

# **Naval Documents of The American Revolution**

**Volume 2**

**AMERICAN THEATRE: Sept. 3, 1775–Oct. 31, 1775**  
**EUROPEAN THEATRE: Aug. 11, 1775–Oct. 31, 1775**  
**AMERICAN THEATRE: Nov. 1, 1775–Dec. 7, 1775**

**Part 6 of 9**

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AMERICAN NAVIGATION  
DURING THE REVOLUTION



I. Shop sign of William Williams, instrument maker, Boston, 1768-1792. Courtesy of the Bostonian Society, Boston.

## AMERICAN NAVIGATION DURING THE REVOLUTION

By the time the first American man-of-war got to sea, the presently accepted theory of surface navigation had been fully developed. Magnetic direction finding had been known for five centuries and determining one's latitude with fair accuracy had been possible for three. Just a few years before the outbreak of the Revolution the last problem, "the discovery of the longitude," which after all meant nothing more than the definite determination of time locally and simultaneously at a prime meridian, had been solved in two radically different ways. The first, suggested as early as 1514, was only made easily available in 1767 by the publication of Dr. Nevil Maskelyne's *Nautical Almanack*, providing the necessary data for the computation of lunar distances. The second was the construction of an accurate time-keeper by John Harrison, conclusively proven at sea in 1762. Both of these had serious draw-backs for American mariners. For the first method a considerable knowledge of mathematics was necessary and with that foundation, to use the words of an American naval officer, "After the mariner has studied and perfected himself in the use of all the necessary books and tables . . . viz. The Nautical Almanac, The Requisite Tables and Shepherd's Tables, &c. he should endeavour to get a complete sextant graduated to quarter minutes, or to half minutes, at most, with a screw to move the index along the arch; Ramsden's intire brass sextants are by far the best, but it is not easy to procure one of them, as I was near four years after I had wrote for mine before I got it: and most people, . . . have met with the same difficulty." The second method demanded less learning but it also required an instrument—eventually known as the "chronometer"—one impossible to procure, for in 1775 less than half a dozen existed in the world, all in the hands of the British Commissioners of Longitude. Hence the American navigator was forced to continue the age-old reliance on dead reckoning.

What equipment, then, in the face of such conditions, was to be found on board the first American men-of-war? And by equipment one must include education as well as instrumentation. By far the majority of the commissioned officers of the Continental Navy had come from either the merchant service or the fisheries, and for the most part what they knew of the art of navigation had been the meager instruction their ambition had prompted them to get from their masters. A few, for instance Nicholas Biddle, had seen service in the Royal Navy and presumably had acquired a somewhat better professional training than experience in the Grand Banks, West Indian, or even the trans-Atlantic trade provided. To be sure in every major seaport there were so-called schools where navigation was taught, schools, usually run by either instrument dealers or by ex-mariners. Of these, one school master wrote, ". . . there are many who have thrown their money away to little or no purpose, by going to School to some Masters (of which sort there are too many) that have only got a Smattering on the Theory, and a few Terms of Art by Rote, which enables them to talk in such a manner as to deceive those that go to learn of them . . ." The reading of

such charts as were available, keeping a log, working a meridian altitude of the sun and getting a sight on the North Star were the usual accomplishments of the Revolutionary navigators. When one considers how few vessels were lost by stranding, they did surprisingly well with this meager knowledge. The unusually well-trained navigator probably could get his variation by a sun azimuth, and the less knowledgeable by a Polaris bearing. But neither group, nor any other for that matter, knew anything of compass correction or deviation. Although the position of some forty-five navigational stars had been well fixed, the only possible use of this knowledge was a meridian sight. Keeping the reckoning ahead of the ship, a bright look-out and the sounding lead active were the greatest assurances of getting the vessel safely to her destination.

If one may judge from the number of copies of navigation manuals preserved in our libraries and museums, the three most popular were:

Nathaniel Colson: *The Mariner's New Calendar* . . .

Thomas Haselden: *The Seaman's Daily-Assistant* . . .

Andrew Wakely: *The Mariner's Compass Rectified* . . .

All three went through many editions both before and after the War, and the second was actually reprinted in Philadelphia while it was in progress.

A study of several pre-Revolutionary copies of each book shows the most worn pages are those on plain sailing, working a traverse, the two latitude computations, the tables for the declination of the sun, and the tables of latitudes, longitudes and times of high water at each of the world's principal ports.

On the same basis, the most popular chart atlas and book of sailing directions was *The English Pilot*, the Fourth Book (commonly called the "Quarter-wagoner") covering the American coast and the West Indies and the First Book covering the British Isles, the Low Countries, and the European Atlantic Coast. These volumes had been first published in the late Seventeenth Century, and continued in print until the beginning of the Nineteenth, with some of the charts, though long out of date, never replaced. Toward the end of the Revolution a few *Atlantic Neptune* charts, vastly superior to those in the *Pilot*, came into American hands; Captain John Barry, for instance, owned many. As our vessels began to frequent the ports of France, the French imitations occasionally could be found. These were Le Rouge: *Pilote Américain Septentrional* . . . Paris, 1778, and *Neptune Americo-Septentrional* . . . Paris, 1778-80.

Of the physical equipment used by our navigators we have considerable knowledge through the inventories of two of our frigates, and by actual pieces of proper date to be found in museum collections. The first frigate launched was the *Raleigh* and the last in service, the *Alliance*. For each, an inventory of every object belonging to the ship has been preserved. The lists below are extracted verbatim from the original manuscripts; the illustrations following show examples of the pieces themselves together with sample pages from the manuals and charts. It will be noted that no charts, manuals of navigation, telescopes, or instruments for taking the altitudes of celestial objects are included in the inventories. All such gear was the personal property of the officers. This precluded any standardization of quality, condition, origin or style. Without doubt the

simple instruments, such as sounding leads, sailing compasses with wood bowls, log chips and boards, log reels and the like were American made. Many of the cross staves, Davis quadrants and a few of the Hadley quadrants definitely were, but the vast majority were imported, generally from England with an occasional piece originating in France or the Netherlands.

Only one American of the period in any way distinguished himself as a navigator: a privateersman who after the Revolution when the Navy was reconstituted became its fourth ranking captain, Thomas Truxtun. Blessed with a better than average formal education, a short service in the Royal Navy as a pressed man had added to his training and natural aptitude. At one time he aided Benjamin Franklin in his investigation of the Gulf Stream. Later he was master of one of the first American vessels to round Good Hope and open the way to China. In 1794 he published in Philadelphia a book entitled *Remarks Instruction and Examples relating to the Latitude and Longitude, Also The Variation of the Compass . . .* a book which Doctor Lawrence Wroth has said, "is a contribution to the art of navigation . . . reflecting credit upon the merchant and naval establishments of a young country struggling against odds for a place among the nations. It could not have failed to increase respect for that country among the mariners of the world."

Marion V. Brewington



TO BE SOLD AT  
**WILLIAMS'S**

Mathematical Shop, next Door  
to Major READ's, opposite the  
Town-House in *Marblehead*,  
A great Variety of Mathemati-  
cal Instruments, Books, and  
Stationary, among which are  
the following Articles,

The largest Af-  
fortment of Hadley's  
and Davis's Quad-  
rants ever in New-  
England.

A L S O,  
Hanging and Standing  
Compasses, in Brass  
and Wood,  
Gauging and Surveying  
Instruments,  
Cases of Mathematical  
Instruments, with  
Steel Joints,  
Half Cases Ditto,  
Telescopes of various  
Lengths, in Ivory,  
Wood, and Fish-  
Skin,

Plotting Scales and Pro-  
tracters,  
Gunter Scales and Di-  
viders,  
Four and Two Pole  
Surveying Chains,  
Artificial Magnets with  
Cases,

Sand Glasses, from  
Two Hours to a  
Quarter of a Minute,  
Instruments of a new  
Construction to mea-  
sure Boards,

An Assortment of Brass  
Pocket Compasses,  
Box Rules,  
Jack Knives,  
Brass and Pewter Ink-  
stands,  
Plated Shoe and Knee  
Buckles,  
Pinchbeck, Block-tin,  
and Brass Ditto,  
Compass Scales,

Watch Keys,  
Ass-Kin Memorandum-  
Books, &c.

**BOOKS**

West-India Pilot,  
Straits and Mediterra-  
nean Ditto,  
Southern Ditto,  
Guinea Ditto,  
Practical Navigation, by  
John Seller,  
Mariner's Calendar,  
Daily Assistant,  
Willson's Navigation,  
Young Man's Best Com-  
panion,  
Patoun's Treatise of Na-  
vigation,  
Atkinson's Epitome,  
A complete System of  
Navigation, by John  
Barrow,  
Large Charts of the Eng-  
lish Channel,  
Large Charts for the  
Coast of Guinea,  
Ditto for West-Indies,  
Ditto for North and  
South-Carolina,  
Nine Leaf Charts for  
the Straits and English  
Channel.

**STATIONARY.**

Writing Paper,  
Dutch Quills,  
Sealing Wax,  
Wafers,  
Scales,  
Black Lead and Slate  
Pencils,  
Quire Books covered with  
Marble Paper,  
Ditto ruled for Journals.

\* \* A Variety of Instruments, too tedious to men-  
tion are made and Sold at the above Place; and  
as he has had a thorough Experience, he  
doubts not of giving Satisfaction. He repairs  
Compasses and Quadrants.

N. B. All Instruments with said WILLIAMS'S  
Name will be made true without Charge.

School-House, Great-Dock Street, No. 18,

October 17, 1781.

**M.** EVANS's compliments to those whom  
he has taught Navigation, and requests the  
favour of their company, from 6 to 7 o'clock,  
in the evenings during the winter, having a  
few hints to give them in that art; particularly  
in finding the latitude by two Altitudes of the  
Sun, and the longitude by the distance of the  
Moon from the Sun, &c. as exhibited in John  
Hamilton Moore's Navigation. 3w.

II. Advertisements of a navigation teacher and  
an instrument dealer. From the Royal Gazette,  
New York, December 5, 1781, and the Salem  
Gazette, June 24, 1774, respectively.



"FAMILIAR AND PARTICULARLY INVENTORY OF ARTICLES BELONGING TO  
THE *Raleigh* FRIGATE . . . TAKEN IN FRANCE JANUARY 1778."<sup>1</sup>

[In the] Captain's Cabin

1 Hanging Brass Compass [Plate XII]

[On the] Quarter Deck

2 Bittacles

1 Dog Vane & Staff [Plate IX]

[Among] small stores

2 Log Reels [The log, Plate VII]

1 Deep sea Line Reel

1 Chest for Compass's & glasses

17 Half Hour glasses

28 Half & Quarter minute Do [Plates VII and IX]

3 Four hours do [Plate IX]

3 Two hours do

1 Azimuth Compass [Plate XI]

1 Amplitude Do

2 Sailing Brass Do [Plate XI]

4 Sailing—wood Do [Plate X]

20 Fishing Leads

5 Deep Sea Do [Plate VIII]

5 Hand do [Plate VIII]

2 Hanging Compasses

6 Coils large white deep sea Line

6 Log Lines

1 Deep Sea Line in use

2 Hand Lines do [Plate VIII]

1. Fox Papers, PM.

"ACCOUNT OF STORES UNDER THE CARE OF THE SEVERAL OFFICERS BELONGING  
TO THE CONTINENTAL SHIP *Alliance* BOSTON NANTASKET ROAD 25 DEC  
1781 JOHN BARRY ESQR COMMANDER AT SEA."<sup>1</sup>

2 Log Reels

12 Log Lines

5 Brass Compasses

4 Wood Compasses

1 Hanging do

2 Two hour Glasses

12 half hour Glasses

10 1/2-minute glasses

12 1/4-minute glasses

3 Binnacles

at Boston

16 Hand leads

4 Hand lines

1 Deep Sea line

6 Log Line

3 Deep Sea Leads

1. Hepburn Collection, Philadelphia.

# THE MARINER'S NEW CALENDAR.

Containing

The Principles of Arithmetic and Practical Geometry ;  
with the Extraction of the Square and Cube Roots :  
Also Rules for finding the Prime, Epact, Moon's  
Age, Time of High-Water, with Tables for the same.

Together with

Exact Tables of the Sun's Place, Declination, and Right-As-  
cension : Of the Right Ascension and Declination of the  
Principal Fixed Stars : Of the Latitude and Longitude of  
Places : A large Table of Difference of Latitude and De-  
parture, for the exact Working a Traverse.

A L S O

The Description and Use of the Sea-Quadrant, Fore-Staff  
and Nocturnal : Necessary Problems in Plane-Sailing and  
Astronomy, wrought by the Logarithms, and by *Gunter's*  
Scale : A Tide Table : The Courses and Distances on the  
Coast of *Great Britain, Ireland, France, &c.* And the  
Soundings at coming into the Channel : With Directions for  
sailing into some Principal Harbours.

B Y

NATHANIEL COLSON, *Student in the Mathematics.*

The whole revis'd, and adjusted to the *NEW STYLE*,  
By WILLIAM MOUNTAINE, F.R.S.

London : Printed for W. and J. MOUNT, T. and T. PAGE,  
on *Tower-Hill*, 1754.

Where you may have all Sorts of Mathematical Books.

# THE Mariner's Compass RECTIFIED.

Containing TABLES, shewing the true Hour of  
the Day, the Sun being upon any Point of the  
Compass : With the true Time of the Rising  
and Setting of the Sun and Stars, and the Points  
of the Compass upon which they rise and set :  
With Tables of Amplitudes. Which Tables of  
Sun-Dials, Semidiurnal Arches and Amplitudes  
are calculated from the Equator to 60 Degrees  
of Latitude, either North or South.

With the Description and Use of those Instruments most  
in Use in the Art of NAVIGATION.

A L S O

A TABLE of LATITUDES and LONGITUDES  
of Places.

By ANDREW WAKELY, Mathematician.

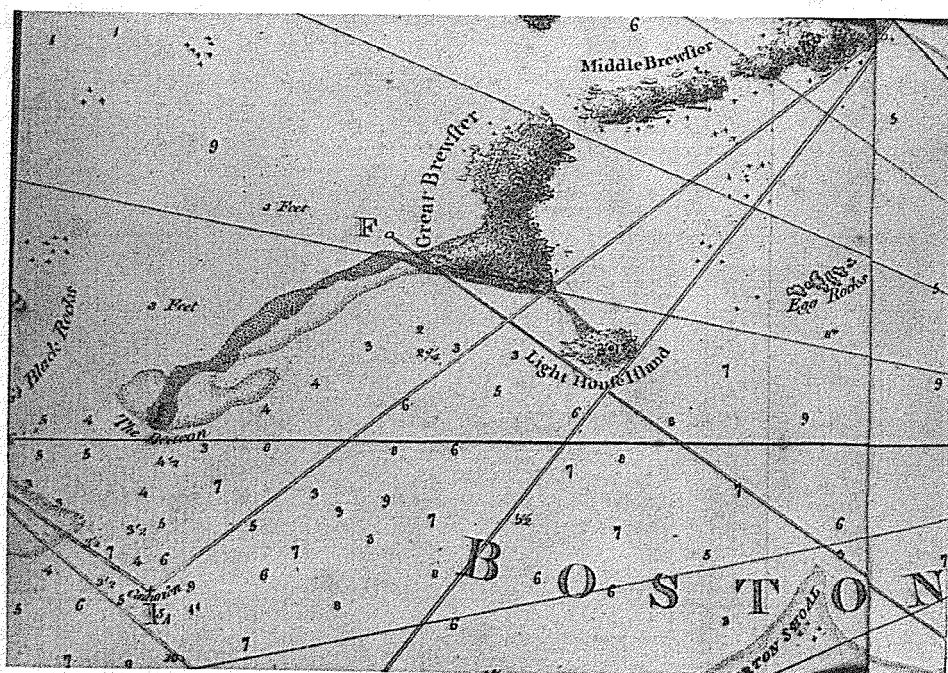
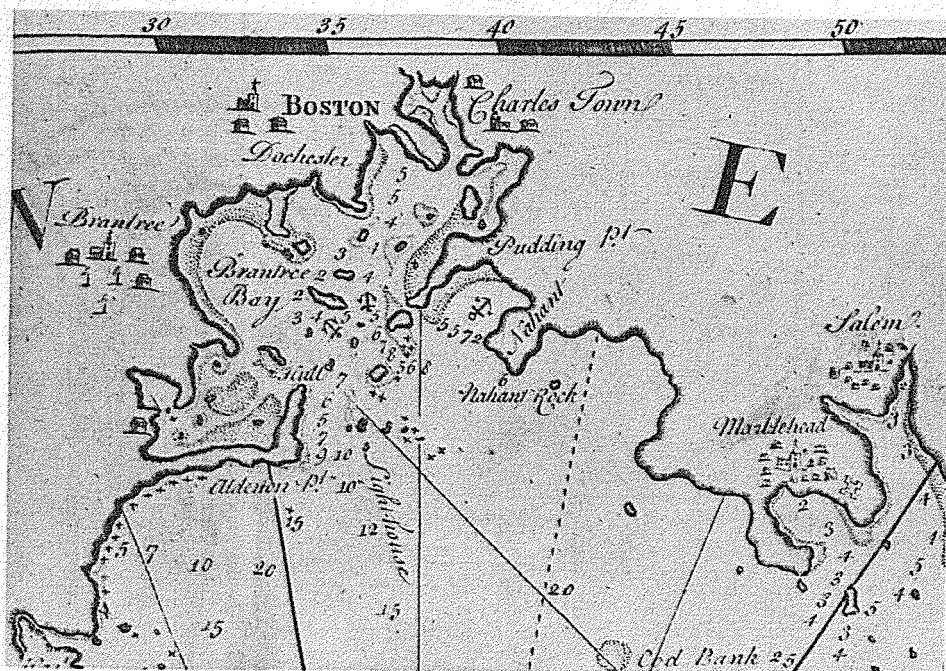
Enlarged with many useful Additions by J. Arkison.

The Whole revised, and carefully corrected, with accurate  
TABLES of the Sun's Declination, adjusted to the N.S.

By WILLIAM MOUNTAINE, F.R.S.

L O N D O N :

Printed for J. MOUNT and T. PAGE, on *Tower-hill*,  
where you may have all Sorts of Sea Books, 1772.



IV. (Top) Detail of a chart, from *The English Pilot, Fourth Book*, London, 1773, showing Boston Harbor and approaches. (Bottom) Equal area of a chart of Boston Harbor, from *The Atlantic Neptune*, London, 1776-81, showing the great improvement in hydrographic knowledge available to the Royal Navy.

H.	K.	F.	Courfcs.	Winds.	Lee-way.	REMARKS on Board, Sunday, May 4th.
2						These 24 Hours moderate Gales, and fair Weather.
4						
6						
8	4		S. W. by W.	N. E.		
10	4	5				At 6 P.M. the Lizard bore N. E. Diflance 6 Leagues, from which I rake my Dep. it being in the Lat. of 49° 57' N. and Long. 5° 14' West of London.
12	5					
2	5					
4	5	5	S. W.			
6	5	5				Unbent the Cables and ftowed the Anchor. Several Sail in Sight, ftanding to Weftward.
8	5	5				
10	5	5				
12	6	5				
						Variation 1½ Point Weftcrly.

Courfc.	Diff.	S.	W.	Lat. by D. R.	Lat. by Ob.	Mer. Diff.	Diff. Lon.	Long. in	Bearing and Diff.
S. 27° W.	107	90	48	48. 21 N.		0° 48'	73	6° 27' W.	Func. S. 27° W. 1060 M.

The Lizard bearing N. by E. Dist. 6 Leagues from the Ship is the same as if the Ship had sailed from the Lizard 6 Leagues or 18 Miles upon the opposite, or S. by W. Point of the Compass, and allowing for the Variation (as before taught) makes it S. half E. Dist. 18 Miles, which is to be set down as the first Course and Distance in the following Traverse Table.

The first Course steered by Compass is S. W. by W. which, allowing for the Variation, makes S. W. by S. half W. and the Sum of all the Distances sailed on that Course till 2 o'Clock, when it alters, is 18 Miles and an half, which being doubled, because the Log is heaved every 2 Hours, gives 37 Miles; so the second Course and Dist. to be set down in the Traverse Table is S. W. by S. half W. 37 Miles. In like Manner the second Course steered is S. W. and the Variation allowed makes it S. S. W. half W. and the Dist. on that Course summed up and doubled, gives 56 Miles; therefore the third Course and Dist. to be set down in the Traverse Table is S. S. W. half W. 56 Miles. Having found the whole Difference of Latitude and Departure made upon the several Courses, I then mark down upon my Slate or Paper what every Thing that is to be found comes to, and afterwards set them down in their proper Columns as above.

TRAVERSE TABLE.						Now to Diff. of Lat. 95.9 S. and Dep. 48.1 W. the Course is S. $27^{\circ}$ W. Dist. 107 Miles; then Lat. failed from, or Lizard's Lat. $49^{\circ} 57'$ N. Diff. of Lat. 1 36 S. Lat. in, or Ship's Lat. $48^{\circ} 21'$ N. Sum of Lats. 98 18 Middle Lat. 49 09 Com. of Middle Lat. $40^{\circ} 51'$ Then with this Com. of Mid. Lat. $40^{\circ} 51'$ , or $41^{\circ}$ found as a Course among the Degrees, and the Dep. 48.1 in its Column, in the Dist. Col. stands 73, which is the Diff. of Long.
Courses	Dist.	N.	S.	E.	W.	
S. $\frac{1}{2}$ E.	18		17.9	1.8		
S. W. by S. $\frac{1}{2}$ W.	37		8.6		23.5	
S. S. W. $\frac{1}{2}$ W.	56		9.4		26.4	
			95.9		49.9	
					1.8	
					48.1	

Longitude failed from, or Lizard's Longitude  $5^{\circ} 14'$  W.  
 Difference of Longitude 73 Miles =  $1^{\circ} 13'$  W.  
 Longitude in, or Ship's Longitude  $6^{\circ} 27'$  W.

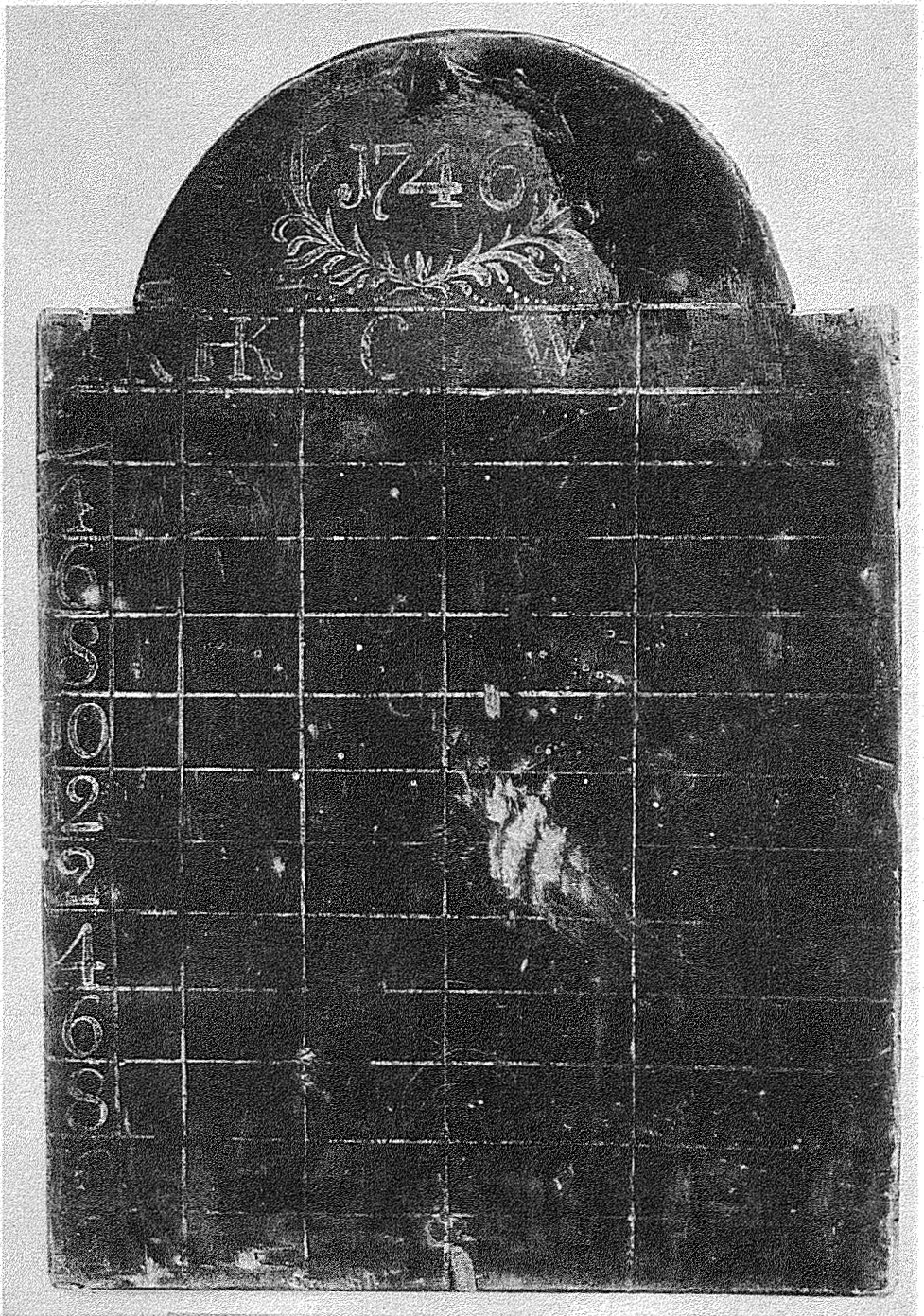
Now to find the Course and Distance to the intended Port;

	Mer. Parts.	Ship's Long.
Ship's Lat. $48^{\circ} 21'$ N.	3323	$6^{\circ} 27'$ W.
Funchal's Lat. $32^{\circ} 38'$ N.	2073	$17^{\circ} 6'$ W.

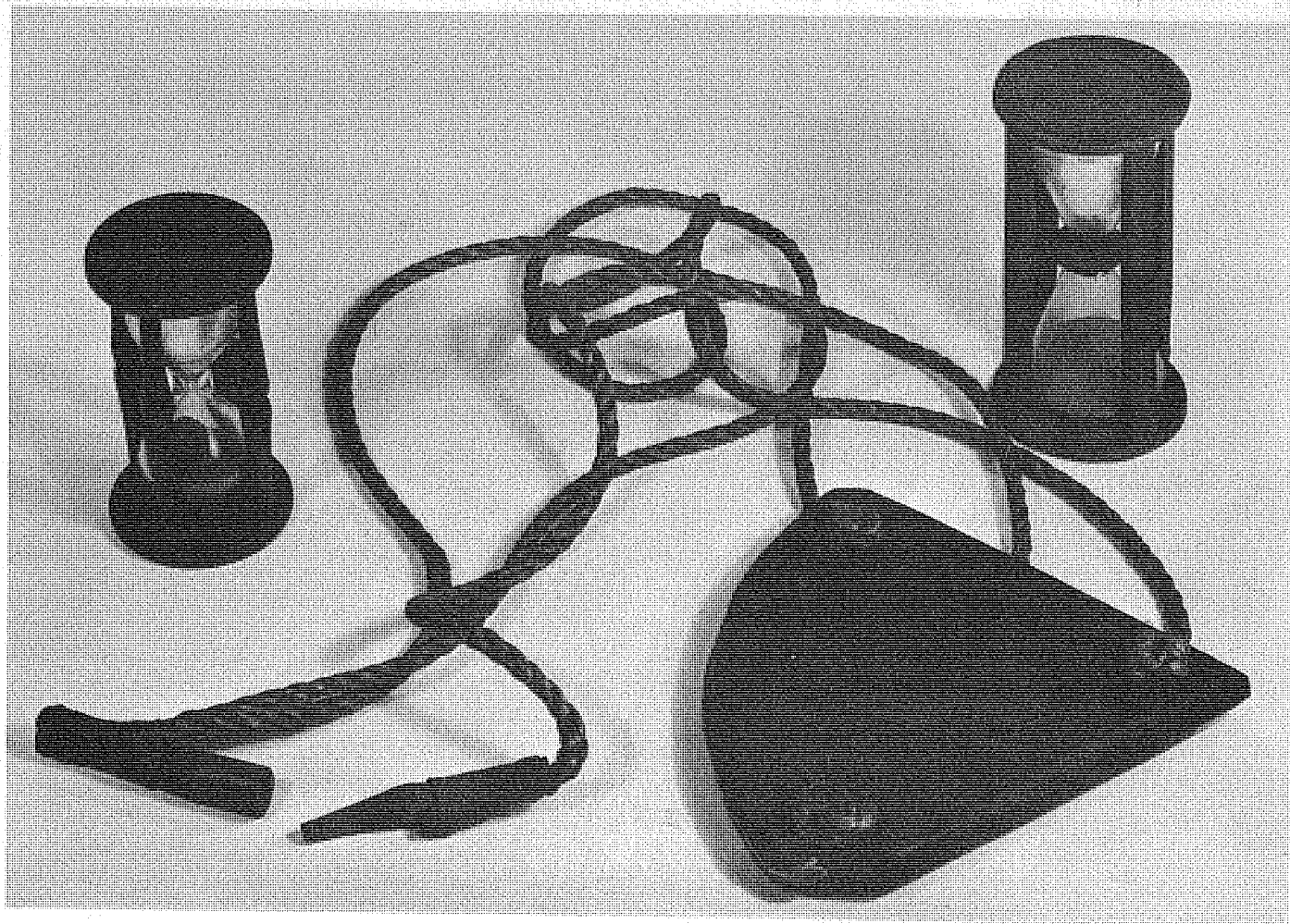
Diff. Lat. 943 Miles =  $15^{\circ} 43'$  Mer. Diff. Lat. 1250 Diff. of Long. 639 Miles =  $10^{\circ} 39'$  W.

So from the Ship to Funchal the Course is found by Mercator's Sailing to be S.  $27^{\circ}$  W. Distance 1060 Miles.

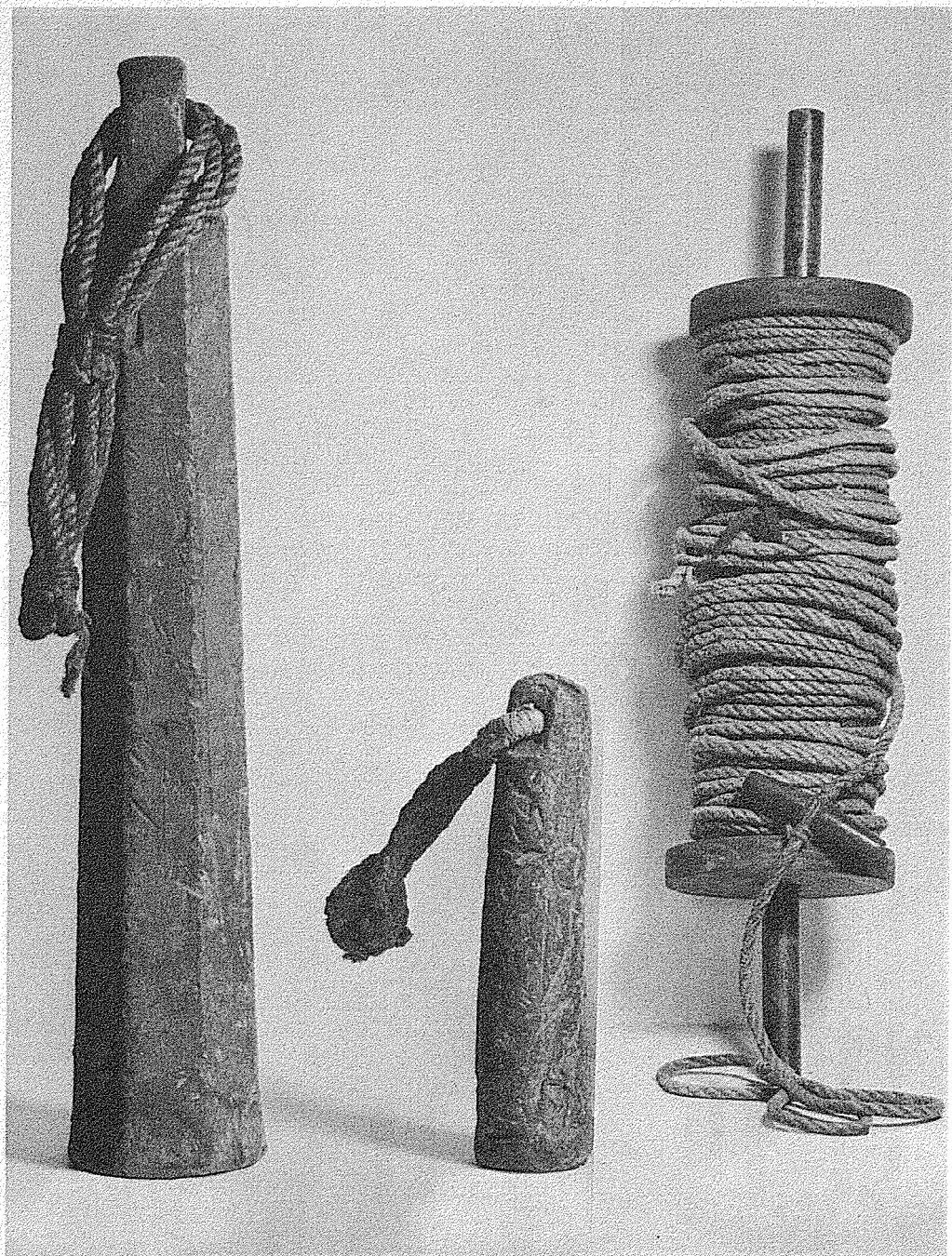




VI. Log board, dated 1746, for recording the "day's work." Columns are for Hours, Knots, Half Knots, Courses Steered, Wind Direction, and Remarks.

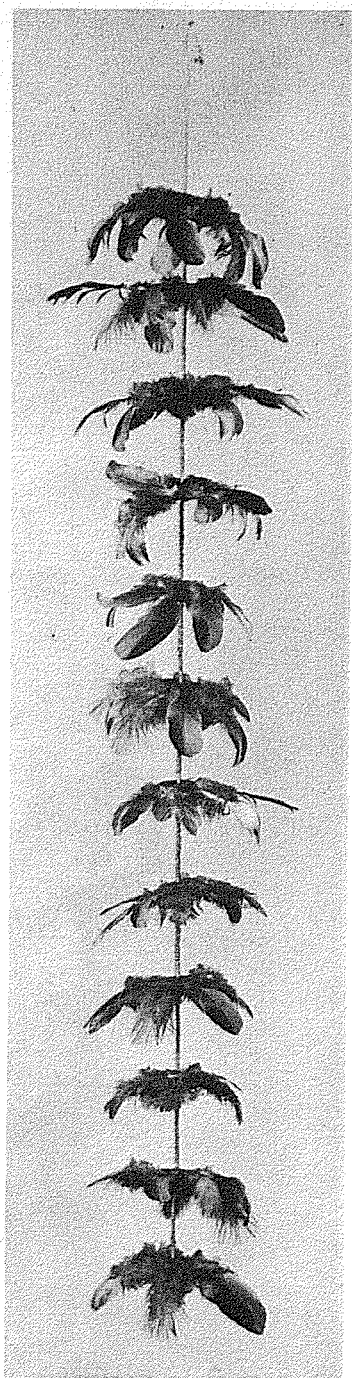
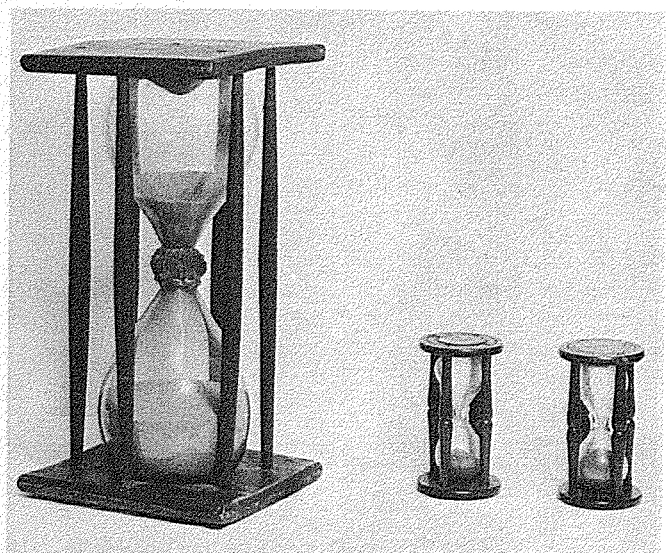


VII. Chip Log with slip-pin bridle, and fourteen- and twenty-eight-second glasses.



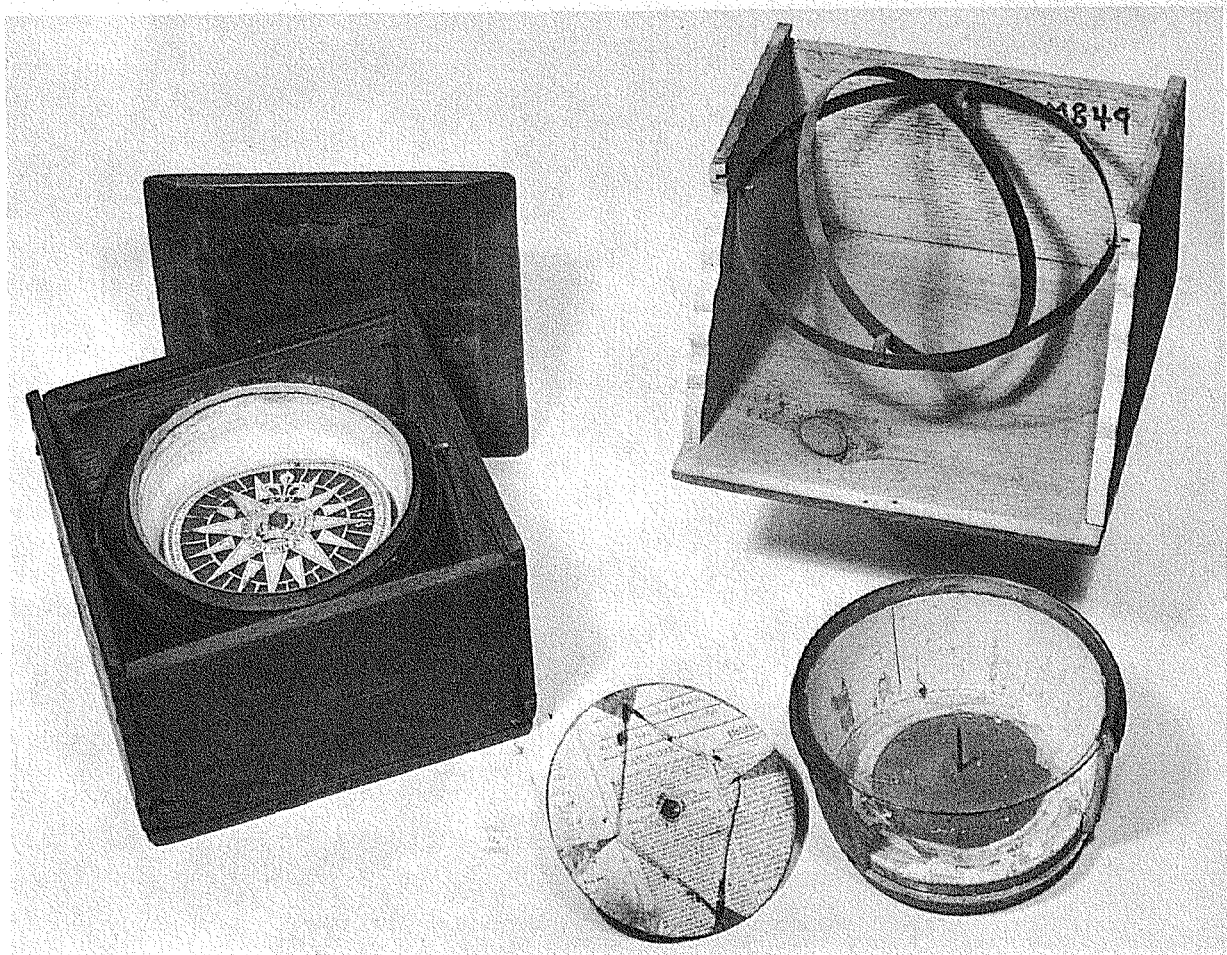
VIII. *Sounding Leads: Deep Sea and Hand; with Line Reel.*



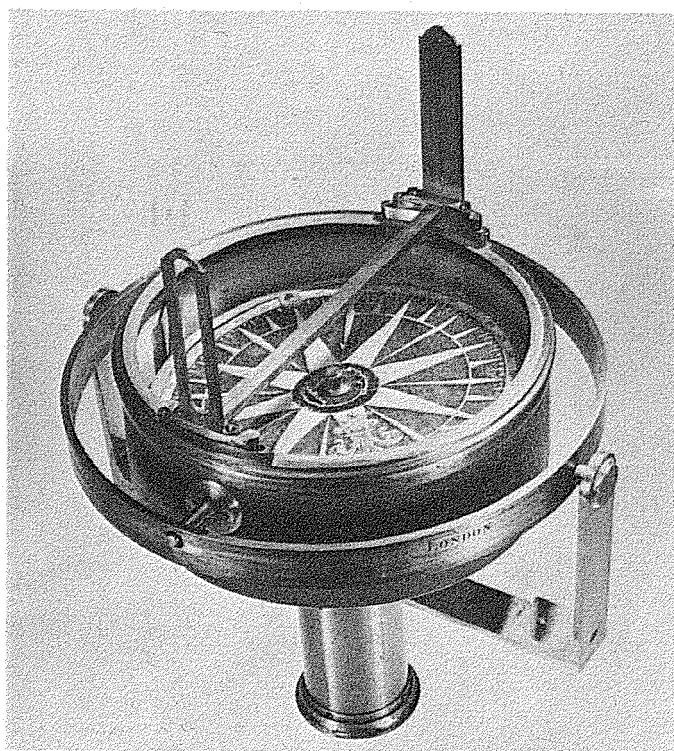
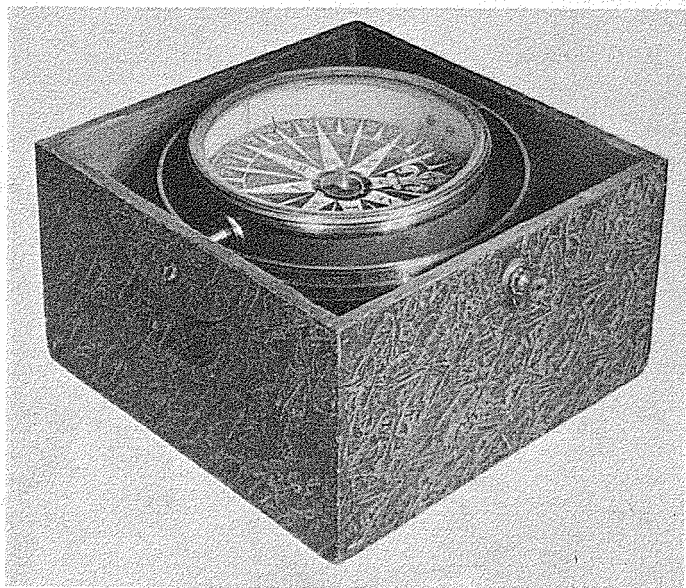


IX. (Left) Sand Glasses: four-hour, fourteen-second, and twenty-eight-second. (Right) Dog Vane, made of chicken feathers thrust into corks threaded on cord which, tied in the rigging, would detect even the slightest breezes.

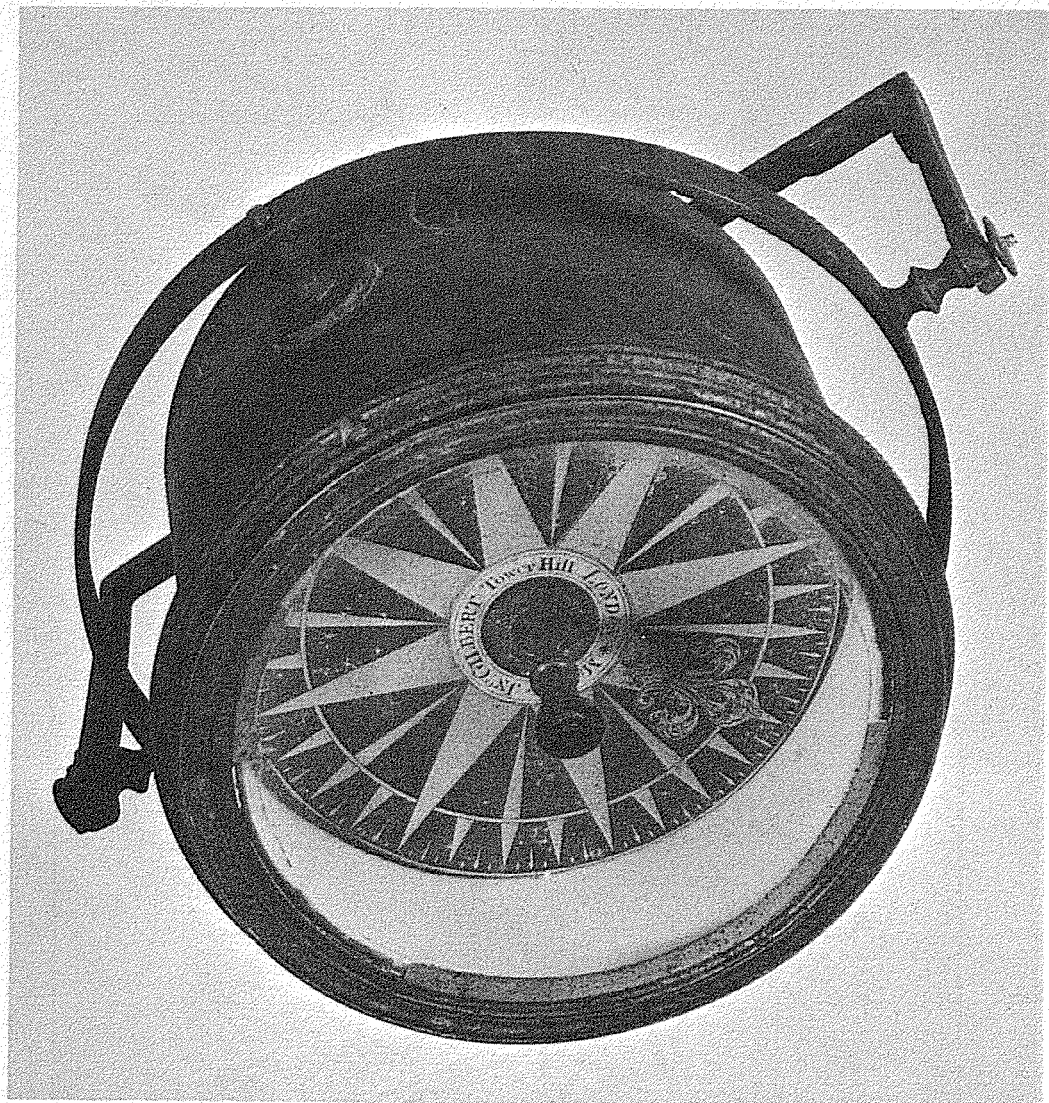




X. Wood bowl Steering Compasses: left, marked: "Made & sold by Benjn. King Salem, New-England", before 1775.  
Right, sectioned compass by King showing the needle system.

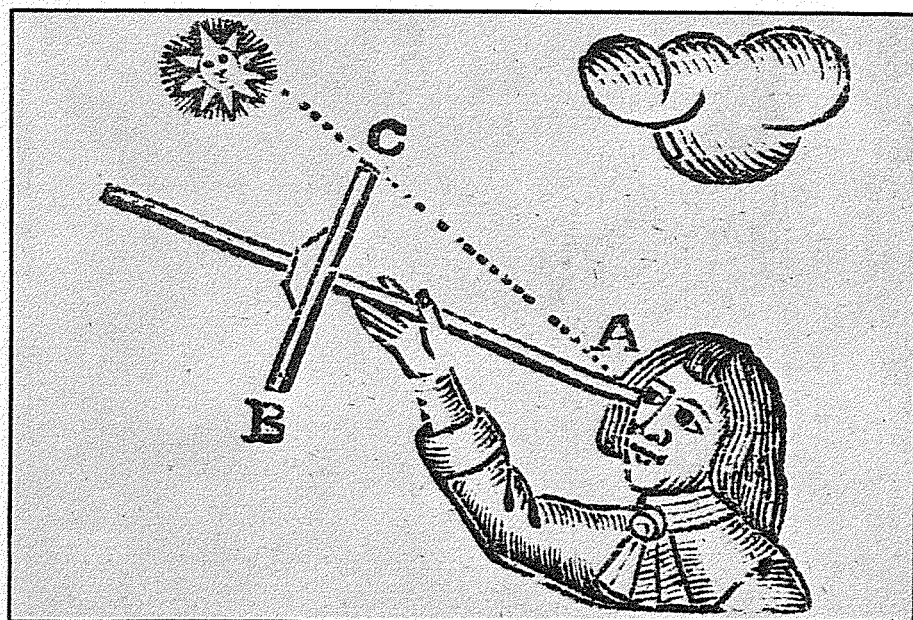
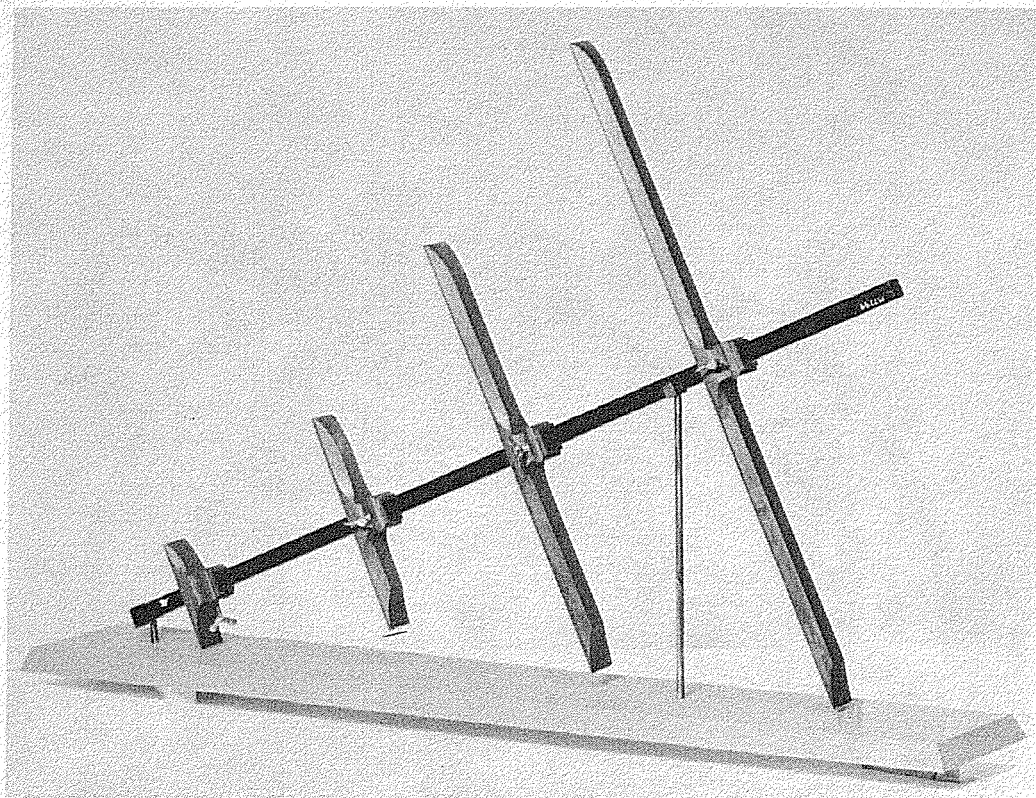


XI. (Top) *Brass bowl Steering Compass, made by E. Nairne, London, 1765.* (Bottom) *Azimuth Compass (removed from its wooden box), made by E. Nairne, London, 1765.* Both, courtesy of Harvard University, Cambridge.

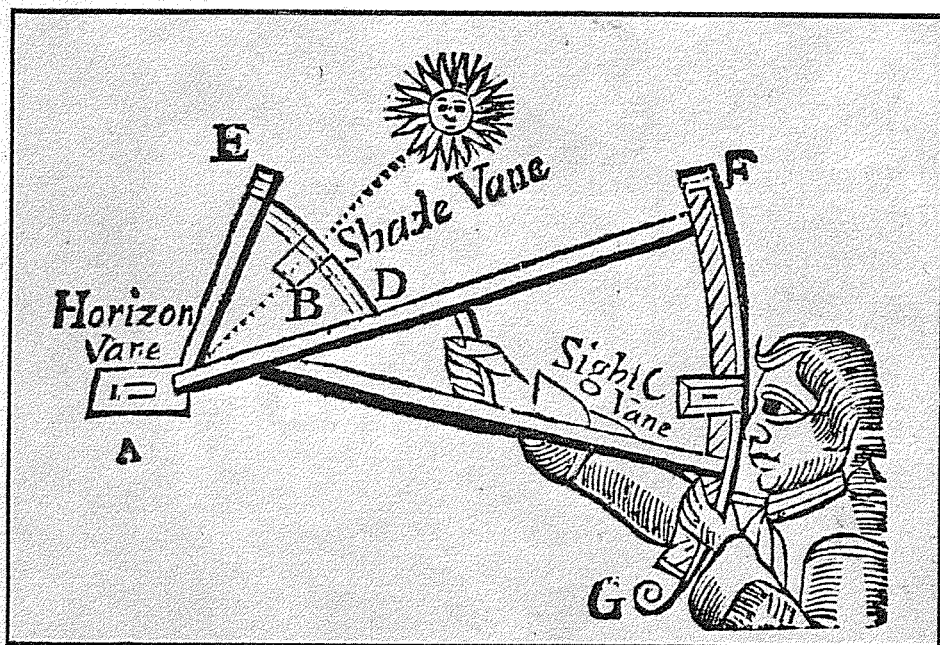
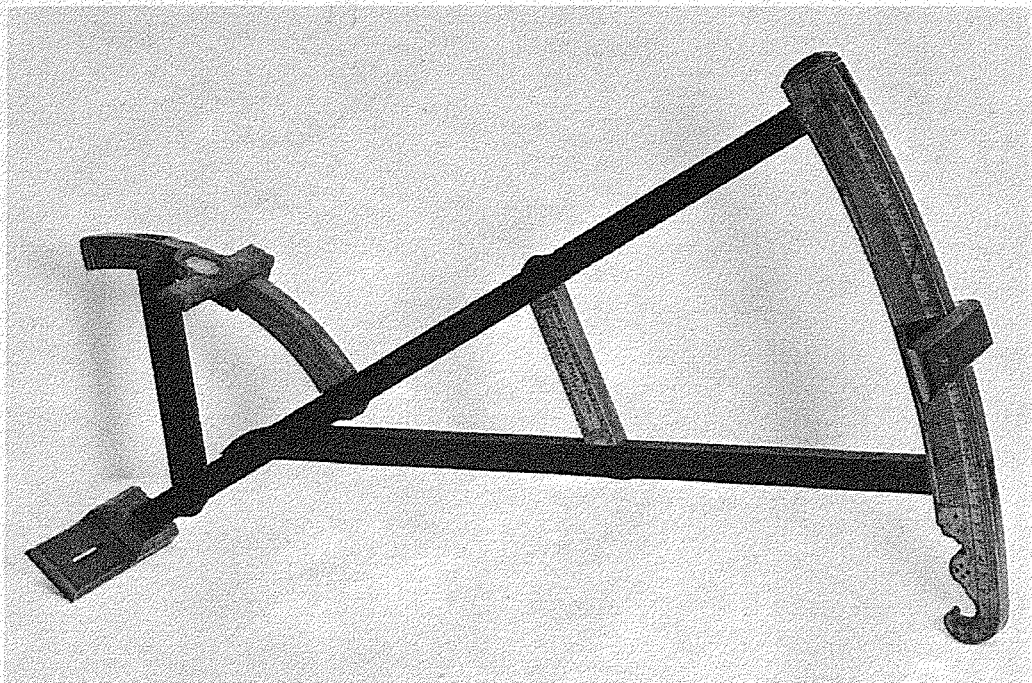


XII. *Hanging Compass, the brass case "Made by Jno Gilbert Tower Hill, London."*

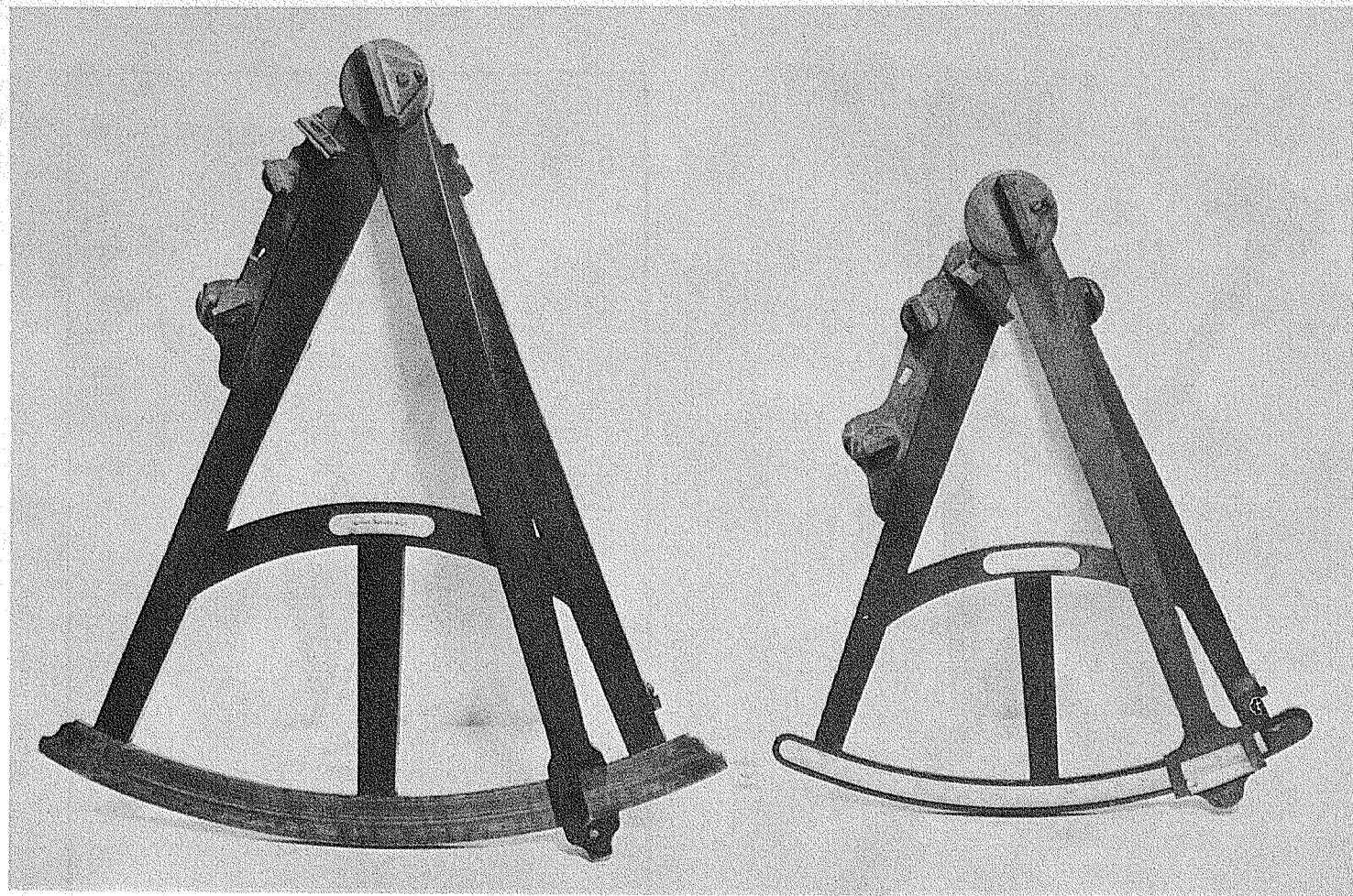




XIII. *Cross Staff, probably made by Anthony Lamb, New York, 1748, with a diagram showing its use.*

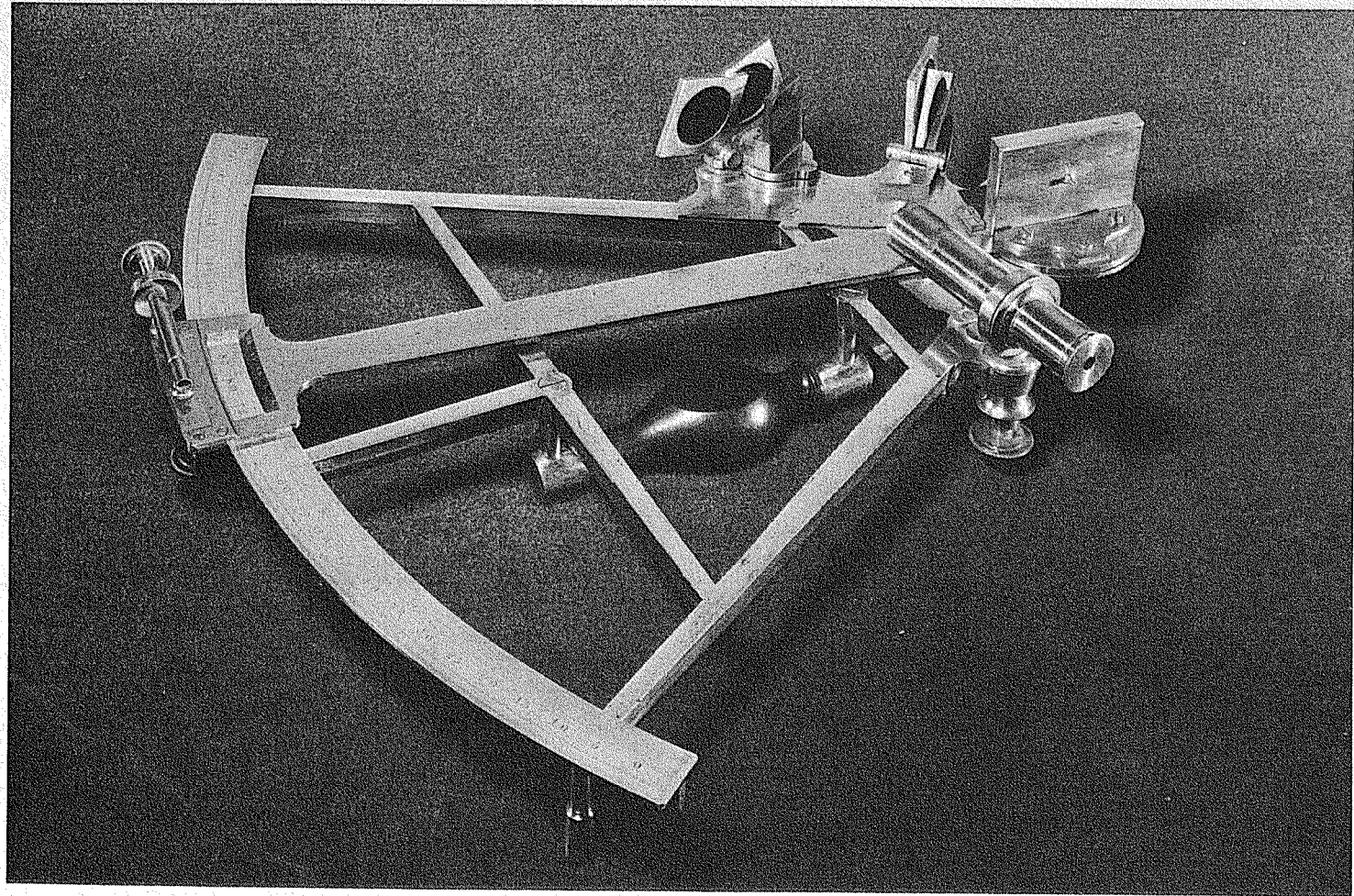


XIV. Davis Quadrant, marked: "Benja King, fecit, Salem, New England 1775," with a diagram showing its use.



XV. Hadley Quadrants, the left marked: "Arthur Ryburn 1772," made by "Sterrop London"; the right marked: "Made by Thos Ripley . . . Hermitage London for Iohn Ness Febry 19, 1773."





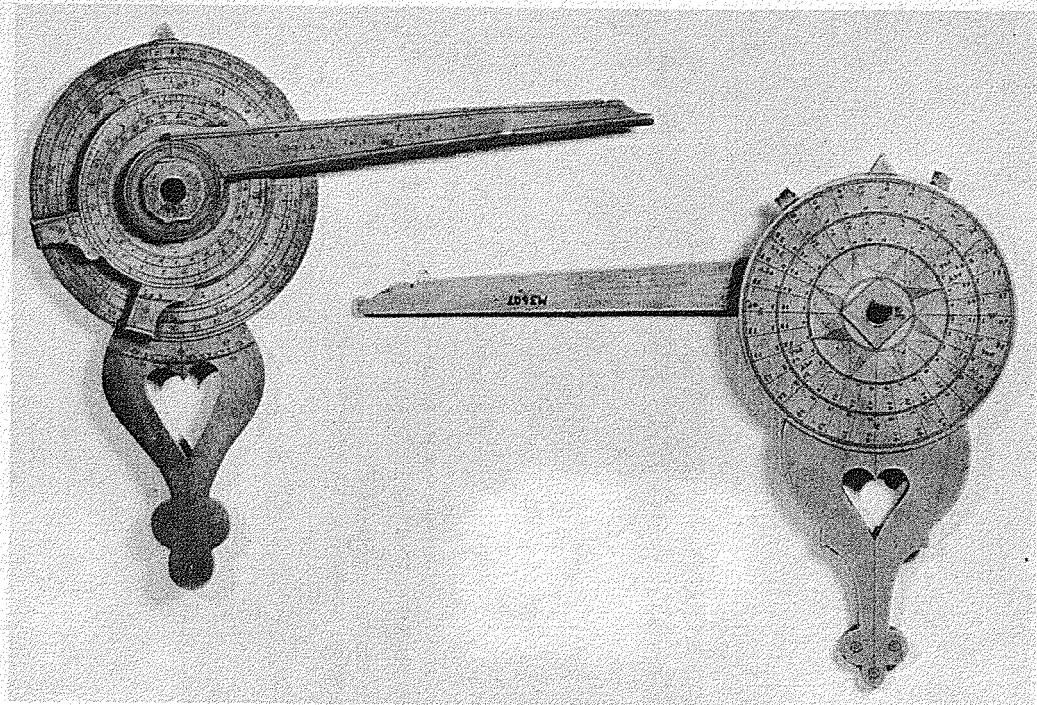
XVI. Sextant, by Ramsden, c. 1770–80. Courtesy of the National Maritime Museum, Greenwich, England.

*Leap-Year.*

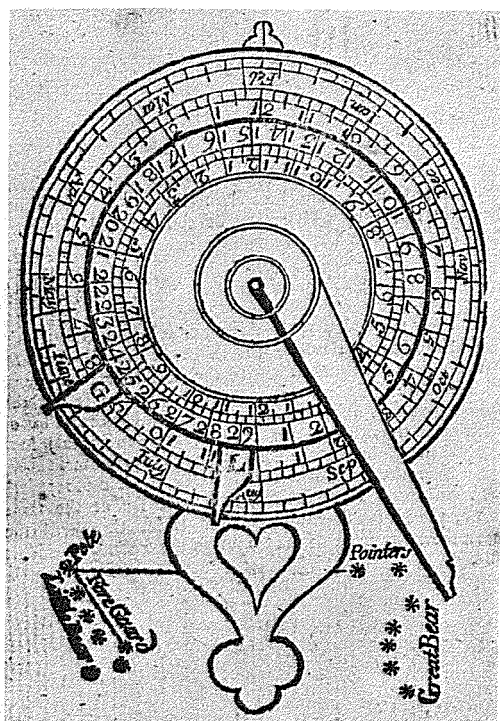
Sun's Declination 1772, 1776, 1780, 1784.

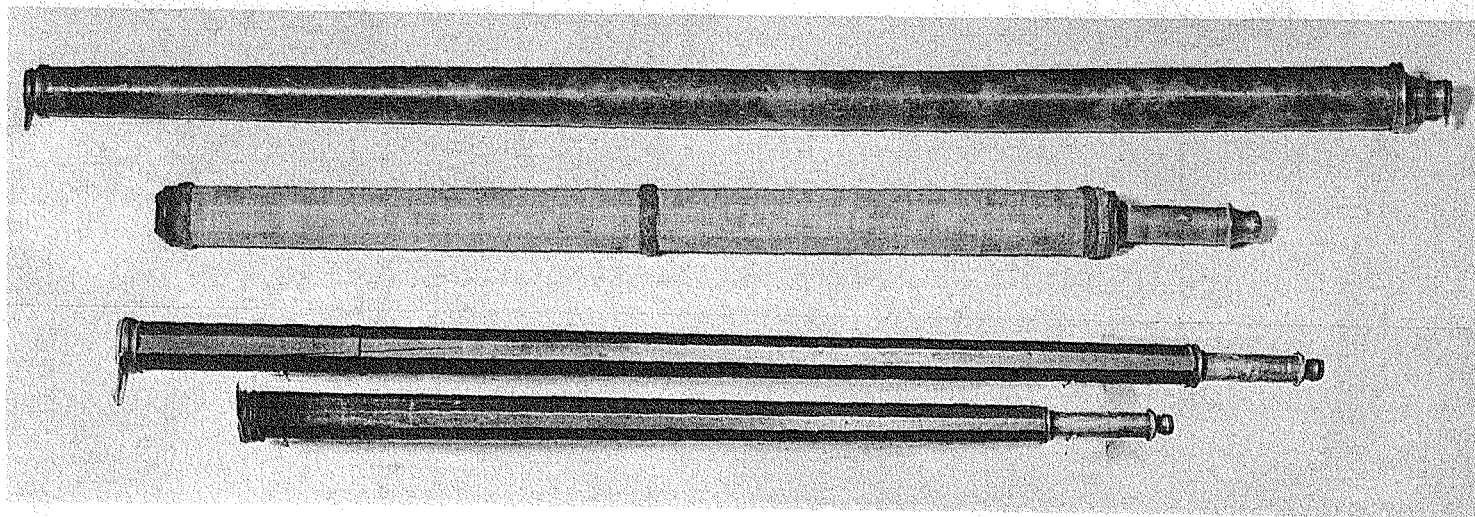
Days	Jan.		Feb.		March		April		May		June	
	South		South		South		North		North		North	
	D	M	D	M	D	M	D	M	D	M	D	M
1	23	02	17	10	07	17	04	50	15	18	22	10
2	22	57	16	54	06	54	05	13	15	36	22	18
3	22	51	16	35	06	31	05	36	15	54	22	25
4	22	46	16	17	06	08	06	00	16	11	22	32
5	22	39	15	59	05	44	06	22	16	28	22	38
6	22	32	15	40	05	21	06	45	16	46	22	44
7	22	25	15	22	04	58	07	07	17	01	22	50
8	22	17	15	03	04	34	07	30	17	17	22	56
9	22	08	14	44	04	11	07	52	17	33	23	01
10	22	00	14	24	03	47	08	14	17	49	23	05
11	21	51	14	05	03	24	08	36	18	04	23	09
12	21	41	13	45	03	00	08	58	18	19	23	13
13	21	31	13	25	02	37	09	19	18	34	23	16
14	21	21	13	05	02	13	09	41	18	59	23	19
15	21	10	12	44	01	49	10	02	19	03	23	22
16	20	59	12	24	01	26	10	24	19	16	23	24
17	20	47	12	04	01	02	10	46	19	30	23	25
18	20	35	11	42	00	38	11	05	19	43	23	26
19	20	22	11	20	00	14	11	26	19	56	23	27
20	20	10	10	59	Nor. 09		11	47	20	08	23	28
21	19	57	10	37	00	33	12	07	20	20	23	28
22	19	43	10	16	00	56	12	27	20	32	23	27
23	19	29	09	54	01	20	12	42	20	43	23	26
24	19	15	09	31	01	45	13	07	20	55	23	25
25	19	01	09	09	02	07	13	26	21	05	23	24
26	18	46	08	47	02	31	13	45	21	16	23	22
27	18	30	08	25	02	54	14	04	21	26	23	19
28	18	15	08	02	03	18	14	23	21	35	23	17
29	17	59	07	39	03	41	14	42	21	44	23	13
30	17	43			04	04	15	00	21	53	23	10
31	17	26			04	27			22	02		



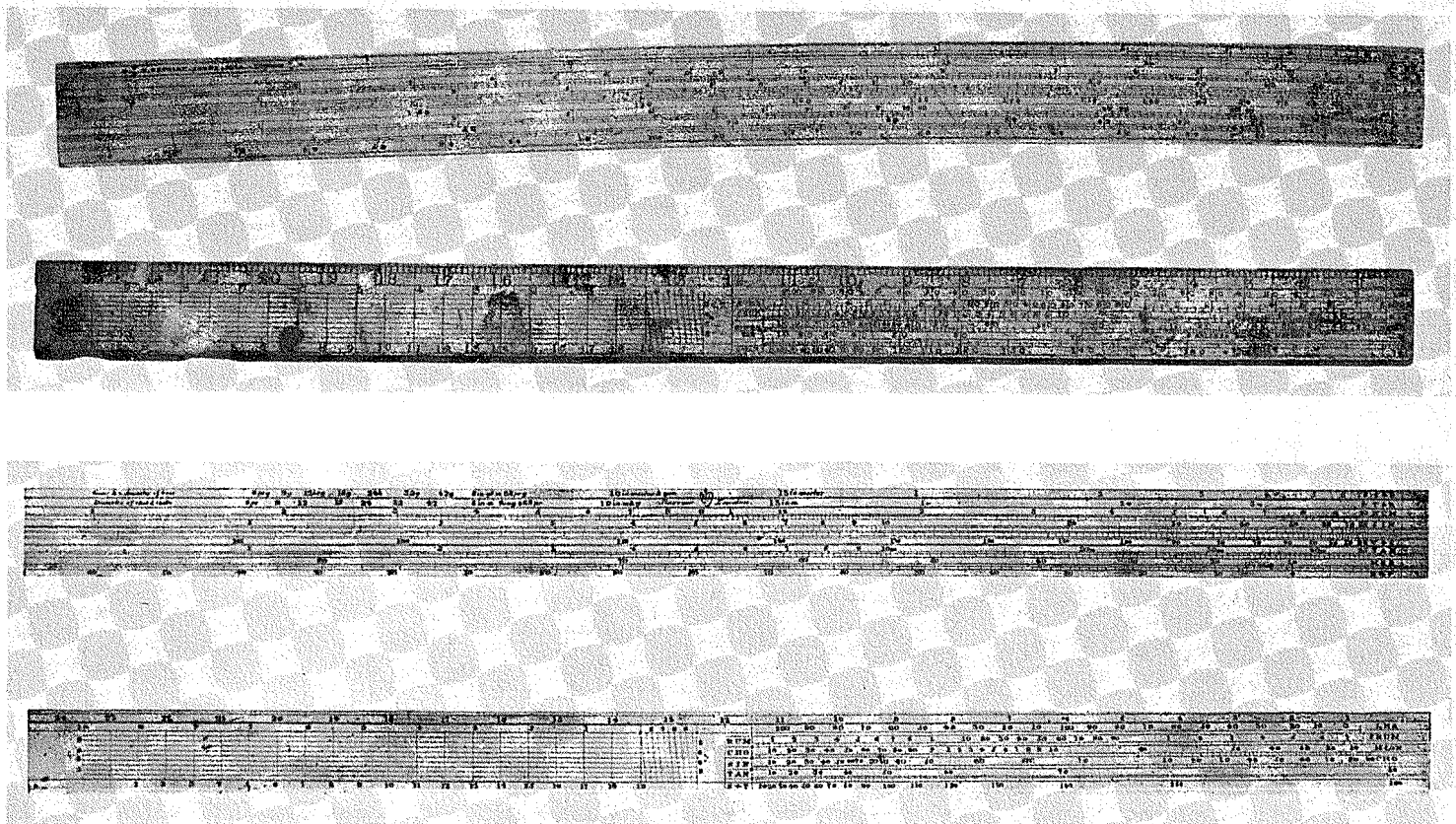


XVIII. (Top) Nocturnals: left, obverse; right, reverse, showing declination corrections for Polaris. (Right) Use of the nocturnal: set the Pointer G(reat Bear) or L(ittle Bear) on the month and day; sight Polaris through the center hole; for G, line the arm with Pointers; for L, line the arm with Guards. Read local time on the proper ring. The reverse shows Polaris correction in line with the arm.





XIX. *English-made telescopes, dating from 1730 to 1785.*



XX. (Top) Boxwood Gunter's Rules. (Bottom) Brass Gunter's Rule, an early type of slide rule. Traditionally owned by Captain Samuel Tucker, Continental Navy. Marked: "Barrow London," and with the stamp of the East India Company. Courtesy of the U.S. Naval Academy Museum, Annapolis, Maryland.