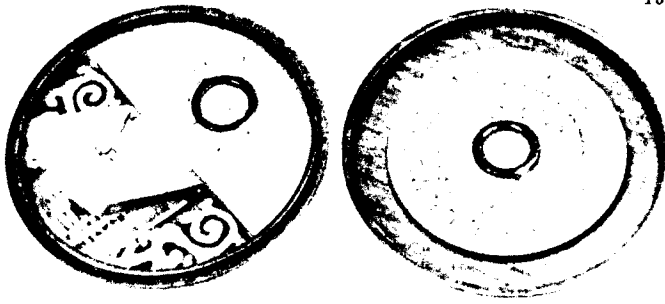
This dial was not intended for use as a compass; the South-North alignment is to place the user in the proper frame of mind, to establish his orientation with respect to the heavens. He then could use the compass to determine the best actions to take in relation to the working of the earth; the setting up of fields, erecting buildings, the construction of drainage and waterways, etc. Some of the marked words are in a mystical language, supposedly known only to the maker and user of this instrument. (4 lbs, UP, PS) \$ 295

131. **FINE MAHOGANY CASED POCKET COMPASS** - English, 18th c, unsigned. Lidded mahogany body 4 5/8" sq x 1" h with 3 3/4" d compass well. Engraved paper dial face, silvered outer ring graduated by degrees, and 3 1/8" compass needle. The cover glass retaining ring is lethe turned. Very fine overall condition although there are some edge chips in what appears to be the original cover glass. (3 lbs, UP, PS) \$ 245



132. **EBONY CASED FLOATING GNOMON SUNDIAL** - English, 1st half 19th c, unsigned. Lathe turned, screw-top, ebony case, 2 1/4" dia x 1 1/4" h, 1 1/2" dia compass card (with chapter ring and brass gnomon) beneath high arched glass dome. Very fine overall (working) condition with 2 small chips in the edge of the lid. These self-aligning pocket sundials seem to have achieved their greatest popularity in Bavaria (Stocker's designs) and England (Porter and others). The case work on this one is of better quality than that of the typical German examples, although the compass card is not as elaborate. (2 lbs, UP, PS) \$ 245

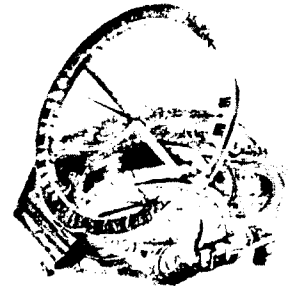




133. **GEOMANCER'S POCKET COMPENDIUM** - Chinese, 19th c, probably signed. Turned teak case, 4 3/8" dia. x 1 1/4" thk, containing a geomancer's sundial, with its alignment compass, in the base and a geomancer's compass in the cover. Both instruments are of a box-wood-like wood. The face of the inclining (pseudo-equatorial) sundial is divided into 12 and 24 equal hours, and these again into thirds. It can be placed in 10 discrete inclinations (the more common arrangement is 13) through the ladder-like slot arrangement on the base. These correspond to the 'chieh ch'i' (listed alongside the slots), words denoting the seasons, weather, planting times, etc. The 3 1/8" dia. compass in the cover has a 5/8" dia. inset magnetic compass and is scribed with 7 rings of markings in black and red. The innermost ring is divided in 8 and the others in multiples thereof. Very fine overall condition.

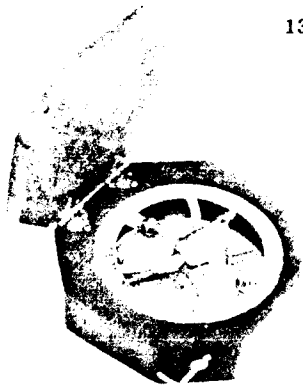
These dials were not used for finding direction or telling time. The North-South alignment of the magnetic compasses was to place the user in the proper frame of mind for making predictions of events associated with the earth - good and bad omens for daily actions. It is most common to find the multi-ring compass and inclining sundial as separate units, as may be noted from this and our earlier catalogs. This is the first time we have had such a combination. (4 lbs, UP, PS) \$ 355

134. **ELEGANTLY ENGRAVED AUGSBURG UNIVERSAL EQUATORIAL DIAL** - German, mid 18th c, signed "LTM" (for Ludwig Theodor Muller). Bright lacquered brass octagonal base plate 2 3/16" across flats, 1 5/16" d inset silvered dial compass with original needle, the underside of which is engraved with the latitudes of 5 European cities including Lisbon and Rome. The silvered chapter ring is 2 1/16" d and the fold down pin gnomon is 5/8" high. The latitude quadrant is also silvered. Extremely fine overall condition, restored surface finishes, and one (of three) turned legs under the base plate is a relatively late, and simple, replacement. No case.



Muller (1710-70) was one of the great 18th century Augsburg dial makers and is well represented in the museum collections. Many of these are listed (and some illustrated) in Bobinger. His work predates that of Grassl, Andreas Vogler, and Schrettegger and may have served as the source for many of their designs. The quality of his workmanship, generally, was at a higher level than that of those who followed him. (2 lbs UP) \$ 995

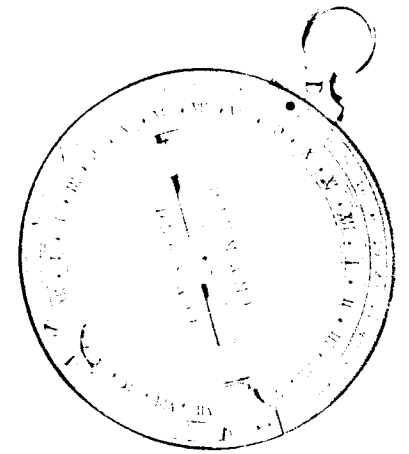
135. **POCKET HORIZONTAL DIAL IN OCTAGONAL MAHOGANY CASE** - English, 18th c, unsigned. The lidded mahogany case is 3" x 3" x 1" thk, with its 2 original closing hooks. The silvered chapter ring is 2 3/8" dia, the compass needle 1 3/4" long, and the 1 1/8" h bright lacquered brass folding gnomon was made for 54° latitude. An engraved paper compass dial is pasted to the bottom of the case. Working needle lifter. Very fine overall condition with original surface finishes.



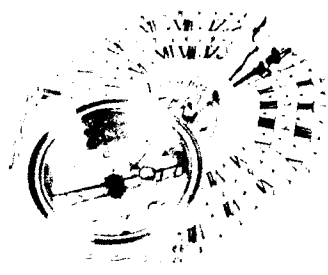
An owner's name, "Matthews", is scratched inside the lid but no maker has been identified. The high quality workmanship is typical of 18th c English mahogany cased horizontal dials, but the shape is not. The cases are usually square with the north-south orientation parallel to the axis of the hinges, rather than perpendicular as the one here. The measured latitude corresponds to the city of York. (3 lbs UP) \$ 585

136. **SUPERB, SMALL UNIVERSAL RING DIAL** - English, early 19th c, signed "SCOTT London". Brass, the 2 7/8" dia. outer ring in bright lacquered finish, the bridge and inner, chapter ring with silvered surfaces, the latter graduated in half quarter hour intervals.

The latitude scale on the face of the outer ring is graduated to degress as is the solar elevation shadow scale on the reverse. One side of the bridge has solar declination and zodiacal scales and the other, calendar scales. The date of the vernal equinox, March 21, means that this instrument must post date 1752 (when England switched to the Gregorian calendar) and design details suggest a c.1800 date. There were several early 19th c London instrument makers named Scott. James Scott, 4 Butchershall Lane, listed in Taylor 2 as fl. 1817, is our best choice in this matter. The photograph shows the dial folded for stowage. In use, the inner ring would be turned 90°, the sliding aperture set at the date, and the index of the suspension bracket at the local latitude. By turning the dial about the suspension ring until the sun spot fell on the inside surface of the chapter ring, true solar time could be read off without first having to align to North. Thus this dial was as useful at sea as on land. Overall condition is excellent, with restored surface finishes. (2 lbs UP) \$ 1,795

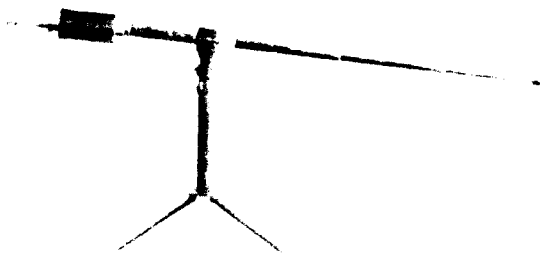


137. **SAVED FROM THE HANGMAN BY A 'T' AND A 'D'** - Butterfield style sundial, French, early 18th c, signed "Buterfiel A Paris". Bright brass, restored lacquer finish, silvered compass dial, 2 3/8" w x 2 7/8" long, the folding adjustable bird gnomon with a max ht of 1". The 1 1/4" dia. compass appears to have its original glass and needle. The gnomon latitude scale is from 40° to 60° north. There are 4 chapter rings, but only the outer two are marked, for 49° and 52° latitude. The underside is (typically) engraved with the names and latitudes of 17 cities. Extremely fine condition.



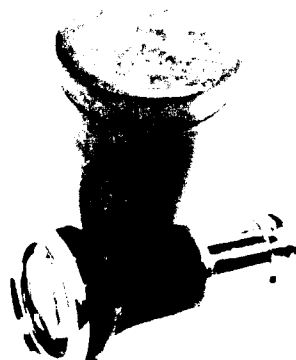
This form of dial, associated with the name of the Englishman, Michael Butterfield, who emigrated to France by 1677 (died in 1724) seems to have enjoyed great popularity. Several of the French instrument makers, including Chapotot and Bion, produced similar examples. There were also those who seemed to want to cash-in directly on Butterfield's name. They could not, however, sign such a dial with Butterfield's name while he was alive, because this would have been forgery, punishable by death (the same as for forging the King's money). Thus this dial would predate 1724. The 0.014" variation in thickness of the hand beaten brass would place it in the same time period. Interestingly, the quality of workmanship matches that of Butterfield's standard grade of instrument. (2 lbs UP) \$ 595



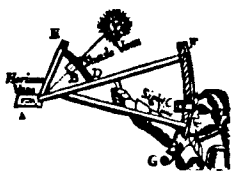


158. **HIGH QUALITY TABLE TRIPOD SPYGLASS** - French, 2nd qtr 19th c, signed "Maison de l'Ingr. Chevallier, Optn. Place du Pont Neuf, 15, Paris". The 4-draw telescope has a 2 1/8" d short mahogany barrel with bright lacquered brass fittings, extending sunshield, lens cap; 38" max extension. The achromatic objective has a clear aperture of 1 7/8" yielding clear sharp images of about 30 x's magnification. The original black oxidized brass folding clamp-on tripod is 14" h. Fine overall condition with some dark spotting of the original finish. No case, although, in our opinion, there was one originally.

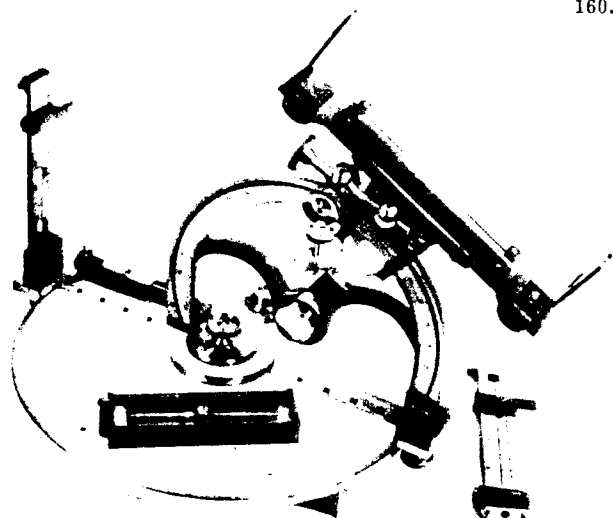
Jean Gabriel Auguste Chevallier (1778-1848) is believed to have been related to the better known instrument makers, Vincent and Charles Chevalier. Although not as innovative as the latter, those of his instruments known to us show him to have been a skilled worker. He exhibited his instruments and books at the Paris exposition of 1827, and produced achromatic microscopes on Selligie's design. (10 lbs UP) \$ 650



159. **CASED PROSPECT GLASS WITH SHEFFIELD SILVER PLATE FITTINGS** - English, c.1800, signed "DOLLOND LONDON". Small telescope, 2 3/4" long (closed) with 1 1/2" dia achromatic objective, doubly curved black enameled body, single draw with negative eyelens, giving 3x's magnification. Extremely fine overall condition except for small (3/16" dia) defect in the enamel finish. Original conical red leather case, 2 3/8" dia at large end x 3 3/8" h, in almost fine condition. This is a particularly nice example of a small, but good quality telescope made by the firm of Peter Dollond, the best opticians in 18th and early 19th c England. (3 lbs, UP, PS) \$ 225



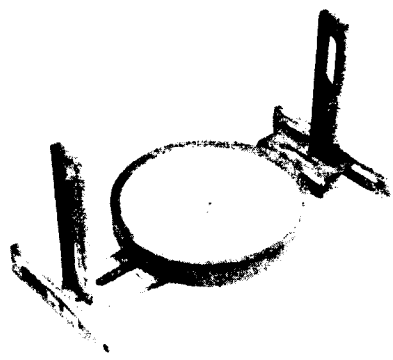
160. **HENDERSON'S RAPID TRAVERSER** - English, late 19th c, signed "MAKERS E.T. NEWTON & SON LTD CAMBORNE". All brass in original bright lacquered and black oxidized finish. Cast and machined base plate 10" dia with removeable recording disk and tripod mounting socket below. Central pivoted 11 1/4" long arm with removeable 5 1/2" h folding sight vanes, 3" longitudinal bubble level, and "T" extension with circular bubble level (liquid missing). The rear sight vane is replaceable with a theodolite attachment (as shown) which has a 6" dia elevation circle with 1 arcmin vernier readout scale and sighting assembly with 2" h vanes, 6 3/4" apart, & a 4 1/2" bubble level. There is also the original separate dovetailed mahogany case, 12 1/2" x 12" x 6 1/4" h, in almost fine condition. The Traverser is near mint although 2 (of 6) disk positioning pins lacking.



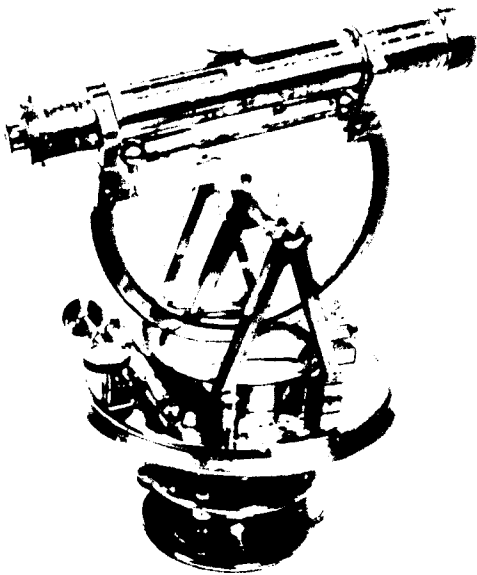
This unusual instrument combines the features of a sophisticated plane table alidade (bearing lines recorded directly on the base disk) with an 18th c style theodolite. (Item 113 of the Whipple catalogue is the same instrument with a telescopic, rather than a sight vane theodolite attachment.) This instrument was described in a paper presented by James Henderson of Truro, Cornwall, England, before the Mining Association and Institute of Cornwall in December, 1893. A description of the instrument in D.D. Scott & Others, "The Evolution of Mine-Surveying Instruments", New York, 1902, notes, "For plotting the [base] disk is removed from the brass table, and placed in proper position upon the intended map, . . . Then with a parallel ruler, best a rolling one, the successive courses of the survey are transferred to the map. The disk becomes a protractor of great accuracy, . . . The Traverser can be used either in mines or on the surface; and for setting out railway or other road lines by chords of any length previously drawn on the disk, with the length thereof noted in the field-book." W.G. Blyth recommended the Traverser for British colonial use in "Notes on Instruments Best Suited for Engineering Field Work in India", London, 1899, "This new instrument bids fair to supercede, in some measure, angle reading instruments, as it is very simple to work, and its accuracy is incontestable." (25 lbs UP) \$ 945

161. **UNIQUE AMERICAN DESIGN** - Wooden surveyor's compass, mid 19th c, signed "G. L. WHITEHOUSE, FARMINGTON, N. H.". Wooden construction (various fruitwoods?), 11" long, 6" d compass housing with printed paper dial and 4 7/8" needle, vertical sight vanes 5 5/16" h each, and horizontal sight vanes, 5 1/4" w each. The bubble vials are in wooden housings and the needle lifter is made of brass wire. Very fine overall condition and completely original except for the glass face plate which is a modern replacement.

Another example of this design is shown on p. 259 of Smart. The one there is of somewhat poorer workmanship and in our opinion dates from shortly before Whitehouse's death, while the example here appears to date from his most productive period. According to Smart, George Leighton Whitehouse was born in Middleton N.H. in 1797 and died in 1887. "From 1839 to 1871 he was engaged in surveys for railroads and canals in New Hampshire and Massachusetts. He was a member of the New Hampshire legislature in 1830 and again in 1856-57. His varied activities included judge of the court of common pleas from 1841 to 1855. He was a land surveyor for 60 years." To date, we know of no published discussion of the design aspects of this instrument. (7 lbs UP) \$ 895



162. **AN ORIGINAL RAMSDEN THEODOLITE** - English, before 1800, signed "Ra[msden] London". Bright brass, original lacquer finish, 11" h overall incl the 4-screw leveling base, with the 9 1/4" long telescope horizontal. A 4" bubble is mounted under the rack focussing telescope which reverses in the wyes atop the pinion driven 6 1/2" dia vertical semi-circle. Elevation readout is to one arcmin by single vernier against the inlet silver scale. A convex, silver faced compass with a 2 3/4" needle, in a 3 1/2" dia housing, is mounted on the 6 7/8" dia azimuth table which has an inlet beveled silver scale with opposing 1 arcmin verniers. Original scale magnifiers have been removed, probably during the late 19th c rebuilding of the instrument which led to the replacement of the original (probably badly worn) conical vertical pivot, and the removal of the horizontal pinion drive (the internal gear teeth also machined off) and its replacement by an American style slow motion tangent screw. This (unfortunately) was accomplished by machining a slot in the middle of Ramsden's signature (see illustration), the only place available for its proper installation. Thus another century of useful life was obtained from this instrument. Fine plus overall condition with some spotting of the original finish. No case.

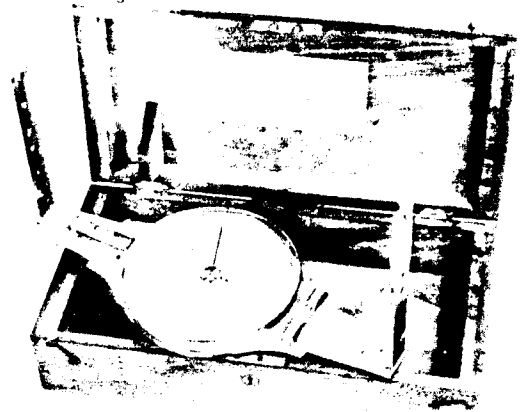


Jesse Ramsden (1735-1800), perfecter of the circular dividing engine, made possible modern geodetic surveying. His Great Theodolite of 1787 (now on display in the Science Museum, London) was used for the first triangulation across the English Channel. He made the instruments used by General Roy (director of the Royal Engineers from 1783) for his alimetry experiments as well as the special chains and chaining rods used to establish the base on Hounslow Heath for the triangulation. Even though his workshop had a staff as large as 50, relatively few instruments by him (except for his sextants) are known. We have been unable to find any of his surveying instruments illustrated in the usual references, although ones based upon Ramsden's designs, but by other makers, are. However, the convex compass face, as found on this instrument, seems unique to Ramsden's work. Interestingly, this theodolite and the later American Knox & Shain transits were all divided on the same engine. (18 lbs UP) \$ 1,695



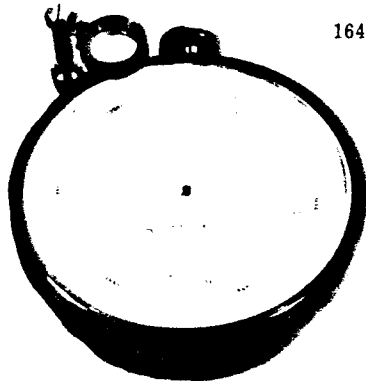
163. **LARGE PLAIN COMPASS** - American, 4th qtr 19th c, signed "W. & L.E. Gurley, Troy, N.Y." with corresponding trade card on the inside case cover. Bright brass, original lacquer finish, 15 3/4" long base plate, silvered dial compass in 6 7/8" dia housing (5 3/4" needle). Screw-on 7 1/2" h sight vanes, the forward one with silvered elevation and depression scales along its edges; crossed bubble levels, 2 3/4" long each. Original mahogany case, 16 1/2" long x 8 1/2" w x 4 3/4" h, in very good sound condition with worn exterior. A ball and socket joint staff mount is lacking but otherwise the instrument is complete and in generally fine condition with minor dark spotting of the finish.

The same basic design is found, unchanged, in Gurley catalogs over a period of many years; the 1860's to 1900. The case, however, is quite similar in construction to those of Items 184 of Catalog 114 and 155 of Catalog 120, which date from the 1885-90 period. (19 lbs UP) \$ 695



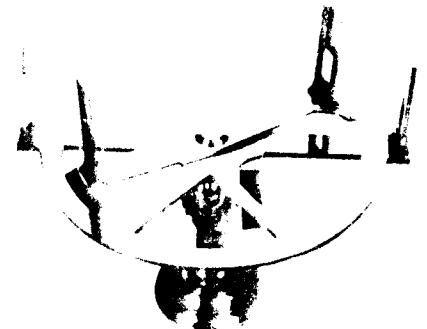
164. **SURVEYOR'S PRECISION BAROMETRIC ALTIMETER** - Scottish (?), c. 1875, signed "Surveying Aneroid / LENNIE, / Optician / EDINBORO / Compensated". Black oxidized brass case, 5" dia x 2" h, with silvered dials, the outermost one with an "ASCENT" vernier which rotates by the bright lacquered brass knob at the top of the instrument. There is also a scale magnifier attached to a ring which rotates about the case. Original shaped leather field case, 5 1/2" x 6 1/4" x 2 1/2" thk, in fine condition. The instrument is in very fine, original, working condition.

Lennie is not listed in D.J. Bryden, "Scottish Scientific Instrument-Makers 1600-1900", implying that the firm retailed rather than made instruments. However, there are a number of instruments so signed in the 1973 catalogue of the Arthur Frank Loan Collection, although all with the correct spelling of "Edinburgh". Thus there is the possibility that this barometer, clearly of French design, was also made in France, and the dial engraved there as well, with "Edinboro" mistakenly spelled as it is pronounced. (8 lbs, UP, PS) \$ 375



165. **GRAPHOMETRE OF SIMPLE ELEGANCE** - French, 1st half 19th c, unsigned. Bright lacquered brass, 7 3/8" major dia with fixed sight vanes 2 1/4" h, pivoted alidade 5 5/8" long also with 2 1/4" h sight vanes; 6 1/2" h overall including ball and socket joint for staff mounting. The semi-circular scale is read out by opposing verniers to 2 arcmins. Excellent overall condition with 80% original, 20% restored finishes. Original hand dovetailed painted wooden case, 8 1/4" long x 4 1/2" w x 4 3/4" h, in fair condition with several age cracks. (The display base in the photograph is not included).

The graphometre, although popular on the Continent, and in France particularly, was little used in the English speaking world. Most were made with relatively small compasses which served for coarse alignment, at best. The example here was designed without a compass for relative bearing measurements only, the mode in which most were used anyway. The simple frame, without decorative elaboration, actually adds to the elegance of the instrument. (6 lbs UP) \$ 775



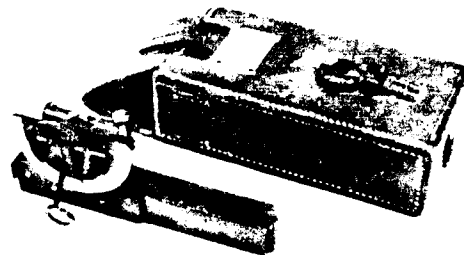
166. **YOUNG STYLE TRANSIT DIVIDED ON RAMSDEN'S ENGINE** - American, 1860-70, signed "Knox & Shain/Makers/Philad" with a trade label within the case placing them at 716 Chestnut. Bright brass, restored lacquer finish, 11 3/4" h including the 4-screw leveling base with the 11" long rack and pinion focussing telescope horizontal. The 5 7/8" d compass housing contains a silvered outer ring graduated to half degrees, an interior azimuth scale appearing within a single vernier window and reading to 1 arcmin, and a 5" needle. Under the base plate are the knobs for the needle lifter, azimuth clamp screw, and azimuth drive pinion. The compass dial face has faded slightly from Young's patented black finish. The rear bubble tube is 2 1/4" long and the side one (mounted within the right standard) is 2" long. The original mahogany tripod has 58" legs. The original hand dovetailed walnut case, 9" x 12 1/2" x 10 1/4" h, is in very good condition as is the tripod (brass fine, legs sound but show rough usage). The transit is extremely fine (although lens cap missing).



This instrument should be compared with William J. Young's original transit (p. 175 of Smart) and his 2nd Model of 1837 (Item 154 of Catalog 124). Indeed a leading scholar of Philadelphia surveying instrument makers has noted "there is no more difference between the Young and Knox and Shain instruments than between different Young instruments." This is not surprising since Joseph Knox was Young's foreman from the early 40's until 1850 and Charles J. Shain served his apprenticeship with Young (1835-42) and worked for him until 1850. In 1851 both men formed a partnership to make telegraph and surveying instruments although they may not have started making surveying instruments until 1855 (the date given in Smart). The reason for this is that they did not acquire a dividing engine until then. Recent research by A.N. Stinson of the National Maritime Museum, Greenwich, has shown that Ramsden's circular dividing engine of 1774 was transferred to Matthew Berge in 1800. After his death in 1819 it was again transferred (in 1821) to Nathaniel Worthington who remained in business until 1852. It appears that Knox and Shain purchased this very same engine (now in the Smithsonian) from Worthington, probably when he closed his firm. It is most likely that it was at this point that they started making their own instruments. Their use of straight bubble levels dates this instrument after 1860. Although they did not move to 816 Chestnut until after 1869, the label in the case may date from a repair job, not the original manufacture. There was never much improvement by them over the original Young designs and by 1876 their instruments were considered to be of quite primitive construction. By 1880 they had sold Ramsden's engine to Professor Henry Morton of Stevens Institute of Technology, Hoboken, N.J. (2 UP packages, 25 & 28 lbs) \$ 1,295

167. **PRESENTATION ABNEY CLINOMETER** - English, unsigned, a silver plate on the case engraved:

The Royal Indian Engineering College.  
Session 1890-91.  
Prize for Physics.  
awarded to  
H.G. Billson.  
Student of the First Year.



Black oxidized brass, the 5/8" sq x 4 5/8" long sighting tube fitted above with rotational bubble level which is read out by 10 arcmin vernier on 2 1/4" dia semi-circular scale. There are also rise and fall ratio scales (from 1:10 to 1:1) and a swing-away readout magnifier. The original, 5 1/4" long x 2 1/2" w x 1 1/2" thk, leather case is in fine condition while the instrument is in very fine, original, working condition. A split mirror in the sight tube allows the user, while hand holding the instrument, to align the bubble on the sighted object, after which its elevation or depression can be read off on the scale.

The Royal Indian Civil Engineering College of Egham, Surrey, England, was founded in 1871 by Sir George Tomkyns. It educated men for the public works, accounts, railways and telegraph departments of India, and included a school of forestry. It was closed in 1906 on the grounds that it was unnecessary for such a specialized college to be maintained by the government.

(4 lbs, UP, PS) \$ 275

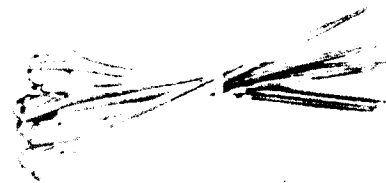


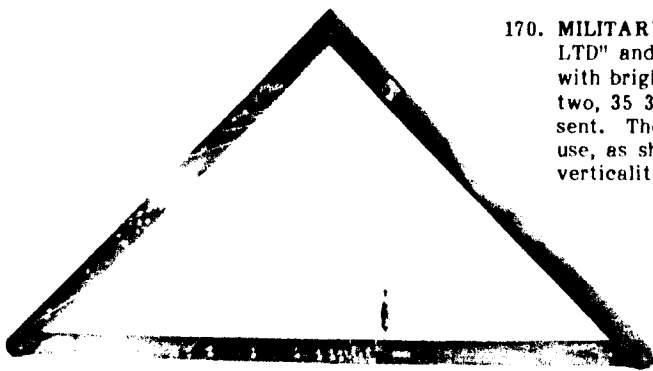
168. **A VERY LONG COMPASS MODEL WYE LEVEL** - English, c. 1830, signed "FAYRER LONDON" while the trade card inside the case cover states "J. Fayrer MATHEMATICAL INSTRUMENT Maker, 35, White Lion Str. Pentonville, LONDON". Bright brass, restored lacquer finish,

The rack focussing assembled telescope is 29" long (min) extending to 30", 6 1/2" h overall. The underslung bubble vial is 10 1/2" long with a graduated ivory centering scale. The 4 3/4" dia compass housing, with silvered dial and (replaced ?) 3 1/4" needle, is within a skeletonized base frame which supports the 11 3/4" separated wyes, one with vertical adjustment. The original lens cap is present, several small screws and one wye locking pin have been replaced, and the crosshairs are gone. The instrument is in extremely fine display condition, although the focussing is very stiff and there may be gear teeth damage if used without precautions. The original hand dovetailed mahogany case, 21 3/4" long x 7 1/2" w x 5" h, is in sound condition with good surfaces, but several age cracks, several repairs (incl a 1" dia hole in the cover), and is missing most of its internal fittings.

Taylor 2 lists a James Fayrer at 40 White Lion Street c. 1838 and notes that James and John Fayrer are said to have done the dividing of Troughton's instruments. Brewington states that Fayrer appeared in the London directories, starting in 1826, at 66 White Lion St. In 1826 Troughton made Simms his partner and it would not be surprising if the Fayrer(s) left at this time and set up their own business(es). The 35 White Lion St. address here may only be a reference to a second door and not a move along the street. Indeed, it is even possible that 35, 40, and 66 White Lion St. were all the same shop. Relatively few instruments signed Fayrer are known and it may be that the firm worked on a wholesale basis for other London instrument makers. (20 lbs UP) \$ 895

169. **CHAINING PINS** - American, 20th c, unmarked. Set of 11 steel chaining pins, 16" to 17" long each, the upper portion in original red enamel. We understand that these came from, the now defunct, surveying instrument company, Buff & Buff of Boston. They have never been used and although there are chips in the enamel which seem to have occurred during storage, condition must be rated as original, new. (For sale only to purchasers of other surveying instruments from this catalog.) (8 lbs UP) \$ 45

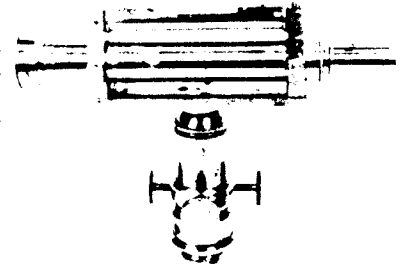




170. **MILITARY ENGINEER'S A-FRAME LEVEL** - English, c. WW I, signed "P.B & S LTD" and marked with the British government arrow. Mahogany arms 1 7/8" w with bright lacquered brass fittings, the hypotenuse bar is 49 3/4" long, the other two, 35 3/4", overall ht 26" (as shown). The original lead plumb bob is also present. The frame folds up against the long bar for transporting. It is intended for use, as shown (canal leveling mode) and in various other orientations so that the verticality and inclination of structures may also be determined, in both angular and slope ratio measurements. There are scales inscribed on all arms, both sides, and the inside edge of the long bar. A bubble level is inlet into the edge of one of the shorter bars. Very fine overall condition.

The design represents, possibly, the most archaic form of all levels. Kiely, "Surveying Instruments: Their History", describes several 'common' plumb-bob levels including Stumienski's "Synwaga" and notes that similar types may be found in Pomodoro, "La Geometria Pratica", Rome, 1599, Schwenter, "Geometricae practicae novea et auctae", Nurnberg, 1618, and Bion (French and English eds). It is interesting that the British military were supplied with (and used ?) this virtually same type of instrument at least through WW I. (12 lbs UP) \$ 145

171. **NEW YORK STYLE DUMPY LEVEL** - American, mid 19th c, unsigned. Bright brass, original lacquer finish, 7 3/4" h incl fine motion leveling column. The eyepiece focussing inverting telescope is 9 1/2" long (min) with its original lenscap, but broken crosshairs. The 4 3/8" long bubble level has a newly replaced vial and is missing its zeroing scale. Original hand dovetailed mahogany case, 11" sq x 4 1/2" h, in very good condition (age cracks and missing 2 interior blocks). The level is very fine with minor spotting of the finish.



The fine motion leveling column was in use in this country around the middle of the 19th c. It is shown with several "obsolete" instruments in D.D. Scott & Others, "The Evolution of Mine-Surveying Instruments", New York, 1902: Fig. 31 (1858), Fig. 93 (1855), & Fig. 94 (1855). It is still illustrated and described, but not shown with any instruments, in the 1873 Gurley catalog, even though it was once a standard feature on several Phelps & Gurley (1845-52) and early Gurley (before 1860) instruments. See also Item 140 of our Catalog 105. The basic dumpy level here is an American modification of early 19th c English designs such as Item 148 of Catalog 124, a c. 1830 level by John Davis, Derby, and Item 218 of Catalog 122, a c. 1810-20 level by John King of Bristol. Thus we would expect the instrument here to have been by an American maker from an English rather than a German background, and possibly from up-state New York. (14 lbs UP) \$ 450

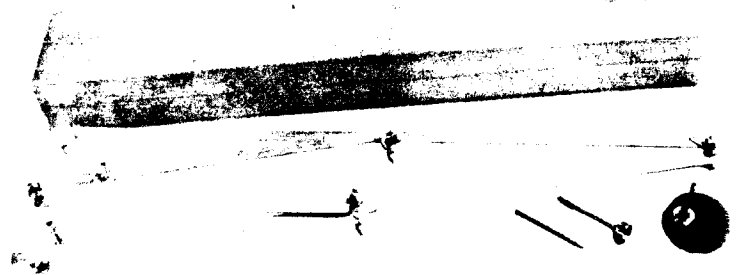


172. **THE BEGINNINGS OF THE PHILADELPHIA SCHOOL OF THE AMERICAN SURVEYING INSTRUMENT** - Surveyor's compass signed "T. Whitney Maker Philada." with serial "No. 321" on the base outside the compass housing and dated "1817 B" on an underside interior surface. Bright brass, restored lacquer finish, the silvered dial compass within a 6" d housing on a 14" long baseplate. There is the original compass cover but no ball and socket joint and no case. The 6" h screw-on sight vanes are instrument maker made old replacements. Fine overall condition.

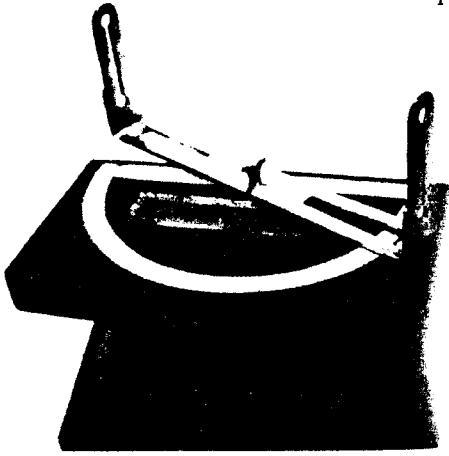
Thomas Whitney (?-1823) was apprenticed to Samuel Browning (of Spencer, Browning & Rust, London) in 1782. They were all members (strangely) of the Grocers' Company which had a significant number of significant instrument makers including the George Adamses and the Troughtons. He obtained his freedom in 1790 and shortly thereafter emigrated to Philadelphia, first advertising himself as an instrument maker in 1798. By 1820, according to his advertisement of that year reprinted on p. 167 of Smart, he specialized in surveying compasses and by then had made 500 of them. William J. Young, the inventor of the American Surveyor's Transit, apprenticed to Whitney in 1813. It may very well be that Young worked

on the instrument here since his 7 year term was not concluded until 1820, when he started his own firm. (9 lbs UP) \$ 745

173. **ORDNANCE SURVEY CLASS PANTOGRAPH** - English, c. 1825, signed "W & S. JONES, Holborn, London." with the trade card inside the case cover listing the "No. 30 Lower Holborn" address. Bright brass, original lacquer finish, the two outside arms 36" long each, one marked with ratio scales, as is the shorter arm connected to it. There are 6 ivory casters, and 1 fixed sleeve & 2 adjustable ones (on the ratio scale arms) for the tracer point and pencil. Original hand dovetailed mahogany case, 37 1/4" long x 4 1/4" h x 5 1/4" (wide end), containing the original tracer point, pencil holder, and lead pivot weight (with its original cloth cover), and in fine condition, missing the lock and 1 internal block, 1 case hook damaged. The pantograph is extremely fine and completely operational.



A pantograph can be used for reducing or enlarging while while transferring maps or plots of one scale to another, sometimes partial plots or details to an overall area map. An instrument of this size would have been suitable for such work as the government Ordnance Survey. William & Samuel Jones bought out the rights to all of the instrument designs of George Adams, Jr. after his death in 1795. Thus they were able to offer possibly the most extensive range of mathematical, philosophical and optical instruments of any London instrument maker. They were located at 30 Holborn from 1802 to 1860. (20 lbs UP) \$ 425



174. **WOOD AND BRASS SEMI-CIRCUMFERENTOR** - American, 18th c, unsigned. Rectangular mahogany body, 8" x 4 1/4" x 1" thk, with inlet trough compass (4" needle), inlet yellow brass readout scale of 7 1/4" dia graduated to degrees, and staff mounting ball joint on the underside, also of mahogany. The pivoted alidade of a redish, high copper content brass is 8 1/4" long with 3 1/4" h sight vanes and opposing verniers reading to 10 arcmins. This alidade stows along the edge of the instrument body where there are 4 positioning pins and a threaded rod for this purpose. The instrument appears to be all original, except for the restored lacquer finish and shims which have been added to the wooden pressure plate of the ball joint (to restore the proper tension). The alidade varies in thickness from 0.074" to 0.117" establishing its early origin, even though made from a different composition brass from the other metal parts. The 4 1/4" x 8" x 1 3/8" h exhibition base is of relatively recent origin. Very fine condition.

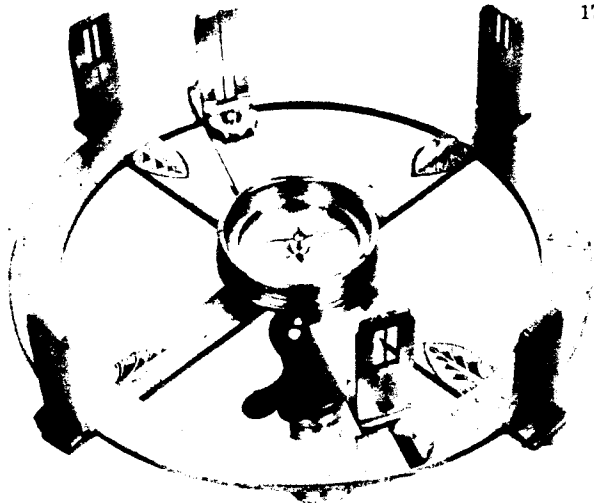
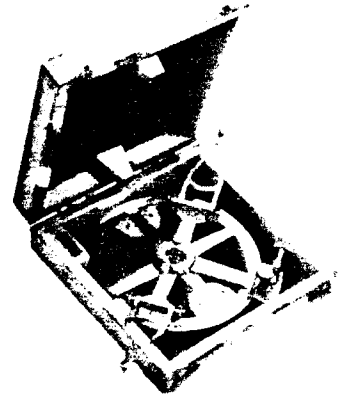
Two similar 18th c examples are illustrated on pgs 70 and 111 of Bedini. Another is to be found as Fig. 78 of Bedini T & T. No. 50 in the Whipple catalogue is a fourth example of an 18th c American semi-circumferentor. All of these have the scale incised directly into the face of the wooden body. However, Item 199 of Brewington, dated c. 1730, and illustrated in Plate XXXIII, has an inlet brass scale very similar to the one here. These all tend to be the work of professional instrument makers, probably dating back to colonial New England, and certainly intended for reasonably accurate work. (7 lbs UP) \$ 925

175. **PRESENTATION MARKING PROTRACTOR** - English, unsigned, engraved inscription on cover of case reads,

The Royal Indian Engineering College  
Session 1881-82  
Prize for Geometrical Drawing  
AWARDED TO  
(blank)  
Student of the Second Year

Bright brass, original lacquer finish, 6" d circle with inlet silver scale divided to half degrees, opposing silver verniers reading to 1 arcmin. Tangent screw slow motion for the 3 5/8" long pivoted marking arms. Original hand dovetailed oak case 7 1/2" sq x 2 1/8" thk, missing original hand magnifier, but otherwise in fine condition. The instrument is very fine.

This instrument was particularly useful for field work when accurate work was required under adverse conditions. The pin marks would define a bearing line which then could be connected with a straight edge and pencil. We are not certain as to why the presentee's name was not filled in although we have found this situation before. (7 lbs UP) \$ 465

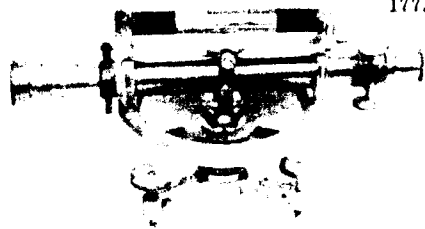


176. **SUPERB CIRCUMFERENTOR BY THE MOST NOTED AUTHOR ON INSTRUMENT MAKING IN THE 17TH CENTURY** - French, c. 1700, signed on the underside of one crossarm, "N. Bion AParis". Bright brass, early instrument maker restored lacquer finish, graduated circle 8 3/8" dia with four 2 1/16" h fixed sight vanes, pivoted alidade with 2" h sight vanes, 6 1/2" apart; 7 1/4" h overall including ball & socket joint for staff mounting. The 2 5/16" dia central compass with its 1 5/8" needle has an engraved compass dial marked for 16 points and an annular scale graduated every 2 degrees. The alidade readout scale is graduated to half degrees. Birch case, 9 5/8" sq x 5 3/4" h, extensively wormed and missing internal fittings, but still in sound condition, certainly early but may or may not be original. The instrument is in very fine condition.

The most obvious characteristic of this surveying instrument is its stark simplicity, but in a most elegant manner. There is a minimum of extraneous decoration, but that which is there - on the cross arms - is a fine example of the engraver's art. The cross-hairs of the sight vanes are actually thin brass bands viewed edge-on. This is an instrument made for serious use rather than polite conversation. Its maker, Nicholas Bion (1652[?]-1733), a contemporary of Michael Butterfield, is best known for his extensive work, "TRAITE DE LA CONSTRUCTION ET DES PRINCIPAUX USAGES DES INSTRUMENS DE MATHEMATIQUE", 1st ed in 1709, with several later editions, and translations into English (by Edmund

Stone) and German (by Johann Doppelmayr). Interestingly, the instrument here is not pictured and its construction is described somewhat obliquely. This was no accident for, as Dumas remarks, "In it we find instruments listed which were rapidly passing out of use . . . it is probable that Bion purposely avoided giving exact details which might have permitted an amateur to have a wide range of instruments made by an able workman." [But possibly someone other than Bion.] A comparison of his known work with Butterfield shows him to have been the better worker by far. Yet, as Dumas also points out, "Bion's instruments are seldom found in collections." Except for Butterfield type dials, only a handful of his more elaborate instruments (such as this one) are even known. Nachet, the 19th c microscope maker did not even have one in his famous collection, nor did Van Marum. There are four (other than sundials), however, at the National Maritime Museum, Greenwich: an astrolabe, graphometre, gunner's callipers, and a measuring rule. But this quantity is an exception, and the example here is a great rarity. (postpaid in the U.S., air freight elsewhere) \$ 2,995





177. **CONTINENTAL LEVEL** - French, 4th qtr 19th c, unsigned. Bright brass, original lacquer finish with a few fittings and the interior of the azimuth bearing plate in black and the bubble level in nickel plate with black ends, 7" h including the 3-screw leveling base. The 13" long telescope has a rack focussing eyepiece. The azimuth bearing circle (ungraduated) is 6 3/4" dia and the 5 3/4" long reversible bubble level fits in a 6 3/4" long mounting bracket. The telescope may also be removed and inverted (for purposes of alignment?). Fine overall original condition with one small screw missing. No case.

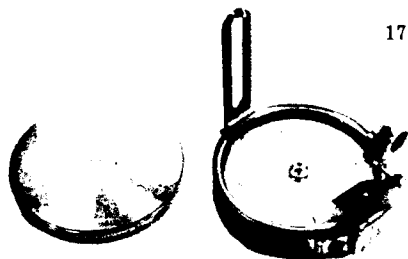
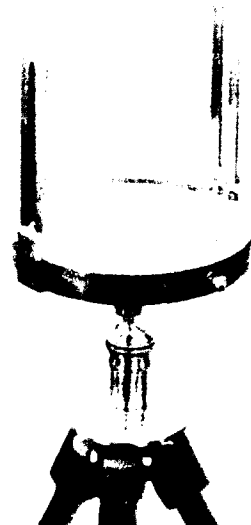
This instrument is unlike any British or American design. Instead of a central axis to which is attached either the telescope (dumpy level) or telescope bracket (we level), the primary reference is the circular azimuth bearing ring. It is possible that the bubble level is first used to level this surface, the crosshairs of the telescope then adjusted with respect to this surface in each of four positions determined by the 2 fixed square blocks which are part of the telescope housing. The bubble level is then fitted to the top of the telescope but it is not clear as to whether it is then used in this position or just placed there for stowage.

(12 lbs, UP, PS) \$ 365

178. **SURVEYOR'S VERNIER POCKET COMPASS ON TRIPOD** - American, last 3rd 19th c, signed "W. & L.E. GURLEY, Troy, N.Y.". Bright lacquered brass 5 5/8" d silvered compass face inset with 1 1/4" bubble levels, 4 5/8" h folding sight vanes, magnetic variation scale and vernier readout engraved on the outer edge of the compass body. Ball and socket joint for staff or tripod mounting. Original tripod with 47" mahogany legs. No case. Fine overall condition except that the needle tends to stick; original finish on compass body, restored finish elsewhere, some minor pinpoint spotting.

Dating of this instrument presents some problems. The design of the tripod head predates that shown in Gurley's catalog of 1873 and is typical of that found in their 1869 catalog. However the largest pocket compass listed in either of these catalogs has but a 3 1/2" needle. Their 1902 catalog does list a 4 1/2" needle model but states quite specifically that it has half slit vanes rather than those of the type found on the example here and the illustrations show a later form of tripod. Could this instrument have been available in the 1860's, but not catalogued with a different tripod and vanes until the 1890's? We do not know.

(15 lbs UP) \$ 375



179. **FINE PRISMATIC COMPASS** - English, mid 19th c, signed "TROUGHTON & SIMMS LONDON". Bright brass, original lacquer finish, 2 7/8" dia, 2 3/8" h folding sight vane, green compass card which is viewed through the folding right angle prism. There are 2 swing-away filters attached to the prism housing as well as a pivoted protective cover on the prism aperture. There is also the matching brass compass cover. Very fine overall condition.

The Troughton & Simms partnership was established in 1826, the firm continuing into the early part of the 20th c. Over the years they were makers of large scale (e.g. observatory) instruments as well as individual sized ones for navigation and surveying. The histories of all their major developments are well known. It is these well made, but small, pocket type instruments that present us with problems when we try to trace them back to their origins.

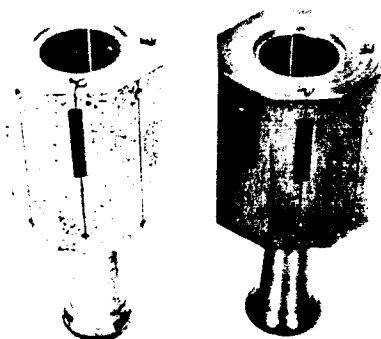
No one seems to have considered them important enough to have documented their development. (3 lbs, UP, PS) \$ 275

180. **BRIGHT BRASS OCTAGONAL SURVEYOR'S CROSS** - French, late 19th c, unsigned. Bright brass with original lacquer finish, now lightly spotted (see photograph), 5 1/8" h overall, 2 1/4" across the flats of the 2 3/4" h sighting head. The staff mounting socket screws off and reverses for stowage. Original walnut case, 2 3/4" h x 3" deep x 3 3/4" w, in very good condition with some worm holes. The instrument is fine, as noted. This design is derived from the classical 4-vane surveyor's cross, its particular shape providing additional sight lines at 45° intervals.

(3 lbs, UP, PS) \$ 115

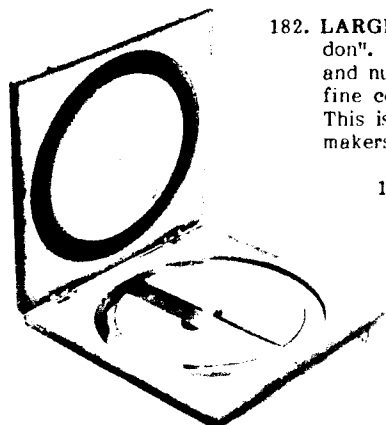
181. **OXIDIZED BRASS OCTAGONAL SURVEYOR'S CROSS** - French, late 19th c, unsigned. Brass construction in original green-black oxidized finish, 4 7/8" h overall, 2 1/4" across the flats of the 2 1/2" h sighting head. The staff mounting socket screws off for stowage, is reversed and screwed back through the hole in the top of the sighting head. Original oak case, 2 5/8" h x 3 1/8" deep x 3 3/4" w, in fine condition. The instrument is very fine, with replaced sighting threads.

(3 lbs, UP, PS) \$ 115



182. **LARGE CASED FULL CIRCLE PROTRACTOR** - English, mid 19th c?, signed "Troughton & Simms, London". Electrum metal, or German silver, 10" d, scale on beveled edge graduated to 15 arcmin intervals and numbered clockwise every 10 degrees. Original lidded mahogany case 11 1/2" sq x 1" thk in almost fine condition. The protractor is very fine, even with a few very small nicks at the edge of the scale. This is a particularly elegant item in keeping with the high quality of workmanship associated with its makers.

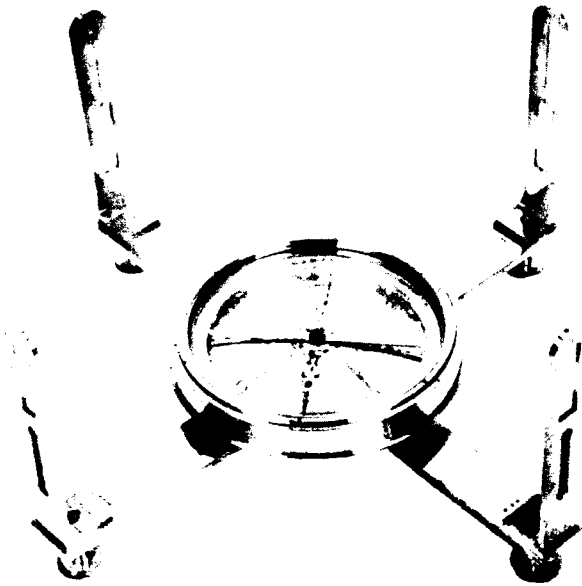
(8 lbs UP) \$ 375



183. **MILITARY ENGINEER'S PLANE TABLE ALIDADE** - English, signed and dated "HOUGHTON-BUTCHER MFG. Co. LTD. LONDON - 1917 No. 6,333" and marked with the government arrow. Boxwood rule, 16" long x 1 3/4" w x 1/2" thk, with scales along the beveled edges; one reading to 50 parts of the inch and the other in yards on a scale of 2 inches = 1 mile. Black oxidized brass 3" h folding sight vanes. Original leather field case in sound, very good condition. The alidade is very fine with 1 small screw missing.

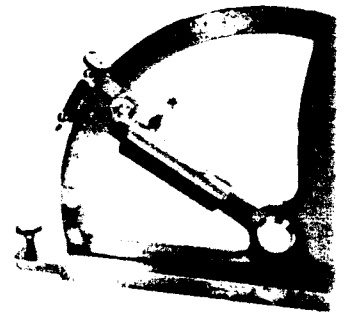
(4 lbs, UP, PS) \$ 85

184. **LARGE SURVEYOR'S CROSS WITH CENTRAL COMPASS** - English, before 1800, signed "Ramsden London". Bright brass, restored lacquer finish, fixed orthogonal arms, 12" long x 1 1/16" w, with four 4 7/8" h screw-on sight vanes. A silver-faced compass with a 3 7/8" needle in a 5 1/4" dia housing at the center of the cross can be rotated about its axis. The compass face is slightly convex (see photograph), a design feature apparently unique with Ramsden. Staff mounting socket on the underside (with its locking screw). Extremely fine overall condition, although no case.



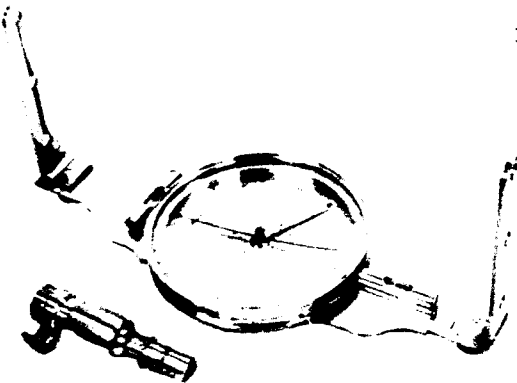
The simple surveyor's cross is derived from the ancient Egyptian Grema, a pair of rods at right angles suspended in the center, with 4 lines with weights suspended from their ends. A brass circle with 4 fixed sight vanes is described in Chap. II, Book IV of Stone's translation of Bion where it is treated as the most basic of all surveying sighting instruments. Leybourn, in the 17th century editions of his "Compleat Surveyor" seems to ignore it completely, describing only those instruments he considered 'newly improved'. The Holland circle of the 17th c is a surveyor's cross, not only with an added central compass, but a rotating alidade and circular read-out scale as well. The instrument here predates it conceptually, although actually of a later date. See Item 267 of Catalog 115 for an even later, miniature version of the same design. Jesse Ramsden (1735-1800), perfecter of the circular dividing engine, was one of the 'great' innovative instrument makers of all times. His London workshop, despite its staff of 50, could not meet the demand for his products. Indeed, he was such a perfectionist that the delivery dates for a number of his major instruments fell years behind schedule. (10 lbs UP) \$ 2,350

185. **ARTILLERY QUADRANT** - English, 4th qtr 19th c, signed "ELLIOTT BROS. LONDON". Bright brass, original deep gold lacquer finish, heavy base, 1 1/2" w x 9/16" h x 9" long, with adjustment screw at end, 7 7/8" h overall. The 6" radius quadrant scale is read out to 3 arcmin by the vernier on the pivoted arm with tangent screw slow motion. This arm is fitted with a 3" level bubble and a folding 1 5/8" crosslevel bubble. The quadrant frame is heavy, 5/16" thk (to stand up to battle conditions). Generally fine condition except for some moderate size spots to the lacquer finish, primarily on the side visible in the photograph. No case. This instrument would be placed on the outside of a cannon barrel (after appropriate zero adjustment). Barrel elevation would be read from the scale once the longitudinal bubble had been set level. William Elliott (fl. 1825-54) founded the firm which became Elliott & Sons in 1850 and Elliott Brothers in 1854. (9 lbs, UP, PS) \$ 195



end, 7 7/8" h overall. The 6" radius quadrant scale is read out to 3 arcmin by the vernier on the pivoted arm with tangent screw slow motion. This arm is fitted with a 3" level bubble and a folding 1 5/8" crosslevel bubble. The quadrant frame is heavy, 5/16" thk (to stand up to battle conditions). Generally fine condition except for some moderate size spots to the lacquer finish, primarily on the side visible in the photograph. No case. This instrument would be placed on the outside of a cannon barrel (after appropriate zero adjustment). Barrel elevation would be read from the scale once the longitudinal bubble had been set level. William Elliott (fl. 1825-54) founded the firm which became Elliott & Sons in 1850 and Elliott Brothers in 1854. (9 lbs, UP, PS) \$ 195

186. **SURVEYOR'S PLAIN COMPASS** - American, c. 1830, signed "E.A. Kutz. New York.". Bright brass, restored lacquer finish, silvered face compass with 4 7/8" needle in 5 3/4" dia housing on 13 1/2" long base plate. The screw-on sight vanes are 6" h and the ball & socket staff mount is present. Original hand dovetailed mahogany case, 14" long x 7" w x 3" h, in fine condition although missing 2 internal fittings, and with a few age cracks and a repaired 7/8" dia hole in the cover. The compass is extremely fine.



Smart notes that Erasmus A. Kutz, Sr. was born in England in 1778, came to the U.S. after 1812, and was first listed in the New York City directories for 1818-20 as a rule maker at 343 Water St. Later he was a nautical & mathematical instrument maker at 180 Water St and had retired by 1850. His son, Erasmus A., Jr. was first listed in the NYC directories for 1839-40, by himself, and it is possible that his father retired then, or shortly thereafter. Smart lists several of his compasses in various historical society collections. (12 lbs UP) \$ 775

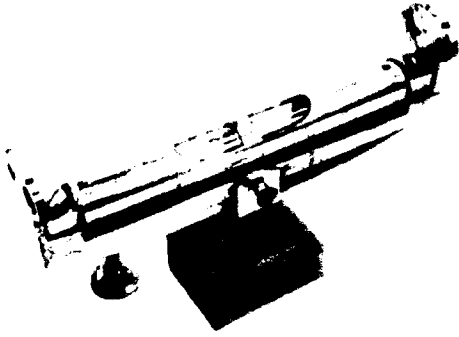
187. **COMPASS MODEL DUMPY LEVEL** - English, mid 19th c, signed "Chislett, London" while the trade card on the inside case cover states, "A CHISLETT, Mathematical, Nautical and Optical INSTRUMENT MAKER, No. 27, Greenfield Street, COMMERCIAL ROAD, (East)". Bright brass, original lacquer finish, telescope 13 3/4" long (min) extending to 15 1/2" by rack & pinion focussing of the eyepiece, 6 3/4" h including 4-screw leveling base. The 3 7/8" dia compass housing, with its 3 3/8" dia floating graduated annular ring, is part of the 9 3/4" long base. There is a scale readout magnifier on one side. The longitudinal bubble is 8" while the transverse one is 3". The removeable lens cap - sun shade has a reduced aperture with protective shutter. Very fine overall condition with minor dark streaking of the finish. The original hand dovetailed mahogany case, 18" long x 5 1/2" w x 4 5/8" h, is in sound condition with age darkened, but undamaged surfaces showing some scuff marks. Although the signed maker is not listed in the usual references, the National Maritime Museum, Greenwich, has a marine compass with an adjustment inscription "A. Chislett 22.3.1854" on the reverse of the card. (18 lbs UP) \$ 480



188. **PRECISE SETTING PROPORTIONAL DIVIDERS** - English, probably late 19th c, unsigned. German silver with steel points, 6 5/8" long, in original red fabricoid covered case, 7 1/2" long x 1 5/8" w x 1 3/8" thk. The case is in very good and the instrument in very fine condition. Unlike the usual proportional dividers (for transferring dimensions from drawings of one scale to those of another) where the pivot point (and hence the ratio) is set by eye, this one has a knurled nut and screw for fine setting and locking. Four ratio scales are engraved on both sides of the divider arms: PLANS, SOLIDS, CIRCLES, LINES. There is also a bracket with threaded hole at the setting screw end, the purpose of which eludes us. (2 lbs, UP, PS) \$ 145

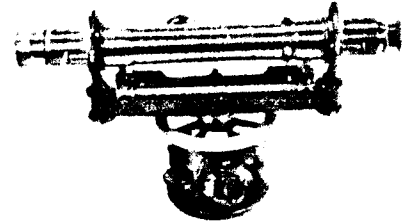


189. UNUSUAL MILITARY TYPE SIGHT VANE LEVEL - English, early 19th c, signed "G. DAVIS \* LEEDS". Bright brass, original lacquer finish, 6 3/8" long with 5" long bubble vial, and side by side double aperture sight vanes, each with a peep hole and a circular opening with crosshairs - for forward & backward sightings. A base mounted screw and leaf spring provide single axis level adjustment. Original hand dovetailed pine case, 7" long x 4" w x 1 5/8" w, signed in ink "T Masterman Little Danby", in very good condition. The level is very fine.

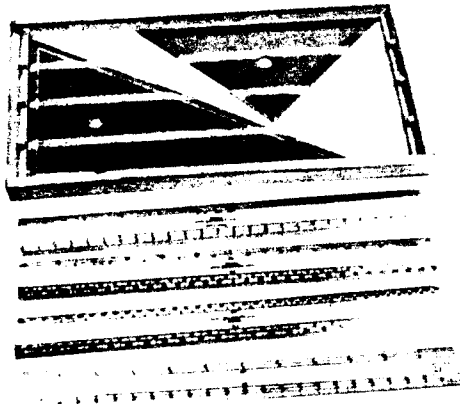


There are some problems in identifying the maker of this instrument. Goodison states that G. Davis was actually Gabriel Davies, at 20 Boar Lane, Leeds, in 1822, and 34 Boar Lane from 1826-53, in partnership with Edward Davies, 1830, and succeeded by him. However, the Webster index lists several instruments signed as the one here (not Davies) and provides a dating of c. 1790. We know that people did change the spelling of their names (e.g. Bancks became Banks) so that it is possible that Goodison is right. However, if Davies and Davis were the same, which came first, and when did the change take place? At present, there are no clear answers. (4 lbs, UP, PS) \$ 285

190. BUILDERS "Y" LEVEL - American, early 20th c, signed "EUGENE DIETZGEN CO / CHICAGO - NEW YORK / 5545". Brass construction in black oxidized finish, some parts black enamel, and fittings and knobs in original bright lacquer. Rack and pinion focusing telescope is 11 1/2" long, with 5 1/8" long bubble level, fitting into wyes 7" apart on 8" base. There is a 4" d silvered azimuth scale reading out by vernier to 5 arcmins. 7" h overall including 4-screw leveling base. The original 13" x 5 1/4" x 8 1/8" h mahogany case also contains (not illustrated) a plumb-bob and a triangular foot for plane table application. The case is in very good condition, the level very fine and original although it is missing its lens cap.

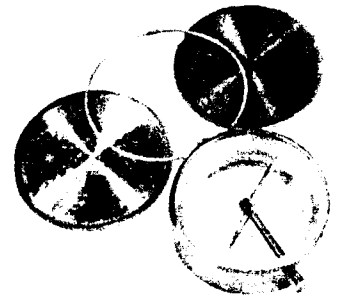


Eugene Dietzgen was born in Uckerroth, Germany in 1862 and died in Chicago in 1929. He came to the U.S. in 1880 and, in 1885, formed the partnership of Cuhring and Dietzgen. The firm became Eugene Dietzgen & Co. in 1891 and then Eugen Dietzgen Co. in 1893 and is still in business under this name. The instrument here is an example of one of their designs intended for use in the construction and building trades. Although not as early as some of the instruments in this catalog, its unusually fine original condition makes it appropriate for any high quality collection. (16 lbs UP) \$ 295

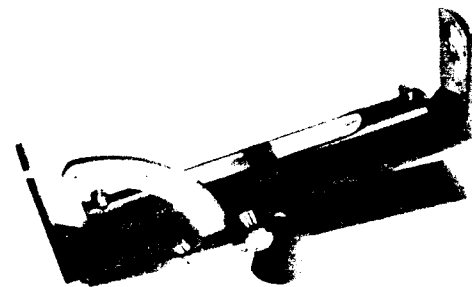


191. CASED SET OF SCALE RULES & TRIANGLES - English, early 20th c, signed "STANLEY LONDON" and all marked with an owner's initials. Mahogany case with sliding cover (not shown in photograph), 13" w x 6 3/4" deep, containing four, 12 1/4" long boxwood scales (3 chaining, 1 architect's) and 2 vulcanite triangles. One chaining scale chipped at a corner, otherwise overall condition is very fine. Although the architect's scale does not match the other 3, it is initial-identically and must have been an original substitution. (4 lbs, UP, PS) \$ 125

192. DIPPING NEEDLE - American, late 19th c, unsigned. Bright lacquered brass case and covers, 3 5/8" d x 1 1/4" thk (covers in place), 3 7/8" d folding loop handle, glass windows on both sides, and 2 1/2" needle in 2-degree of freedom mount. The silvered internal ring is graduated in degrees from 0 to 90 (at the bottom) and back to zero. Generally fine condition with the original finish somewhat darkened, particularly on the removeable covers. The needle seems to have lost its magnetism so that the instrument no longer functions correctly but is still satisfactory for display purposes. These dipping needles were made for two purposes: tracing veins of iron ore which would cause variations in the inclination of the local magnetic field, and locating buried iron pipes, boxes and survey markers. (3 lbs, UP, PS) \$ 125



193. THE CANADIAN SURVEYOR - Pocket cased sight vane clinometer, possibly English, c. 1875, signed "C. POTTER TORONTO". Black oxidized brass with bright lacquered brass readout quadrant, 5 5/8" long with 1 7/8" h sight vanes, 4 1/2" long bubble vial, the 1 7/8" rad quadrant scale graduated to degrees. The original red leather covered case, 6 1/4" long x 2 3/4" w x 1 3/4" h, is in good condition, sound but with wear and loss (on the back mainly) to the leather covering. The instrument is like new.

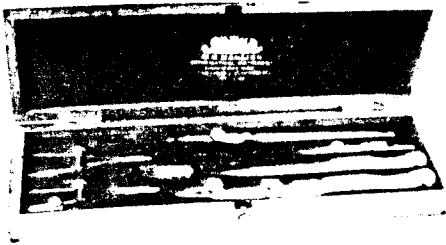


Charles Potter, born and trained in London, England, seems to have been the first professional instrument maker in English Canada. A Toronto publication of 1893 stated that he had "been established in business in this city since 1853." Some of his instruments were clearly of Canadian origin (see Item 138 of Catalog 127), but he imported British made instruments as well. The one here is characteristic of English fabrication and finish of the 1875 period so that it could have been imported rather than made in Canada. Note though that Potter's name was applied before the oxidized finish, not after. First option of sale to our Canadian customers. (3 lbs PS) \$ 295

194. TWO POLE 50 LINK SURVEYOR'S CHAIN WITH IRON RING HANDLES - Probably American, 1st half 19th c, unsigned. Long links (7 1/8") joined by pairs of rings (except where the odd ring has been removed to correct for stretching) made from drawn steel wire of 1/10" nominal dia but varying in thickness in a single length by about 0.003" and from link to link by 0.010". The handles are 4" dia hand forged iron rings, but there are no marker tags nor anti-twist joint. Overall length is 33 ft, or 2 poles. Generally fine condition except for some age darkening and some rust spotting, mostly at the ends of the links and of the connecting rings. (For sale only to purchasers of other surveying equipment.) (6 lbs, UP, PS) \$ 175



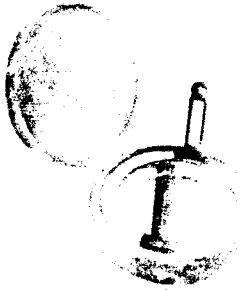




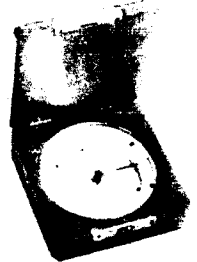
195. **CASED SET OF DRAWING INSTRUMENTS** - English, early 20th c, signed "W. H. HARLING MATHEMATICAL INSTRUMENT MANUFACTURER 47 FINSBURY PAVEMENT LONDON". Original mahogany case, 10 1/4" long x 3" w x 1 1/8" thk, containing 7 separate items in German silver, steel, and ivory: 2 small bow compasses, ruling pen, large compass with interchangeable pencil & pen legs, large fixed point dividers, and adjustment tool. These are complete. There is a hinged cushion inside the cover which possibly held a scale rule, but this is not now present. Very fine overall condition.  
(3 lbs, UP, PS) \$ 120



196. **HEAVY IRON 50 FOOT ENGINEER'S CHAIN** - Possibly American, early 19th c (or earlier), unsigned. Heavy iron long links (1 ft spacing) joined by hand forged and heat welded single rings, 3 1/8" dia hand forged ring handles. There are brass marker tags at 10 ft intervals and an anti-twist joint at the mid point of the chain. Very fine overall condition except for extensive surface pitting (from sitting in a New Hampshire barn for a century or more). The long links vary in thickness from 0.200" to 0.224", typical of hot drawn iron rod of the c. 1800 period. The connecting rings vary in thickness from 0.169" to 0.207". The brass marker tags, however, vary only about 0.003" with a nominal thickness of 0.043" and are probably of later origin. A very similar chain with virtually identical handles is illustrated in the various mid 18th c editions of the German book of Johann-Penther, "Praxis Geometriae". (For sale only to purchasers of other surveying equipment.)  
(13 lbs, UP, PS) \$ 265

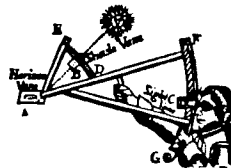
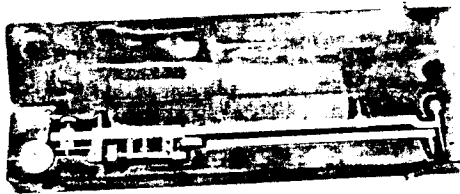


197. **CASED POCKET SURVEY COMPASS** - French for the English speaking market, late 19th c, marked "MADE IN FRANCE". Bright lacquered brass 3 5/8" d with 2 1/2" h black oxidized folding sight vanes, silvered compass dial 2 7/8" d with 2 1/4" needle. Original 4" d x 1 1/4" h case in simulated fishskin covering. The case is warped and shows edge wear but the compass is in very fine original condition.  
(3 lbs, UP, PS) \$ 155

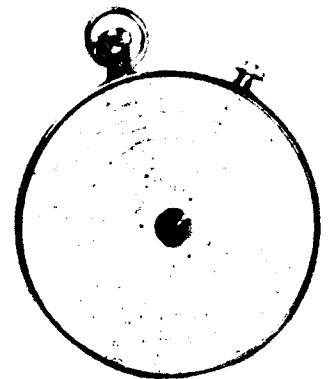


198. **MILITARY ENGINEER'S POCKET COMPASS** - American, signed and dated, "U.S. ENGINEER DEPARTMENT/W. & L.E. GURLEY, TROY, N.Y./1918". Lidded mahogany case 3 1/4" sq x 1 1/8" thk, 2 5/8" dia white faced compass with outer ring graduated in degrees and marked every 10 degrees; 2" needle. Very fine condition. (2 lbs, UP, PS) \$ 90

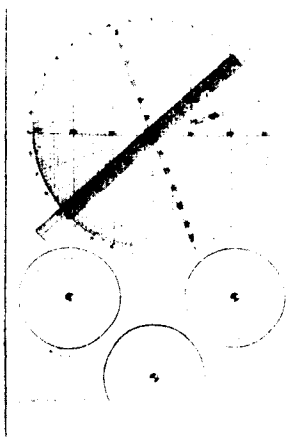
199. **AMSLER VARIABLE RATIO POLAR PLANIMETER** - Swiss, c. 1890, signed "Crosby Steam Gage & Valve Co Boston, U.S.A. & London, Eng.", but also marked with Amsler's serial no. "14758". German silver and steel, major arm 10" long, in fitted black leather covered case, 11 1/2" long x 2" w x 1 1/2" h. Case in very good condition, the instrument in fine display condition, operating, but with no guarantee of proper or accurate performance. The planimeter is used to obtain the area of an irregular plane figure by tracing around its perimeter. The one here was sold for the purpose of integrating steam engine indicator performance traces, but can be used just as well for finding the areas of surveyed plots since it can be adjusted to different mapping scales. It was invented by Prof. Jacob Amsler about 1856 and over 12,000 examples had been made by 1884 according to Science Calculators. (4 lbs, UP, PS) \$ 110



200. **FOWLER'S "TWELVE-TEN" PATENT CALCULATOR** - English, early 20th c, signed "FOWLER & Co. MANCHESTER". Nickel plated body 3 3/8" dia with 8 concentric scales marked on the single white face dial which rotates under the red index line by the top knob. The side knob provides for rotation of a second (black) cursor. The outermost scale consists of discrete constants and conversion factors. The continuous scales are labeled "TENTHS, RECIPS, TWELFTHS, TWELFTHS, SINES, SINES, & TANS". Original leather case, 4 1/4" x 4 3/4", in fine condition, but missing the instruction booklet. The circular slide rule is in very fine, working condition.  
(2 lbs, UP, PS) \$ 145



201. **POSSIBLE PROTOTYPE OF THE "OKE-STEWARD" ARTILLERY PLOTTER** - English, c. WW I, signed "J.H. STEWARD LTD. LONDON". Laminated mahogany base, 11" h x 7 1/4" w, with a white celluloid upper surface which contains three 2 1/2" dia circular slide rules and a 6" dia graphical plotter consisting of a ranging grid marked on the white surface, a rotating disk of age yellowed clear celluloid with the same grid, and a rotating line of fire pointer, also of clear (yellowed) celluloid. The plotter-tripple calculator is in very fine condition, except in that the wooden base has warped. The original cloth case in fair to good condition and 2 sets of typed instructions, one on the letterhead of J.H. Steward, Ltd of 406, Strand and 457, West Strand, London, W.C., and the other an unsigned 4 page elaboration thereof. Neither set is dated. According to the Steward notes, "The object of this device is to show graphically where each shot in a ranging series falls and to be able to measure off the necessary corrections directly by means of suitable scales. . . . For double observations the two observations are traced to their intersection and the distance of this point left or right of the line of fire pointer is read on the deflection scale corresponding to the range of the target from the battery." Corrections and typing errors on this sheet and the nature of the two sets of instructions lead to the belief that the unit here was actually a prototype intended to promote government interest. It is not known if it went into production.  
(5 lbs, UP, PS) \$ 195



202. **EXCISE OFFICER'S LONG GAUGING SLIDE RULE** - English, c. 1825, signed "BATE LONDON MAKER TO THE EXCISE". Boxwood rule with brass fittings, 44" long x 1 1/2" w x 1/4" thk, divided with linear (inch) and logarithmic scales. The center slide with its projecting brass index was used both for the measurement of kegs and the computation of their content. Fine plus condition with some warping.

Taylor 2 lists Robert Bretsell Bate (fl. 1807-43) noting that by 1840 the firm was "Bate & Son". A number of his instruments and physical standards are known and it seems that he was particularly involved with establishing basic standards of length. This slide rule is an example of the clever devices developed to aid the government in squeezing the last tax penny possible out of the very last ounce of a man's beer or whiskey. (10 lbs, UP, PS) \$ 295

203. **EIGHTEENTH CENTURY SECTOR** - French, signed "Defnos AParis". Bright brass, restored lacquer finish, 6 7/8" long x 1 1/4" w (closed), varying in thickness from 0.148" to 0.169". The scales on the face are labeled, "Les Cordes, Les Solides, Les Metause, Poids des boulets", while those on the reverse are, "Les Parties Egales, Les plans, Les Poligones, Calibre des pieces". Very fine condition except for a few nicks on the reverse side (not visible in the photograph). Although the maker of this instrument is not in Daumas, the Webster

index lists L.C. Desnos, fl. 1757-82, ingénieur geographe, rue St. Jacques à l'enseigne du Globe; St. Severies Quartier de la Place Maubert. A number of his instruments are known including a circumferentor at the Newport News Mariner's Museum, armillary spheres dated 1757 and 1760 at the Conservatoire National des Arts et Métiers, Paris, planetaria at the Deutsches Museum, Munich, terrestrial and celestial globes dated 1757, 58, 70, & 72, and a globe clock dated 1782 at Dresden. (3 lbs, UP, PS) \$ 295

204. **AMERICAN WANTAGE ROD** - Before 1862, signed "No. 79 / E.A. STEARNE & Co. BRATTLEBORO [VERMONT]". Wood-

en rod (illustrated only in part), 1/2" x 5/8" x 50 1/2" long, with (damaged) brass tip at the bottom end. One side is graduated in inches, a 2nd with a logarithmic scale, the 3rd with 4 conversion tables, and the maker's signature on the 4th. The rod is in very good condition, somewhat age darkened and with an (old) repaired break at its middle. This measuring-calculating device was used, first, for determining the level of liquid in various size barrels or kegs, and then calculating the actual volume of such liquids. E.A. Stearne was acquired by Stanley, the American tool firm, in 1862 thus placing an upper limit on the date of fabrication of this item. (10 lbs UP) \$ 95

205. **FOUR SIDED, FOUR SLIDE EXCISE RULE** - English, early 19th c, possibly late 18th, unsigned. Boxwood, 13/16" x 1 1/16" x 12" long, with a total of 16 scales on the 4 sides, 3 more on the back of one slide, and

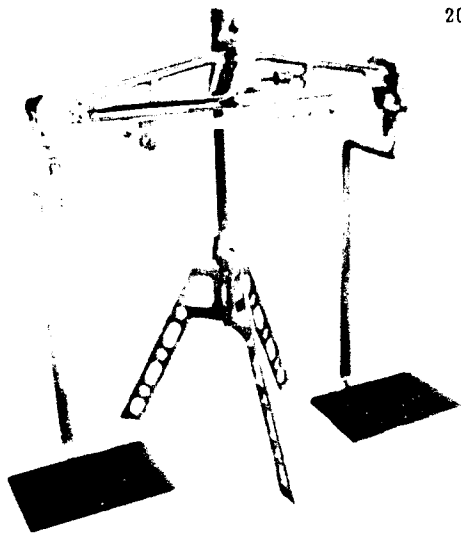
data tables on the backs of the other 3 slides. Very good to fine overall condition with a few stains and minor end chips. These slide rules were used for the various excise (tax collecting) calculations associated with the production and sale of alcoholic beverages including Ale, Wine, Spirits (whiskey & gin), Malt beer, and Cyder. (3 lbs, UP, PS) \$ 135

206. **THE BRICAL MONEY CALCULATING MACHINE** - English, c. 1900 (?), signed, "The British Calculators LTD. THE 'BRICAL' FOR COMPOUND ADDITION / PATENT". Black oxidized brass face, 5 1/4" dia, built into 6" sq wood and cardboard case. There are notched wheels under 3 semi-circular slots, terminating in four windows; the 1st for £'s in increments of 50, up to 500, the 2nd for £'s in increments of 1, to 50, the 3rd for shillings, to 20, and the 4th for pence, to 12, in half pence increments. Every time there is an advance of £ 50, a bell rings. Fine overall condition and working, although missing the 2 original styli for working the wheels. This basic adding machine is listed as no. 333 in Science Calculators, but without any detailed information. (4 lbs, PS, UP) \$ 99

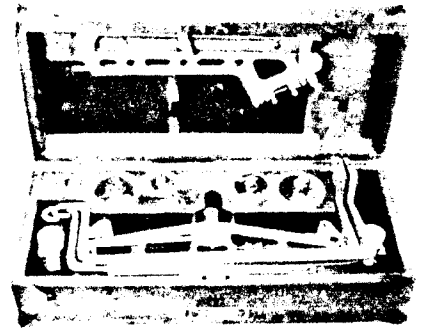
207. **CASED SET OF TURKISH STANDARD WEIGHTS** - Possibly American, penciled-in notation "Tested July 4-82" [1882], unsigned. Mahogany case, 6" deep x 10" w x 4" h, containing 9 bright lacquered brass weights from 1/64 to 2 oka. The largest is 3 1/16" dia x 3" h. It is stamped within the case that 1 oka equals 1283 grams. The standard conversions are 1 oka = 4 choky = 400 drachmas, and 1 batman = 6 oka while 1 canturo can equal either 44 or 45 oka (probably depending upon whether you are buying or selling). The case is in almost fine and the weights in very fine condition (lacking a pair of tweezers). This set was found in the attic of the Howe Scale Co. of Rutland, Vermont, together with their other sets of reference weights. However, we suspect that they were used but rarely. How often do you think that any one in Vermont had need to check the weight on an order of 58 batmans of Turkish olives, or what ever? (30 lbs, UP, PS) \$ 265

207. **NESTED NURNBERG TYPE WEIGHTS** - Possibly Austrian, 18th c, hallmarked with a double-headed eagle within a circle. Cast brass master cup (16 Loth wt) and 6 nesting cups, but lacking the 1/4 Loth center weight, the total marked as weighing 1 German pound. The

Pfund (pound) = 467.62 gm = 32 loth. The master cup is 1 9/16" h x 2 1/4" d (not counting the latch bar). Although the double headed eagle is found on some of the Cologne mastersigns, the one here does not match any of those listed in Kisch, "Scales & Weights". The set is in fine condition, the brass surfaces having been cleaned but not buffed. (4 lbs, UP, PS) \$ 235



**208. CASED PORTABLE FOLDING BALANCE & WEIGHTS** - American, signed & dated "GURLEY PATENTED MAY 8 1913", the case nameplate "GURLEY STANDARD WEIGHTS AND MEASURES TROY, N.Y., U.S.A.". The machine dovetailed mahogany case, 16" w x 7" deep x 4 1/4" h, holds the folding balance and the 8 original nickel plated weights (from 1 oz to 2 lbs). The cast aluminum 2 pan balance stands 18 1/2" h, has a zeroing adjustment, a balance indicating pointer extending to the left, and a sliding weight on a rod marked from 0 to 1 oz with 1/100 oz graduations. The case is in sound condition, rough exterior but fine interior. The balance is very fine.



same time span, suggesting that initial output was correspondingly low as well.

About the turn of the century, the American surveying instrument maker, W. & L.E. Gurley, appears to have tried to diversify its operations by setting up a Standard Weights and Measures department, or division. The portable balance, Item 135 of Catalog 119, was one example of this effort. Item 208, Catalog 122, a set of volumetric measures, was another. This, one of the most clever take down balances in our recollection, was a third. However, this sideline must have met with but limited success for very few examples have survived compared with their surveying instruments of the

(22 lbs UP) \$ 395

**209. SET OF FIVE DRAGON WEIGHTS** - Burmese, 19th c, unsigned. Cast bronze, graduated, balance weights in the form of stylized (Asian) dragons. The largest is 2 1/2" h, weighing 8 ozs, and the smallest is 1 1/4" h, weighing 1 oz. Very fine overall condition with a deep green-brown patina. All five pieces are to the same design, and were found together, so that the set appears to be an original entity. Dragons seem to be somewhat more rare than the better known 'ducks'. (4 lbs, UP, PS) \$ 245



**210. FINE SET OF PEWTER VOLUMETRIC LIDDED MEASURES** - French, 19th c, the largest, 1 Litre, signed "(?)ERMAND BOULANGET/RUE ST. NICOLAS/LILLE" and marked with a crown over rose hallmark; the next two, Demi Litre and Double Decilitre, "LECLERC/A LILLE/HUMBERT" with a crown hallmark; the last, Decilitre, marked "J.R.". All are stamped with a series of inspection marks. The design of all 4 is virtually the same, all seem to have been made in Lille, and all were found together, suggesting that they are indeed a matched set even though signed by different makers. It would not be surprising if the pewter makers' guild in Lille apportioned out the work so that everyone received some income. The measures are in fine condition noting that they have darkened and that there are the usual signs of use. (12 lbs UP) \$ 445

**211. NICELY CASED COMPLETE SET OF TROY WEIGHTS** - Possibly American, marked with certification date of July 1882, unsigned. Cherry case, 6 3/4" x 9 1/4" x 4 3/8" h, fitted with 10 brass weights ranging from 1/4 troy ounce to 50 troy ounces. Very fine overall condition. This set was found in the attic of the Howe Scale Co. of Rutland Vermont and apparently used by them as one of their calibration standards. (18 lbs, UP, PS) \$ 265



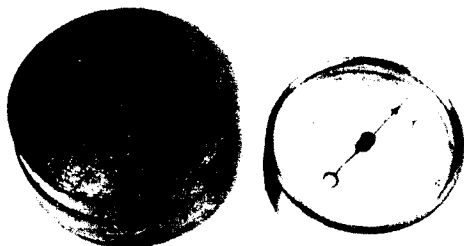
**212. UNUSUAL 'DUCK' WEIGHTS** - Burmese, late 18th or early 19th c, each marked with an 8-point asterisk. Five cast bronze, graduated, balance weights in the form of stylized ducks (or chickens). The largest is 3 1/4" h, weighing 12 1/2 ozs, and the smallest is 1 7/8" h, weighing 3 1/2 ozs. Very fine overall condition



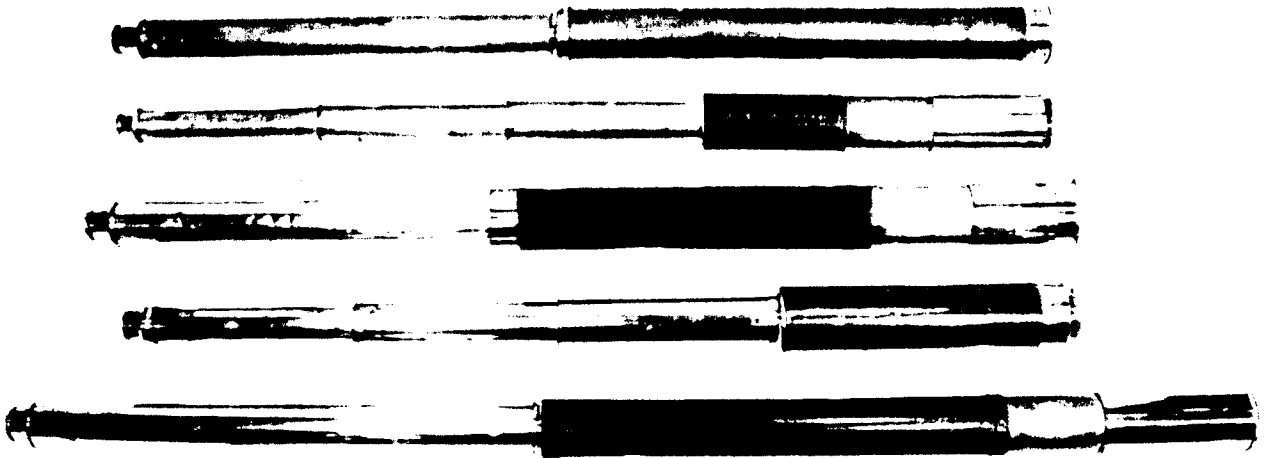
with a deep brown patina. All 5 pieces are to the same design with the same markings, and were found together, convincing evidence that they are an original entity. These 'ducks' differ somewhat from the more common form. They are heavier set and their combs are at the back of the top. Each also has a third leg at the rear (for stability one may suppose).

(5 lbs, UP, PS) \$ 245

**213. CASED POCKET WEATHER BAROMETER** - English, c. 1875, signed "Negretti & Zambra / 1. HATTON GARDEN. 59. Cornhill. AND 122 Regent Street LONDON / 2870". Deep gold lacquered brass housing, 2 1/2" dia x 1 1/8" h, with silvered dial graduated to 0.05 inches of Mercury, blued steel barometer needle and hand adj gold pointer. Original red leather covered case, 3" dia x 1 1/2" h, in very good condition (badly worn interior cover lining). The barometer, with original finishes, is in very fine, working condition (although accuracy cannot be guaranteed). The firm of Henry Negretti (1818-79) and Joseph Zambra (1822-88) was established in 1850 and at one time offered over 2,000 items in their catalogues. They were still in business only a few years ago (in 1977 Goodison stated that they still carry on "a flourishing business in scientific instruments, etc."), and may even be so to this day. Goodison lists them as having moved from 11 to 1 Hatton Garden in 1859 and as having a branch at 59 Cornhill from 1858. (3 lbs, UP, PS) \$ 155



MARINE SPYGLASSES



(The apparent curvature of some of the above is due to camera lens distortion. They are actually straight)

236. **SINGLE DRAW DAY OR NIGHT GLASS** - English, 1815-20, signed "GILBERT & SONS / LONDON / DAY OR NIGHT". Orange varnish finished wood barrel 2 1/4" d, bright lacquered brass fittings including lens cap, eyepiece protective slide, and single draw tube, 21" long (closed) extending to 38". The 2-element achromatic objective and 4-element eyepiece yield clear sharp images. Very fine overall condition with but minor darkening of original lacquer finish. The firm of (John) Gilbert & Son was established in 1810 and by 1820, according to Taylor 2, had become "W(illiam) & T(homas) Gilbert, lasting until 1842, according to Goodison. Sometime between 1810-20 the "& SON" became "& SONS", as recorded on this well made hand telescope. (6 lbs, UP, PS) \$ 385
237. **THREE-DRAW SPYGLASS** - English, 1st half 19th c, signed "Harris & Co., London, Day or Night". Brass construction, 2 1/4" dia short leather covered barrel, extending sunshade, lens cap with protective slide, triple draw tubes, eyepiece protective slide, 12 1/2" long closed, extending to 37 1/4". Achromatic objective of 1 3/8" aperture. Very fine overall condition; original leather and bright lacquered finish, except on sunshield which has a restored matching lacquer finish. The optics produce sharp images with slight pincushion distortion. A small crack in an eyepiece interior field lens is just visible in the field of view. William Harris & Co. was located at 47 High Holborn from 1799-1812 and then at 50 High Holborn until 1848. (5 lbs, UP, PS) \$ 295
238. **YANKEE SAILOR'S SPYGLASS** - English, signed "Spencer, Browning & Co, London, Day or Night", the extended sunshield is engraved "Wm. W. Kendrick, Boston, March 16, 1858". Leather covered brass barrel 2 1/2" dia, lacquered bright brass fittings, single draw tube with with eyepiece slide, objective lens cap, 20 1/4" long (closed) extending to 38 1/4". Generally very fine restored (lacquer finish and leather covering) condition with minor dents to the draw tube. Image quality is quite good although there is some field curvature. The maker was the mid 19th c continuation of Spencer Browning & Rust, a firm which was established in the late 18th century. We have been unable to trace the named owner although he may have been related to the Revolutionary War naval hero John Kendrick of Cape Cod. (6 lbs UP) \$ 425
239. **NEW YORK SPYGLASS** - Probably English, mid to 3rd qtr 19th c, signed "Wolfe & Clark's New York". Original leather covered brass barrel 2 1/2" d, lacquered bright brass fittings, protective objective and eyepiece slides, 3 brass draw tubes; 12 3/4" long closed, extending to 35 3/4". Achromatic objective of 1 1/2" aperture and 4-element eyepiece give sharp, clear images. Very fine plus overall condition with restored lacquer finish and some scratches and wear to the leather. We can not find Wolfe & Clark in our records and so believe the firm to have been retailers rather than instrument makers. The design follows typical English practices. (6 lbs, UP, PS) \$ 350
240. **A GOOD NAUTICAL SPYGLASS** - English, 2nd half 19th c, unsigned. Leather covered barrel 2 1/4" dia with bright lacquered brass fittings, extending sun shield, single draw tube, sliding shutters to eyepiece and objective, 23 1/2" long closed, extending to 45 1/2". Very fine overall condition with restored lacquer finishes, some wear to the original leather. Very fine optical quality yielding clear, sharp images. (6 lbs, UP, PS) \$ 345
241. **FINE 18TH CENTURY NAVIGATOR'S POCKET SET OF DRAWING INSTRUMENTS** - English, c. 1770, signed on the sector "Shuttleworth London" and with with the oval trade label within the case lid, "SHUTTLEWORTH, No. 23 Ludgate Street, LONDON". The 6 3/4" long x 2 7/8" w x 1 1/4" thk fishskin covered case contains 10 separate items: ivory navigator's sector, ebony & brass parallel rule, semi-circular brass protractor, and 7 instruments in brass & steel - large dividers, large compass with interchangeable legs, pencil & pen legs for same, ruling pen with brass handle containing marking needle (needle now broken off), pencil holder, and small pen compass. Very fine overall condition.



Taylor 2 lists Henry Shuttleworth, c.1732-1811 [probably in error, combining the life spans of father and son], as having apprenticed to John Cuff in 1746 (which could have put him on his own by 1754) and having his own shop at the sign of Sir Isaac Newton and the Two Pairs of Golden Spectacles, the Old Mathematical Shop near the West End of St. Pauls, which was numbered 23 Ludgate Street. Clay & Court note that the elder Shuttleworth was made Master of the Spectacle Makers' Company in 1786 and was last listed in 1797. His major achievements were in the field of microscopy and Clay & Court describe some of his work on pgs. 148, 197-9, and 204. Two of his more elaborate microscopes are shown as Figs. 31 & 47 of Billings. (3 lbs UP) \$ 595



242. **TWO-DAY MARINE CHRONOMETER** - English, c. 1838-40, signed "Norris Liverpool / 190". Brass-bound mahogany case, 6 3/8" sq x 6 5/8" h, containing gimballed 2 day spring detent marine chronometer with 4" dia silvered dial. The minute & hour hands are gold and the seconds & up-down hands are blued steel. The unusually small movement, only 2 1/4" dia, has an Earnshaw type spring detent, blued steel helical balance spring, and a fusee driven power train. The chronometer has been cleaned, oiled, adjusted and is now running with a mean rate of 0.5 secs/day fast with a variation of only + or - 1 sec. All the brass work of the case and chronometer has been cleaned and refinished in gold instrument lacquer. Overall condition is very fine.

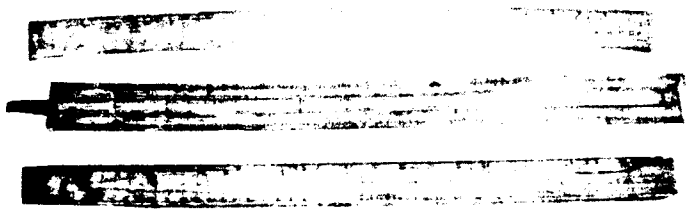
Vol. 2 of Baille (Loomes) lists Francis Norris as having started in business in 1834, the firm becoming Norris & Campbell in 1845, lasting until 1855 when John Campbell took over. The chronometer, Item 203 of Catalog 128, dating from the time of this last transition, had serial no. 927. Using straight line interpolation, the chronometer here would have been made in 1838. Allowing for lower production in the early years could push the dating ahead another 2 years, as indicated above. This is a particularly fine, moderately early precision marine time-piece. (25 lbs UP) \$ 1,875

243. **LARGE EBONY FRAME QUADRANT** - English, early 19th c, signed "Spencer Browning & Rust London" and in script "SBR" on the scale. Ebony frame, bright lacquered brass fittings, reinforced index arm, ivory scale and vernier of 11 3/4" readout radius, reading to 1 arcmin; 14" overall



length. Sets of 3 index mirror and 3 horizon glass filters, tangent screw adj of the horizon glass, tangent screw slow motion on the index arm, and screw-in shade tube. Very fine display condition with restored finishes, noting the following imperfections: missing chip from the edge of one filter, crack and chip in one corner of horizon glass, some loss of silvering on the mirrors, and missing ivory note pad from rear of frame, pencil holder, and pivoted peephole cover from the telescope bracket - all having almost no real effect on the visual appearance of the instrument. Original mahogany hand dovetailed stepped keystone case, 15 1/4" deep x 14" w x 3 3/4" h, in fine condition except for some age cracks and a 3" long chip missing from the bottom (newly repaired).

There is an incomplete trade card of Gedney King & Son of Boston within the case cover with signs of a still earlier (removed) trade card. Thus we know that the instrument was resold in the U.S. by 1839 (Gedney King & Son existed only from 1837-39), and had to have been made earlier. Indeed, it is very close in design details to Item 57 of Brewington (Plate XVIII) which is by the same maker, and is dated in the book c. 1800. (12 lbs UP) \$ 885

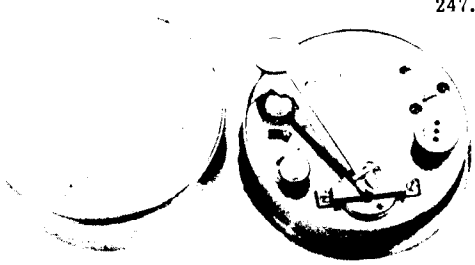


244. **NAVIGATOR'S GUNTER RULE** - English, c. 1800, unsigned. Darkened boxwood, 24" long x 1 3/4" w, with 16 computational scales, a 10" diagonal scale, and a 24" tenths-inch scale; brass insets at the zeroes and points of greatest usage of the various scales. Generally fine condition with a nick in the bottom edge and a slight curve to the entire rule due to age shrinkage (just ideal for calculations in an Einsteinian strong gravitational field). The use of this form of analog calculator (consisting of the standard set of logarithmic number and functional scales for navigation)

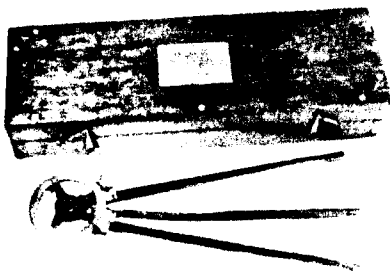
was described in Mackay, Bowditch, Moore, etc. Computations were performed by working back and forth on the scales with a pair of dividers in lieu of the slide and cursor of Mannheim type slide rules. It was derived from the earliest form of computational device using logarithmic scales, that invented by Edmund Gunter between 1610-20. (5 lbs, UP, PS) \$ 170

245. **VERY RARE NAVIGATOR'S SLIDING GUNTER** - English, c. 1840, signed "Blachford & Imray". Darkened boxwood, 24" long x 1 7/8" w, with a total of 22 scales (both sides); brass insets at the zeroes of several scales. Very good to fine condition noting some stains, a break in the slide which has been repaired (some time ago) by brass wire and glue, and minor warping. There is also a small chip at one end of the slide. This slide rule represents an improvement over the fixed Gunter rule but was little used (and hence quite rare) because of the extreme conservatism of the typical ship's officer. Robert Blachford, son-in-law of John Hamilton Moore, established his Navigation Warehouse about 1804 where charts, textbooks, and instruments were sold and the latter repaired and adjusted. There was also a navigation school. He was joined by James Imray in 1836, the partnership lasting until 1842. Later Laurie, Noire, and Wilson joined in revised partnerships. (5 lbs UP) \$ 445

246. **STANDARD NAVIGATOR'S GUNTER RULE** - English or American, 1st half 19th c, unsigned. Boxwood, 24" long x 1 5/8" w, with 16 computational scales, an 11" diagonal scale, and a 24" tenths-inch scale. There are brass insets at the zeroes of the scales and points of greatest usage. Fair to good condition (noticeably worse than Item 244 above) with stains, a few chips, and wear from use. (5 lbs, UP, PS) \$ 65



247. **HIGH QUALITY BOX SEXTANT** - English, very early 19th c, signed "Fraser & Son, Bond St. London". Bright lacquered brass, 3" d x 1 5/16" h with the cover/handle screwed in place. The inset silver scale of 1 7/8" readout radius is read out on the silver vernier scale to 1 arcmin. There is a swing-away magnifier, rack and pinion drive of the index arm, internal sliding line-of-sight and index mirror filters, and an adjustment key. This is a peep sight rather than telescope model. The interior surfaces all have their original lacquer finish while that on the outside of the case is a modern restoration. Very fine plus overall condition with 3 small screws, modern replacements. Taylor 2 lists William Fraser (c. 1720-1815) at 3 New Bond Street, London. He was mathematical instrument maker to George III & the Prince of Wales. "A son took over the business in 1799, and it passed in 1815 to Hawks Grice who was followed at this address by Edward Dixey and Co." (4 lbs UP) \$ 565



248. PRESENTATION MINIATURE STATION POINTER - English, signed "H. HUGHES & SON LTD. 59 FENCHURCH ST. LONDON No. 1197" with the dated presentation:

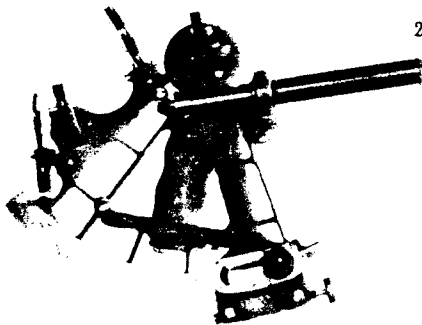
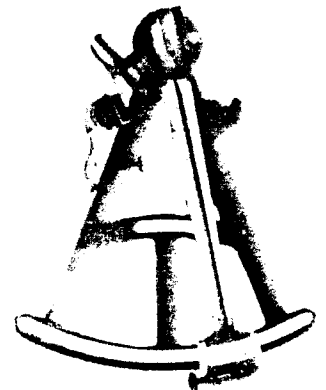
THE INCORPORATED  
THAMES NAUTICAL TRAINING COLLEGE  
H.M.S. WORCESTER  
PORT OF LONDON  
1ST NAUTICAL & MATHEMATICAL DIVISION  
THIRD PRIZE  
to the Head Boy in Theoretical Navigation  
Awarded to  
Cyril John West  
MIDSUMMER. 1913.

Brass construction in black oxidized finish with the 2 5/8" dia readout circle in bright brass, the index pointers on silvered plates, and other fittings in deep gold lacquered brass. The 3 arms are of 10" radius. The presentation plaque is attached to the cover of the hand dovetailed mahogany case, 13" w x 4 1/4" deep x 2 3/8" h, which is in fine condition, revarnished many years ago and with a replaced hinge. Missing a hand magnifier. The instrument is in very fine original condition.

A station pointer is used for locating a ship's position on a chart or map by setting in two landmark-landmark relative bearing angles between 3 landmarks and moving the instrument on the chart until the edges of the three arms each intersect one of the landmarks. The 2 angles can be measured with a peloris, sextant, or azimuth compass. Henry Hughes, son of the instrument maker and dealer, Joseph Hughes, moved into 120 Fenchurch St. about 1840, later to no. 59. When his son, Alexander, joined the firm it became "& Son", later a limited company, probably near the end of the 19th century. (6 lbs UP) \$ 495

249. "HUGHES \* LONDON" EBONY FRAME QUADRANT - English, c. 1835, signed as indicated. There are also the later trade labels of Mrs. Janet Taylor & Co., London and I. Bianchetti, Marseille within the cover. Ebony frame with brass reinforced index arm. above surface slow motion tangent screw, sight vane (missing pivoted cover), and set of 3 index mirror filters. The ivory scale of 9 3/4" radius reads out by vernier to 1 arcmin. Original ivory note plate on back. The brass is in a combination of bright lacquered and black oxidized finishes which, in our opinion, although not original, is the work of a 19th c instrument maker. There is tangent screw adjustment of the horizon glass. Fine plus overall condition. Original mahogany keystone case, 11 3/4" w x 12 3/4" deep x 3 1/2" h, in good condition, missing its lock and with several age cracks.

Brewington notes that a Joseph Hughes was in business in Limehouse, London in the early 19th c who was then succeeded by his son, also Joseph, who moved to Ratcliffe Cross in 1835 and then to the Minories. He had a younger brother, Henry, also a nautical instrument maker, who was at Commercial Road in 1835, moving to 120 Fenchurch in 1840. This firm later became "H. Hughes & Son, Ltd.". It is not possible to determine which of the 3 original Hugheses made this instrument. (10 lbs UP) \$ 765

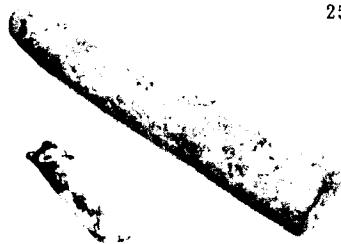
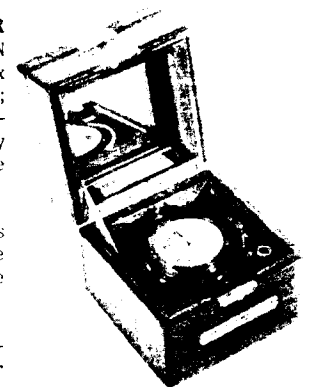


250. WW I VERNIER SEXTANT - English, signed "H. Hughes & Son LTD 59 Fenchurch St. London E.C.", a calibration chart within the case cover is dated Nov. 1919. Brass construction, primarily in black matte finish, some fittings in bright lacquered brass. Readout is to 10 arcsecs by vernier against inlet silver scale of 7" radius. There are sets of 4 index mirror and 3 horizon glass filters and a sliding magnifier fitted above the vernier. Fine adjustment by tangent screw. The sextant is complete with its 3 quick-unscrew telescopes and an extra eyepiece, but is missing 2 eyepiece filters. Original mahogany case, 11 1/4" x 11 1/2" x 5 1/2" h, in very good condition, sound, but with surface scratches and a 3/4" long edge chip. The sextant is in fine original condition and may be useable after appropriate alignment. (15 lbs UP) \$ 520

251. GIMBALED HAMILTON MODEL 22 CHRONOMETER WATCH - American, WW II, dial signed "HAMILTON LANCASTER PA., U.S.A.". Brass case, 3" dia x

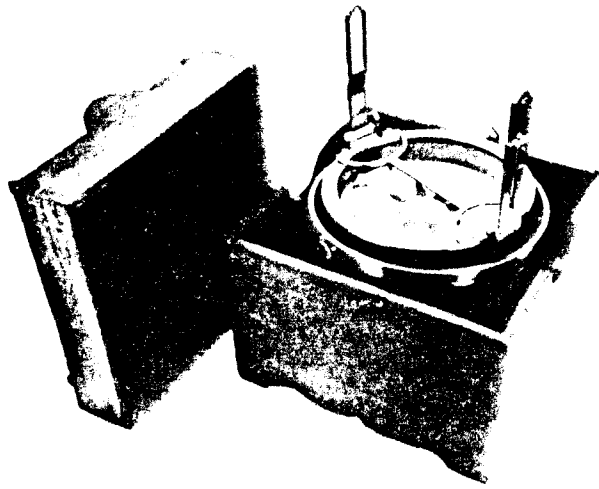
1 3/4" h, in a gimbal within a mahogany chronometer type box about 6" cube. Runs 2 days on a winding; up-down indicator on dial; 21 jewels. Box and watch in very fine condition. The watch has been cleaned, oiled, and after a month of testing and adjustment, it is now running at a mean rate of 0.9 sec/day slow with a long term (several week) periodic variation of about 0.5 sec/day amplitude. This will change with a restart under different environmental conditions.

Hamilton placed the Model 22 mechanisms in 2 different cases, the one here and the one which looks like a large pocket watch (see Item 248, Catalog 129). Our own tests have convinced us that these were the most accurate production lever escapement watches ever made, generally surpassing the performances of most true spring detent chronometers. (12 lbs UP) \$ 795



252. LARGE EARLY SOUNDING LEAD - Spanish, early 18th c, unmarked. Lead weight with suspension hole and hollow bottom (for holding the wax used to pick up bottom samples), 2 3/4" dia base x 12 3/4" long, weighing 19 pounds. Salt water etched and lightly encrusted. This (and the following) are said to have been recovered from the wreck of the Spanish treasure ship, the San Ignacio, sunk off the Florida Keys in 1733. Most likely it was used on the San Ignacio when approaching unknown shores as well as known harbors. This is not a common find. (25 lbs UP) \$ 395

253. SMALL EARLY SOUNDING LEAD - Spanish, early 18th c, unmarked. Lead weight with suspension hole (but without hollow bottom), 1 3/4" dia base x 4 1/2" long, weighing 3 pounds. Heavily encrusted with sea growth. Found in the San Ignacio and most likely used in one of the small boats which would have been sent out to find safe channels. (6 lbs, UP, PS) \$ 195

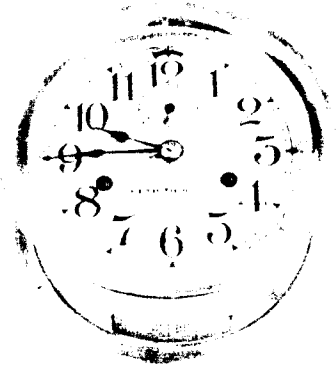


254. **AZIMUTH COMPASS** - American, between 1838-64, signed "ROBERT MERRILL / NEW YORK". Lidded hand dovetailed mahogany box, 10 3/4" sq x 10" h (lid in place); 7 3/4" (outside) dia compass with 5 1/2" h folding sight vanes & 6 1/2" dia green compass card with silvered brass edge ring graduated to degrees, suspended in 8 3/4" dia bright lacquered brass gimbal ring, which in turn is mounted in a black enameled cast brass yoke which rotates in azimuth. There is a sliding housing with window on one vane and a similar one with red solar filter on the other. The compass upper assembly and gimbal ring are in bright (restored) lacquered brass while the brass compass drum is in its original black oxidized finish. The box is in very fine condition, with several age cracks and missing one retaining block from within the cover. The compass is extremely fine.

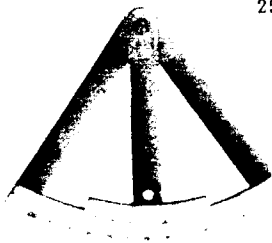
Brewington notes that Robert Merrill was born in Newburyport, Mass. in 1804 and died in Brooklyn, N.Y., in 1876. He lists him as a partner of William C. Davis from 1835 to 1840, then under his own name in 1840 at 163 Water Street, New York City, 1845-50 at 149 Maiden Lane, and 1855-60 at 152 Front Street. By 1869 he was at 156 Water Street, the firm having become Robert Merrill & Sons. Smart states that the partnership with Davis ended in 1837 and that "& Sons" dates from 1865. The azimuth compass combines the functions of the stan-

dard boat compass (in its single degree of freedom gimbal) with the peloris, enabling the navigator to take azimuth sightings to landmarks as well as obtaining compass variation by solar sightings. It is a more sophisticated instrument than either of the above by itself and so more effort was expended on its construction. The one here is a particularly fine example. (25 lbs UP) \$ 895

255. **INSIDE BELL SHIP'S WATCH STRIKE CLOCK** - American, early 20th c, signed "SETH THOMAS / MADE IN U.S.A.". Brass case in original nickel plate, 7" dia x 4" h, with 5 7/8" dia silvered dial, blued steel hands. The strike adjustment lever is under the hinged bezel. The clock runs about 2 days on a winding but it is best to wind it every day for best performance. It strikes the 8 bell watch sequence which repeats every 4 hours. Very fine, running condition. There is a slight dulling of the plated finish. (8 lbs UP) \$ 465

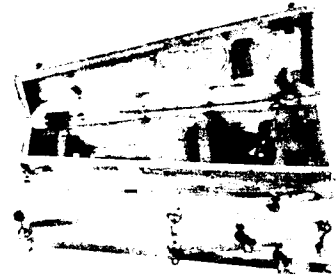


256. **VERNIER DEMONSTRATOR** - English, probably early 20th c, signed "BAIRD & TATLOCK LTD. LONDON". Mahogany arms with maple vernier and scale, 13" overall radius, 11" readout radius, the scale 14 1/4" at its widest. Very fine condition. The scale is graduated from 0 to 60 degrees in 1 degree increments and the vernier from 0 to 30 in supposed 1 arcmin increments (they are really 2 arcmins). Baird may have been the junior partner of Kelvin, Bottomly & Baird, but we have been unable to find any more information. Although this piece appears to have been made as an instruction aide, we suspect that it must be very rare in the form here because of the x's two error in marking the vernier scale.



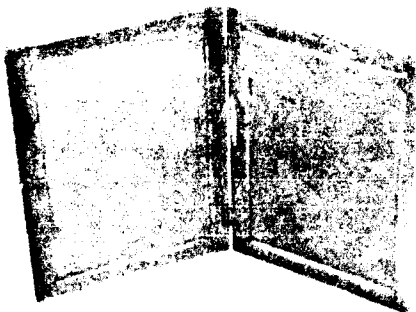
(4 lbs, UP, PS) \$ 155

257. **MINIATURE PANTOGRAPH** - English, c. 1800, signed "Bancks 440 Strand London" with his trade card inside the case cover stating, "Makes and sells all sorts of Mathematical, Optical, & Philosophical Instruments, On the most Improvit principles, and Lowest Terms". Bright brass, original lacquer finish, the two outside arms 11 1/4" long each, one marked with ratio scales, as is the shorter arm connecting to it. There are 4 ivory wheeled casters, 1 fixed sleeve, and 2 adjustable ones (on the ratio scale arms) for the tracer point and pencil holder. Original pine case, 12 1/4" long x 2 7/8" h x 4" w (max), containing the original tracer point, pencil holder, and cloth covered 2 1/4" dia lead pivot weight, and in fine condition (considering the material). The pantograph is very fine, complete, and quite useable.



Miniature pantographs (such as this one) are quite rare because of their limited useability; full size ones are more practical in an office environment where large plots, maps, or charts are being drawn or revised. Indeed these very small ones may have intended primarily for seaboard and expedition purposes where space and weight were of major consideration. Both Goodison and Taylor 2 list Robert Bancks (fl. 1796-1834), by himself at 440 Strand, then 441 Strand, from 1820 as Bancks & Son at 119 New Bond Street. He was Optician to the Prince of Wales, later George IV, but almost certainly only after the period of this instrument because otherwise it would have been noted on the trade card. Later he changed the spelling of his name to Banks. (7 lbs UP) \$ 550

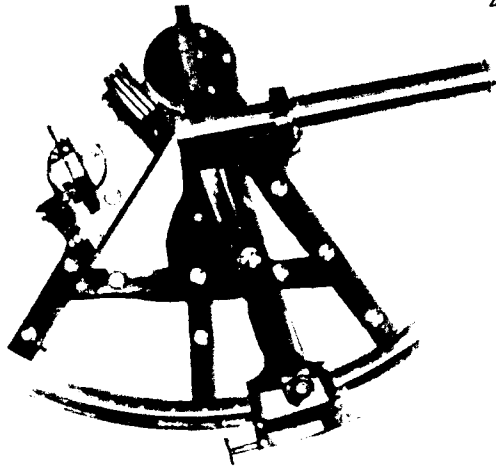
258. **MARINER'S FOLDING LOG SLATE** - Possibly American, 19th c, unsigned. Pine framed and backed black slates, 15 3/4" h x 11 5/8" w (closed), 23 1/4" w open. Fair to good condition with age shrinkage, cracks, chipping and some repairs; although sound overall. No marked recording columns such as Brewington's Item 259. These slates were used to mark in chalk the sailing instructions for a watch on one side and the course actually made on the other. They saw hard usage and far fewer have survived than might otherwise have been the case in a more benign environment. (12 lbs, UP, PS) \$ 155



259. **CASED ROLLING PARALLEL RULE** - English, early 20th c, unsigned, but marked "BRITISH MADE". Boxwood rule with beveled edges, 15" long x 2 3/8" w, with bright lacquered brass fittings, 1/10ths inch scale on one long edge and the angular scales of a rectangular protractor on



the other three. Original mahogany case, 16" long x 3 1/2" w x 2" h, with a space inside the cover for a now missing pair of dividers, otherwise in very fine condition, as is the rule. The rolling parallel rule is particularly useful in translating course lines on large charts where the more conventional, linkage connected parallel rule would eventually step itself off the edge. (6 lbs, UP, PS) \$ 95



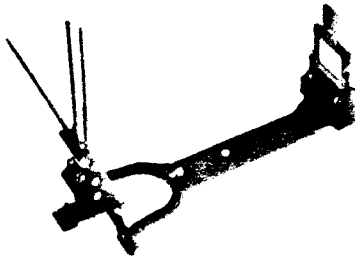
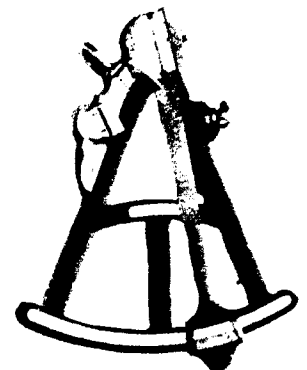
260. **SUPERB DOUBLE FRAME SEXTANT** - English, 1844, signed "Troughton & Simms London" with serial no. "2375". Brass double frame with silver scale of 8" radius, reading by silver vernier to 10 seconds of arc, inlet into the bright brass limb. There is a swing-away magnifier with diffusion glass on the reinforced index arm, sets of 3 horizon glass and 4 index mirror filters, and all 3 original interchangeable telescopes and extra eyepiece, the 2 solar filters for the telescopes, and the adjustment pin, lacking only the hand magnifier and (possibly) a screwdriver or other tool. The frame and mirror & filter mounts are all in original clear lacquered black oxidized finish, the screw heads, knobs, all pieces of the frame spacing screws, telescopes, and other fittings are in their original bright lacquered brass finishes. Original keystone shaped hand dovetailed mahogany case, 14" w x 11 3/4" deep x 5" h, in very good condition, sound, but with some age cracks and surface marring, and missing a restraining block from the inside cover. The sextant is between excellent and mint.

An important element in the success of the Troughton firm as instrument makers was that the eldest brother, John (fl. 1752-84), was able to develop a dividing engine (about 1775) that rivaled the accuracy of Ramsden's. Thus Edward's (1753-1831) invention of the double frame sextant in 1788 enabled the firm to produce an exceptional navigation instrument of unique design and superb accuracy. (We had a Troughton sextant which when calibrated in

the 20th century showed no measurable error over the entire scale.) At the time of the formation of the Troughton & Simms partnership in 1826, sextant production had reached no. 1560 according to Alan Stimson's graphs. The same graphs give 1844 as the date of the instrument here. (15 lbs UP) \$ 2,295

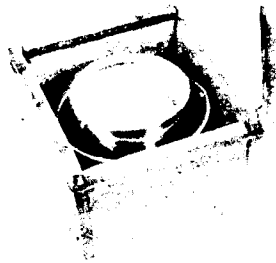
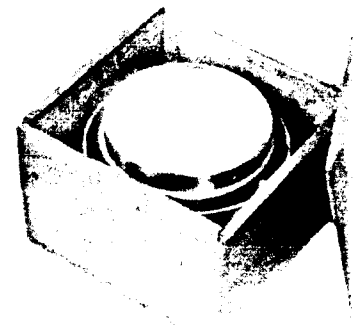
261. **"G. HEATH \* LONDON" EBONY FRAME QUADRANT** - English, early 19th c, signed as indicated. Ebony frame with flat brass index arm (not fitted with tangent screw slow motion), sight vane with solar filter pivoted cover (lacking small glass filter insert), and set of 3 index mirror filters. All brass parts in restored gold lacquer finishes. The ivory scale of 9 5/8" radius reads out by vernier to 1/2 arcmin. Very fine overall condition, lacking ivory pencil top, but otherwise complete. Original black lacquered keystone case, 13" deep x 11 1/2" w x 4" h, in very good condition.

The 20th c instrument firm, Heath & Co. Ltd. has stated that they were founded in 1845, but who the founder was seems to be somewhat uncertain. It is not at all clear the it was William Heath of Devenport and it may not have been the maker of this instrument either. There is no G. Heath in our standard references. Design considerations, particularly the flat index arm without any adjustment, suggest that this instrument was made about 1800, or shortly thereafter. (10 lbs UP) \$ 765



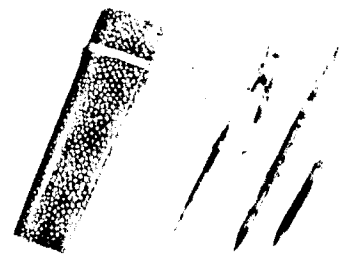
262. **DETACHABLE COMPASS AZIMUTH SIGHTS** - American, signed and dated "RITCHIE / BOSTON / PAT. AUG. 30. 1892". Black enameled brass with 8 1/4" long base, folding front and rear sights, the front one 6 1/8" h, the black solar mirror is in a pivoted mount 3 1/2" long x 7/8" w, and a mirror is mounted in the rear folding sight. Fine original condition. The original mahogany case, 9 1/4" w x 4 1/4" deep x 3 1/2" h is in good shape with some surface deterioration. Edwin S Ritchie (1814-95) invented the world's first practical liquid compass about 1860. The firm's success led them to introduce accessories such as the one here. (5 lbs, UP, PS) \$ 95

263. **WELL-MADE BOAT COMPASS** - Scottish, 2nd half 19th c, signed "GEBBIE & CO., GREENOCK". Spun brass bowl, 6 1/4" dia, suspended in 7 3/4" dia brass gimbal ring to 9" sq x 6 1/4" h stained pine box. The 6" dia compass card has a jeweled center and dual, brass mounted compass needles below. The box is in very good condition with several repairs and a newly replaced sliding lid. The compass is fine with original finish on all the brass parts. Gebbie & Co. is not in our standard references suggesting that they were retailers, rather than makers of this compass. The needle arrangement of the compass card may be a unique design and so may be described somewhere in British patent records. (15 lbs, UP, PS) \$ 155



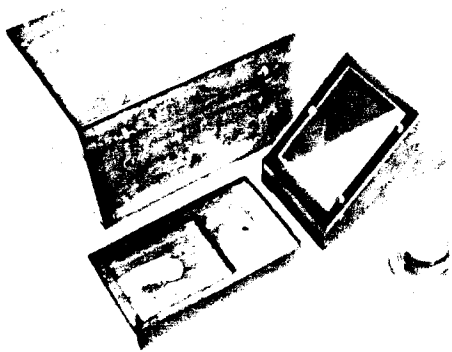
264. **SMALL DRY-CARD DORY COMPASS** - American or English, 19th c, signed but stains on the compass card make the name illegible. Paper-faced mica compass card 2 1/2" dia in 3" dia spun brass bowl within 4" dia brass gimbal ring. Original hard pine box with sliding cover 5" sq x 3 3/4" h. The box has seen hard usage and has been repaired, but is still sound. The brass parts have been cleaned and refinished in gold instrument lacquer so that overall condition is very fine except for the compass card. (6 lbs, UP, PS) \$ 95

265. **SILVER BOUND SHAGREEN CASED POCKET SET OF DRAWING INSTRUMENTS** - English, 1st qtr 19th c, the back of the 4" long ivory rule signed "\* SILBERRAD \* LONDON \*". The case in green shagreen is 5" long x 1 1/2" w x 5/8" thk, with an unengraved silver name plate on the top of the lid. The brass & steel instruments consist of a compass (shown with divider leg) and a pencil - pen assembly which can be used independently or either end by itself with the compass, and a pencil holder. The ivory rule has inch, 1/2, 1/4, and 3/4 proportional scales, and a scale of chords. Extremely fine overall condition. Taylor 2 lists Charles Silberrad, fl. 1800-26, at 34 Aldgate Street, London, and notes that a Culpeper microscope by him is at the Whipple museum in Cambridge. This is a particularly nice example of a well made compact, but versatile pocket set. (2 lbs UP) \$ 430





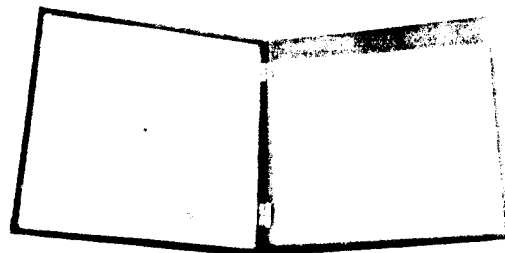
266. **MERCURY POOL ARTIFICIAL HORIZON** - English, early 19th c, unsigned. Hand dovetailed mahogany case, 5 3/4" x 7 3/4" x 4 7/8" h, contains the black lacquered brass windscreen, 3 5/8" x 6 3/4" x 4 3/8" h, with 2 3/4" x 3 7/8" optical windows mounted at right angles to each other, the 2 1/4" dia x 4" h boxwood bottle for stowage of the mercury (contains mercury) with its ivory funnel cap, and a black lacquered, 3 3/8" x 5 7/8", sheet iron tray which holds the 3 1/8" x 5 3/4" mahogany mercury tray. This latter has ivory fittings. Very fine overall condition.



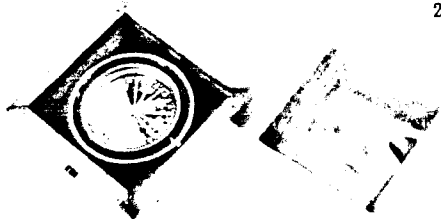
The artificial horizon is used with a sextant, when on land, for determining the location of a harbor, or other coastal feature, when the Sun or reference star is in a direction in which the sea level horizon is obscured. The angle measured is between the direct line-of-sight and the mercury surface reflected line-of-sight. This is then twice the true angular elevation of the body. The wooden mercury tray and boxwood mercury bottle are an important indication of the age of this set for by mid 19th c common practice was to have both made of cast iron. (12 lbs UP) \$ 430

267. **THE "McGEGAN STAR IDENTIFIER"** - English, early 20th c, made by "THE LONDON

NAME PLATE MANUFACTURING Co.". Mahogany box 15" sq x 7/8" thk which opens to show a card on the left side with a printed projection of a spherical grid upon which rotates a celluloid semi-circle with the same projection. The right hand side has a printed instruction sheet titled "STAR IDENTIFIER AND DIAGRAM FOR THE GRAPHICAL SOLUTION OF PROBLEMS IN NAUTICAL ASTRONOMY BY J.E. McGEGAN of the Hydrographic Department, Admiralty". There is a loosely inserted star table which is not illustrated. The National Maritime Museum, Greenwich, has one of these identifiers in its collection dated 1918. This is an interesting example of a fast, easy way of solving problems in celestial navigation. Very good external, fine internal condition. (8 lbs, UP, PS) \$ 185

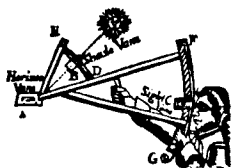
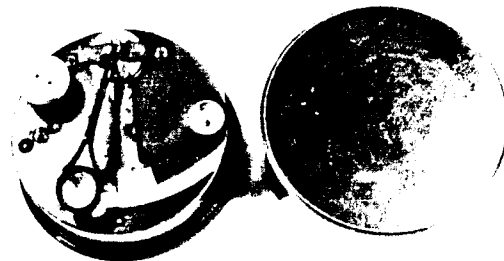


268. **MINIATURE BOAT COMPASS** - English, c. 1865, signed "SINGER'S PATENT". Slide cover mahogany case, 3" sq x 1 5/8" h, containing an 1 1/2" dia compass card with jeweled center in a 1 3/4" dia brass bowl with original lacquer finish, suspended in 2 1/4" dia bright lacquered brass gimbal ring. Extremely fine original condition. Singer's invention, patent no. 1496 of 1861, was intended to produce a compass card which was easily read under poor light, the northern half in black with white markings and the southern just the reverse. This is the smallest gimballed marine compass we have ever had. (2 lbs, UP, PS) \$ 225



269. **WELL MADE BOX SEXTANT** - English, c. 1875, signed

"Troughton & Simms, London". Black oxidized brass, with bright lacquered brass knobs and fittings, 3" dia x 1 3/4" h with the cover-handle screwed in place. The cover screws off for use and then screws on the other side as a handle. The inlet silver scale of 1 7/8" readout radius is read to 1 arcmin on the silver vernier. There is a swing-away scale magnifier, rack & pinion drive of the index arm, internal sliding line-of-sight filter, and an adjustment key. This is a peep sight (rather than sighting telescope) model. Original leather case, 3 1/2" dia x 2" h, in fine condition. The sextant is very fine. Such sextants were used for several purposes, primarily based upon their compactness and, because of their design, an ability to resist adverse environments. They were good emergency at sea and lifeboat instruments. On land they could be used for surveying, particularly on expeditions of exploration. They were also taken to the polar regions, notably on the sledging searches for Sir John Franklin. (4 lbs UP) \$ 395



## IMPORTANT REFERENCE BOOKS - A SERVICE TO OUR CUSTOMERS\*

(\*Those Purchasing Numbered Items from These Catalogs)

There is a packing and shipping charge of \$ 2 for the first item and \$ 1.50 for each additional item shipped to a street address within the 48 states. There is an additional surcharge of \$ 1.50 per item when shipped within the U.S. by U.S. Mail and to Hawaii and Alaska. Outside the U.S. the charge per item is as follows: \$ 9 for "j", \$ 6 for "b", "c", "d", "h", "j", "k", and "n", and \$ 4 for "g", "l", and "m". These are new books and can not be returned for refund or credit.

- b. Campbell, "History and Bibliography of The New American Practical Navigator and The American Coast Pilot" \$ 15
- d. Wheatland, "The Apparatus of Science at Harvard 1765-1800". A large (9" x 11") book with over 100 illustrations, 6 in color. In many ways, far superior to the picture books on instruments from France because it illustrates items which one can still find and collect. \$ 20
- g. Moskowitz, "THREE STUDIES IN THE HISTORY OF CELESTIAL NAVIGATION \* From Simple Quadrant to Space Sextant. \* The Method of Lunar Distances and Technological Advance. \* The Development of the Artificial Horizon for Celestial Navigation.", cloth bound reprints from "Navigation", the journal of the Institute of Navigation. 49 pages with 44 illustrations. The second title received the Institute's Burka Award in 1971 as the best paper of the year published in "Navigation". \$ 10
- h. R.S. Clay & T.H. Court, "The History of the Microscope". Reprint of the 1932 original and, except for technical details of optical design, still the best reference work on the development of the microscope before the achromatic objective (c. 1810). 163 illustrations. \$ 35
- i. Robert T. Gunther, "Astrolabes of the World". Reprint of the 2 volume edition now bound in one large book 11" h x 9" w, 609 pages. The last recorded auction sale of an original copy of this book brought over \$ 900 which is understandable because without it, one should not consider collecting astrolabes. This reprint is now out of print too. Special price to current private customers - \$ 95, to all others - \$ 245
- j. "Five Years of Historical Technology I \* \* \* Catalogs 101-110". Bound volume of the first 10 catalogs issued by Historical Technology, over 500 pages and a great number of illustrations. Special price to current private customers - \$ 70, to all others including all dealers, museums, and libraries - \$ 130
- k. "Five Years of Historical Technology II \* \* \* Catalogs 111-120". Bound volume of the second 10 catalogs issued by Historical Technology, over 575 pages and a great number of illustrations. Special price to current private customers - \$ 70, to all others including all dealers, museums, and libraries - \$ 130
- l. R.H. Nuttall, "MICROSCOPES from the Frank Collection 1800-1860". Paper bound book 8 1/4" w x 11 3/4" h with 64 pages, 60 photographic and 40 other illustrations and figures. In our opinion, this catalog of microscopes, now included in the permanent exhibits of the Royal Scottish Museum, Edinburgh, contains the most perceptive analysis of the early development of the achromatic microscope ever published. \$ 15
- m. J.A. Bennett + Olivia Brown - SURVEYING AT THE WHIPPLE MUSEUM Of The HISTORY Of SCIENCE, CAMBRIDGE UNIVERSITY - Two booklets in paper wrappers: "THE COMPLEAT SURVEYOR", an historical study to accompany a special exhibit, 30 pages with 64 illustrations; "Catalogue 1 SURVEYING", the museum's surveying instruments and old book collection, 46 pages with 61 illustrations. For sale to current customers only. \$ 5.50
- n. C.E. Smart, "THE MAKERS OF SURVEYING INSTRUMENTS IN AMERICA SINCE 1700". Both volumes. Best reference to American instrument makers ever published. Now out of print. Special price to current private customers - \$ 85, to all others - \$ 155

### CURRENT BOOKS ON SURVEYING

Roy Minnick's LANDMARK ENTERPRISES offers the finest selection of new books on the subject of anyone we know. Truly interested readers may write for a free copy of his latest catalog:

Landmark Enterprises  
10324 Newton Way  
Rancho Cordova, California 95670