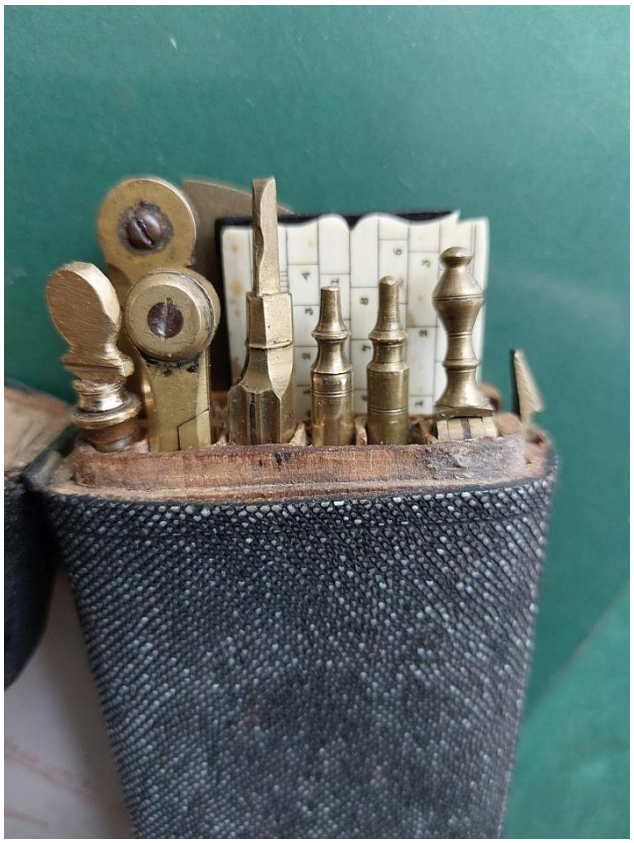
An English Pocket Case for Mathematical Drawing Instruments Around 1800



Jaap den Hollander

CONTENTS

I. INTRODUCTION

If portable pocket cases filled with mathematical instruments could talk, then they had a lot to tell about the places they have visited and the owners they brought with them. While travelling on the Grand Tour or for work a pocket case with mathematical drawing instruments is a piece of the equipment, the owner always had within reach. Many English architects have made a trip through Europe via Paris to Italy and other places around the Mediterranean Sea to visit notable places with ancient and 'modern' architecture. But marine officers[1] who sailed around England, Ireland, Scotland and in other waters also needed their tools to plot their shipping routes. Surveyors also travelled the mainland and mapped the areas. An inconspicuous yet functional pocket case was one of their attachments.

This study is devoted to an inconspicuous object that holds mathematical instruments together, a portable sort of packaging, storage case, holdall, case of instruments, a pocket case that fulfil a role by the work of architects, draftsmen, surveyors, visual artists, etc. This last sentence shows the different names for this artefact.[2]
Searching for the concept “case maker” gives unintentionally a lot of findings for “in this case then” etc. Linguistically, a problem arises here when searching in written sources in English. The French language is blessed with one term: “Gainier”, but the sentence ”case maker” is in both languages not very exhaustively described. The Encyclopedie of Diderot et d’Alembert of 1765 shows a illustration of a working place or “attelier” of a “Gainier” or a “Gainerie”. [3] Certainly worth mentioning is a text about ‘Gantiers’ in relation to Didier le Gamnié. [4] The profession of ‘Gainier’ or ‘Gantier’ was in France a not bound to one specialized type of object. In Amiens was for example in the 16th century already a ‘Rue des Gantiers’.

The upright cases and their content were sold in England in the 18th century by mathematical, philosophical, optical instrument makers, some goldsmiths and some booksellers. Given the large number of similar 18th century portable storage cases for mathematical instruments covered with fish skin, it is possible that they came from a single manufacturer. In France it is since 1704 not allowed for painters to sell mathematical instruments. [5] These painters are granted to sell pigments and paints besides their profession as a painter. The same is in England. In France, the professionals were divided into professional groups after the dissolution of the Guilds in 1648.

---

[1] Charles Blunt (1775- after 1853). In a four-page 1816 advertisement from Charles Blunt: “*Young naval officers find great advantage and convenience in having their mathematical instruments methodically arranged in one compact case: they are naturally kept in much better order than when foosely scattered in a chest, they are readily found at the instant they are wanted; and, in any of those perilous emergencies to which the service is exposed, the complete collection of instruments can be secured at once.*”

[2] Henry WinhamDickinson (1870-1952), D. A brief history of draughtsmen's instruments, Transactions of the Newcomen Society, Vol. XXV11 1949-50 : *“Somewhere about the middle of the 16th century it began to be the custom to assemble instruments in cases (Fr. etui; Ger. Besteck [JdH ?]). At first they were upright, with the instruments inserted vertically, covered in Shagreen or in leather with, perhaps, a sling to carry them over the shoulder. Later they were assembled more conveniently in the horizontal position in wooden magazine cases; these, lined with velvet continue to the present day”.*

[3] Diderot et d'Alembert: Encyclopédie - Suite du Receuil des Planches sur les Sciences et les Arts, Paris, 1765
GAINIER (Boutique, Travail, Outils & Ouvrages)

[4] Histoire de Nancy. par Chr. Pfister, [..],Tome II,[...] Berger-Levrault & Co., Paris/Nancy, 1909. p.173
https://gallica.bnf.fr/ark:/12148/bpt6k56730328/f190.item: *“Or, sur ce personnage, nous avons quelques renseignements précis. Son vrai nom était Didier Fossier; il remplissait le métier à la fois de fabricant d'armes blanches et de poudres. Ces ouvriers, très recherchés, étaient appelés en latin des vaginarii, parce qu'ils confectionnaient aussi des gaines pour les sabres et les poignards ; en français, on les nommait des gantiers.”*

[5] Les_métiers et_corporations_de_[...]Lespinasse_René_bpt6k55440899.pdf
1736, 20 juin. — Arrêt du Parlement en conformité de celui du 11 juin 1704, rendu à l'occasion des nouveaux statuts des peintres et sculpteurs del'Académie de Saint-Luc, établissantque les peintres ne vendrontaucuns instruments de mathématiques, règles, compas, etc., réservés aux fondeurs. (Coll. Rondonneau,AD, XI, vol., p. 202.)

For the production of newly developed instruments, the government in France had established professional groups to prevent unfair competition. Mathematical instruments in France and England underwent a major development in the 18th century, which received a lot of attention in the field of legislation. [6]

Portable cases, to store these instruments, do not seem to be part of this. While there were also many changes in the medical field (cases with surgical instruments), household field (cases with eating utensils), optical field (glasses, brills), etc. Instrument Makers at the Royal Society of London in the Eighteenth Century had a monopoly for selling their instruments. About the making of portable pocket cases to store mathematical (drawing) instruments is hardly information. In the mid-18th century, there was a domestic market in England for the manufacture and trading of instruments but without a guild of its own. Many instrument makers were often originally from other disciplines and not active in London.

About the construction and fabrication of the pocket cases for these instruments is little known.[7] However, all the more so about the content. There is usually interest in the exterior cladding of these types of objects, but the interior remains hidden.
The most common size of a case for mathematical instruments is either six inches or four and a half (though the former is more frequently used). The length of the sector or the plain scale sometimes determines the height of these instrument cases.

The mathematical drawing and measuring instruments have been described in a lot of studies in the 18th century and their functions have been accurate explained. However the used storage cases are underexposed. The most practical description of the drawing and measuring instruments with illustrations per object is of William Ford Stanley (1866) [8] [9]

Perhaps is this study helpful by the recognition and restoration of 18th century pocket cases for mathematical drawing instruments. Around 1815, with the transition from ink ruling pen with a hand cut (butterfly) wing shaped screw to a brass ruling pen with a finely turned handle and thumb screw, a transition that is based on practical and ergonomic causes such as difficult manual handling, too great a chance of breaking/bending of the wings and getting caught in the rectangular columns of the pocket cases. Flat, rectangular wooden storage boxes with lockable lids come into fashion. The layout of these boxes shows a number of vertical upright strips between which the instruments can be placed.

---

[6] Duncan J. Melville, Dividing to Rule: Precision Mathematical Instruments in mid-18th Century England, St. Lawrence University ,12/6/2013
"Many practitioners had been trained in a different trade, often outside London. While individuals had to be free of some guild to practice in the City of London, they belonged to a wide variety of guilds and there was no single body with the power to regulate and enforce their activities."

[7] Definition of a Case Maker in 1921: http://doot.spub.co.uk/idx.php?letter=C
Case Maker. Order XV. Workers in Wood and Furniture. Code 479: Packing Case and Wooden Box Makers.
case maker ; packing case maker assembles boards, previously cut to required dimensions by sawyer (481) q.v., and nails them together to form packing cases; trims edges of boards with saw, and adds fittings, hoop iron binding, lids, metal corners, rope handles, hinges, etc., as required, using joiner's tools. (A Dictionary of Occupational Terms Based on the Classification of Occupations used in the Census of Population, 1921).

[8] William Ford Stanley, A descriptive treatise on mathematical drawing instruments, their construction, uses, qualities, selection, preservation, and suggestions for improvement ; with hints upon drawing and colouring. By william ford stanley, mathematical instrument maker to h. m. government, science and art department, council of india, tythe commission office , royal school of naval architecture, royal geological society, &c. , &c. 66 –"C'était la main de l'homme qui était la seule machine de l'esprit. A. de Lamartine" . published by the author, at 5 , Great Turnstile, Holborn, London, W.C. 1866 . Price five shillings.

[9] William Ford Stanley, A descriptive treatise on mathematical drawing instruments, their construction, uses, qualities, selection, preservation, and suggestions for improvement; [...], London, 1866. p. 4 https://archive.org/details/descriptivetreat00stanrich
"Many draughtsmen, for the convenience of having their instruments at hand when required, prefer a pocket-case. This is a thin, wood case, covered with Russia or Morocco leather, and is generally made to contain the set, or full set, of instruments. Pocketcases should be made with the corners properly rounded; the fastening should be a spring clip or a bolt, as adopted
by the French-we often see them fastened by hooks, which catch in everything.
The French make pocket-cases very tastily; they wear much better and are thinner than the old style of English ones- the sides and corners being entirely rounded. Lately, the English case-makers have imitated the French, nearly equalling them in the appearance, and perhaps surpassing them in the solidity of the leatherwork and hinging."

In some restoration reports concerning the upholstery of pocket cases, there is often a bit more to read about the construction and production of the portable pocket case. In this respect, mention should be made of the report of Creman et al about the Symposium Hout- en Meubelrestauratie, held in1995 [10] and information from David M. Riches about conservation of portable mathematical instrument cases.[11]

This study may also be of interest to collectors of mathematical drawing instruments. Their comments would be greatly appreciated.

About the cover image:
Top view: layout at the front for various narrow parts such as ruler pens and pencil holder (circle). Intermediate layer for parallel ruler (black ebony) and plain scale or scale ruler (here ivory). Next to it an opening for a large compass, space at the bottom for a protractor (thin brass). Interior (veneer/ thin wood/ "papier maché"?) of the rectangular tubes is here covered with printed paper for better fitting. On the narrow sides of the case, exposed wood grain shows that the case consists of thin wooden planks for that part (not veneer). Part of the fish skin with this housing is missing at the foot of the short side of the hinged head and has been painted over there with black (Indian ink?) paint. The whole is covered with dark gray/ black fish skin.

II. SOME EXAMPLES OF PRINTS/ DRAWINGS, PARTIALLY MADE WITH MATHEMATICAL DRAWING INSTRUMENTS

Although many design activities, calculations, working drawings and executions have been taken over by modern equipment in our time, the basis for this can be attributed to the use of mathematical drawing instruments in the 17th and 18th centuries. Nowadays, one can make designs in 3D on the computer, which also makes the calculations and working drawings. Using scans of existing instrument cases, one can look inside, peel away the layers and rotate the pocket case in 3D in exploded view on the screen. One can even make a 3 dimensional copy of any object with wood filament or metal, using a 3D printer.
However, it is good to reflect on the early stages of the many drawings in which mathematical drawing instruments played a role.


Fig. 1

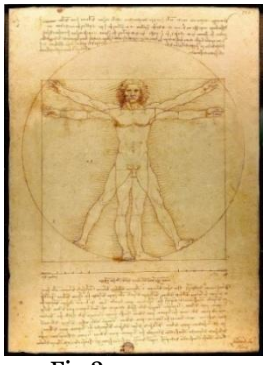


Fig 2.

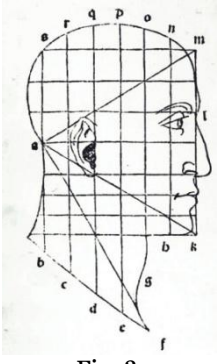


Fig. 3


Fig. 4

[10] Creman e.a.: Symposium Hout en Meubelrestauratie, VeRes, Amsterdam,1995. Especially topics such as*: Animal glue in restoration practice, Background information on the production of skin glue, Shagreen, upholstery material from the sea, Fish skin as upholstery material in the nineteenth and twentieth centuries, A reconstruction of applications of ray skin are relevant in the context of this study.*
https://www.ebenist.org/wp-content/uploads/2015/09/Creman-et-al-Symposium-Hout-en-Meubelrestauratie-VeRes-1995.pdf

[11] David M Riches , Collecting Drawing Instruments 2nd Edition, 2024 p. 119 -122
https://www.sliderules.lovett.com/uksrc/collecting_drawing_instruments.pdf

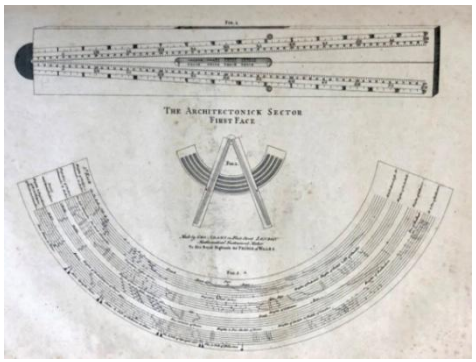


Fig 5.

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

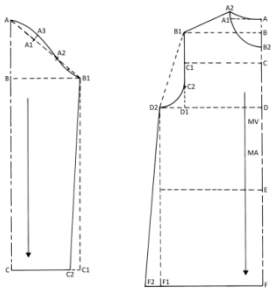
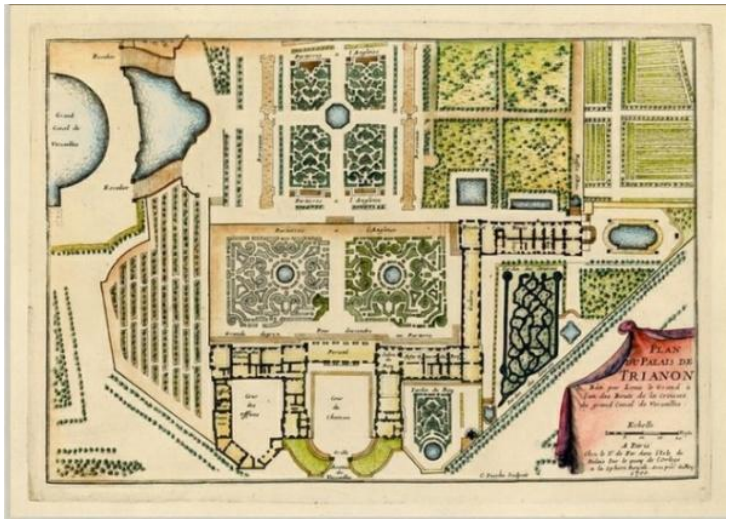


Fig. 11a



Fig, 12

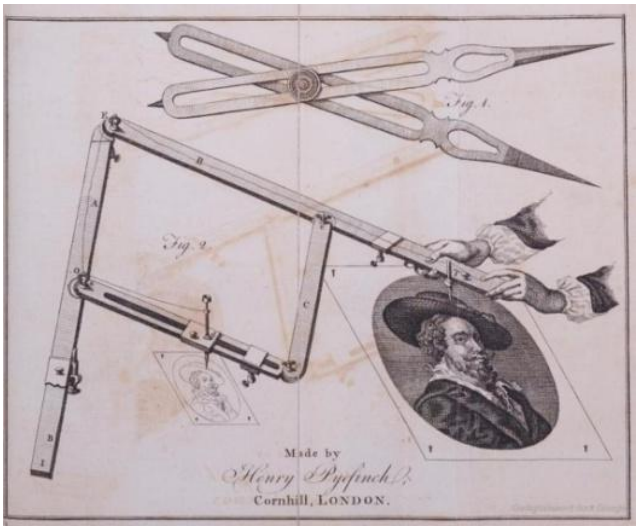


Fig. 13

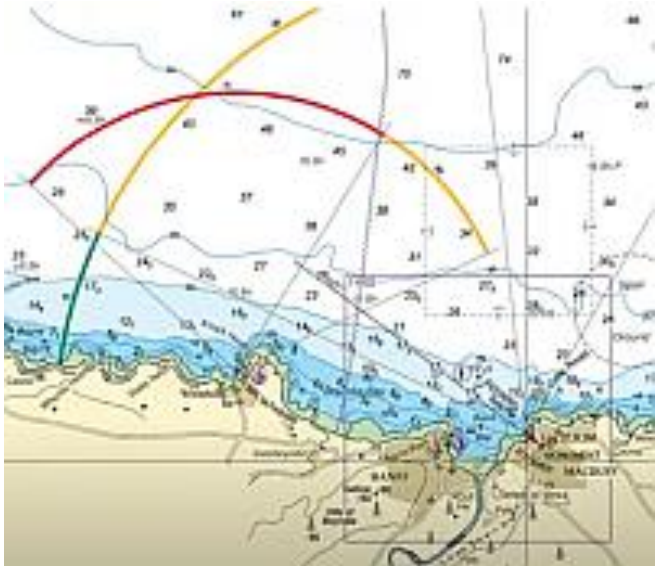


Fig. 14

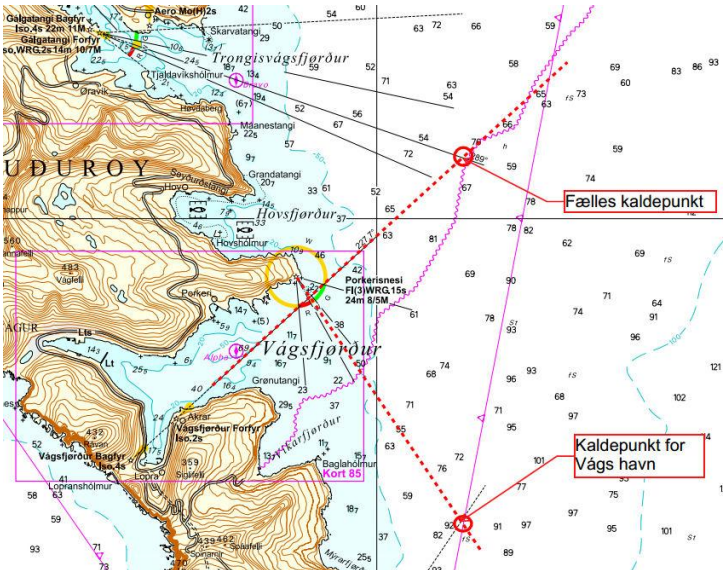


Fig. 15

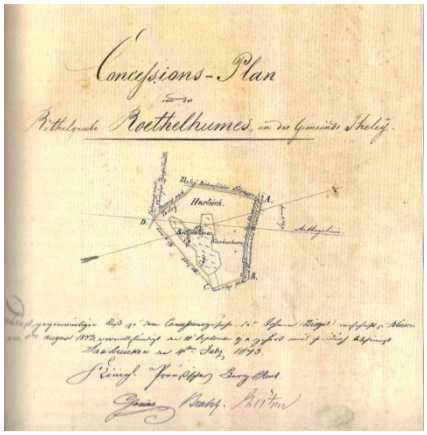


Fig. 16 (Surveying)

In each of the enclosed drawings the use of one or even more particular mathematical drawing instrument(s) can be seen.[12] Recognizable by certain motif forms is the use of parallel rulers, dividers, sectors, protractors, bow compasses, tracing pens, pantographs etc. Besides architects, technical and topographical draftsmen, surveyors, carpenters, sculptors, artillerymen, sailors, decoration and pattern designers, also visual artists like painters and sculptors come into contact with mathematical drawing instruments. Around 1800 the smallest of these instruments were kept in handy storage pocket cases and boxes.

[12] Mathematical drawing instruments uses in drawings and designs
Fig.1. Albrecht Durer, Copper Engraving of Melancholia, 1514 – (parallel) ruler,
Fig 2. Leonardo da Vinci, Vetruvian Man, 1492 – compass/divider, protractor and ruler,
Fig 3. Luca Pacioli, De Divina Proportione, Head with Equilateral Triangle, 1509, Compas/ divider, ruler, protractor
Fig 4. Leonardo da Vinci, Fragment from RCIN 912283, Recto A sheet of miscellaneous studies, ca 1490 – compass-ruler
Fig 5. Joshua Kirby (?), Diagram of 'architectonic sector' by Joshua Kirby, 1759 – compass, protractor and ruler
Fig 6. Maurice Denis, Détail d'architecture gothique drawing in sketchbook , 1926 – compass, protractor, ruler,
Fig 7. Villard de Honnecourt, Page Ms Fr 19093, BNF, ca 1225-1250 – ruler, protractor, compass with ink point, tracing pen
Fig 8. Villard de Honnecourt, Pages Ms Fr 19093, BNF, ca 1225-1250 – ruler, protractor, compass with ink point, tracing pen
Fig 9. Anonymus, Tilework design of wall fragment of the Alhambra in Spain, ca 13th-14th century - (parallel) ruler, compass
Fig 10. Baldassare Peruzzi, Architectonical Perspective drawing of Rome, ca 1503 – ruler, compass
Fig 11. and Fig. 11a. Pattern Fashion, 2025 – ruler , dotting point, parallel ruler, flexible curve
Fig 12. Charles Inselin (1673-1715), Plan du Palais du Trianon, 1705 - (parallel) ruler, protractor, compass/ divider
Fig 13. Henry Pyefinch, The Pantagraph improved, optician, London, 1790? - Proportional compass, "pentagraph" etc.
Fig 14. UK Hydrographic Office, Inserting and deleting a leading line [....] standard nautical chart, 2013-14. , ruler, compass, tracing pen
Fig 15. Navigation map of Vágsfjørður (with permission of Faroe Maritime Services). https://www.fms.fo/port-of-vagur/
Fig 16. Concession Plan of the Röthelgrube Roethelhumes in Theley, Oberbergambt Saarbrücken, 1840., - ruler, tracing pen

A lot is written about the instruments and their use. [13] Many instrument makers and sellers in England and France are well known in the 18th and 19th century in Western Europe. [14]

III. HISTORIC INFORMATION ABOUT THE FISH-SKIN DRAWING CASE

In old publications about mathematical instruments, only the instruments are mainly depicted and discussed. (1723 Nicolas Bion, 1757 J. Robertson, 1793 Benjamin Martin). Cartographers, surveyors, engineers, architects, mariners etc. were mainly interested in the measuring and drawing instruments that could be taken along when travelling. Similar portable 'cases', without the refined division for the mathematical drawing instruments, were already used from the 16th century for sewing equipment, private cutlery, spectacles etc.

Henry Pyefinch, an optician in Cornhill London and known from an action against him by Peter Dollond, published a book “Short description of the pocket case &c. The best of theſe Cafes confiſt of the following Inſtruments ; viz. The Compaſſes, with their appendages: The Steel Drawing-pen. The Plain Scale, the Sector, The Protractor. And The Parallel Ruler.”, 1769
The title suggests that the storage of the instruments is also discussed.
Only half a page in the entire book is partly devoted to this.
How a pocket case is made, is not described in his book. He emphasizes the instruments in the case. [15]




[13] The next authors have written in the 18th century about mathematical drawing instruments:
1723 Nicolas Bion: Traite de la construction et des principaux usages des instrumens
https://books.google.nl/books?id=1dPHH_BGDDgC
1757 John Robertson: A treatise of such mathematical instruments as are usually put into a portable case etc,
https://archive.org/details/bim_eighteenth-century_a-treatise-of-such-mathe_robertson-john-librari_1757
1793 Benjamin Martin: The description of the pocket case of mathematical instruments etc.
https://books.google.nl/books/about/The_Description_and_Use_of_the_Pocket_Ca.html?id=EdL8AJMkxDIC&redir_esc=y

[14] Well-known names of instrument makers and opticians/sellers in London, Paris and even Amsterdam/Leiden/ Haarlem are Samuel van Musschenbroek, Claude Langlois, Michael Butterfield, Benjamin Martin, Nicolas Bion, Henry Shuttleworth, Wiliam Fraser, John Bleuler, John, William & Samuel Jones, John & Peter Dollond, Philip Jacob & Edward Halse, William Harris & Co., John Rubbelgall, George Adams, Hendrik Linderman en Zoon, H (Hendrik) Meeuwig, Gedempte Oude Gracht 37, Haarlem, etc.

[15] *A description of the pocket case of mathematical instruments; together with the Use of the Several Instruments ... To which is Added, the Description and Uses of the Pocket Quadrant, Commonly Called Gunter's ... London : Printed for the Author , and fold by Henry Pyefinch).*

Some photos of an English Georgian case with mathematical drawing instruments from around 1800.
Case with contents. The compass has a characteristic (for the 18th century) wing screw.
Attachments (pencil point and ink point) on compass, here comparison regarding correct type and dimensions.
Piece of eraser rubber around compass point to prevent poking through the case bottom (fish skin).

Top view of a pocket case. The deformations suggest that paper or cardboard was used for the interior of the case. However, this is not the case. Even thin veneer (wood) can deform under the influence of moisture if instruments do not fit properly.

Based on the marble pattern at the top inside, a global dating is possible. Just before or just after 1800. It is striking that there are two pins in the case. Each pin also has a built-in prick pin. The pencil holder was added later. Inside of the top in the hinged hood or lid is placed an early 19th century piece of marbled paper (brownish spatter pattern). In the 18th century this paper has a more colourful spatter pattern (cf. endpapers of antique French and English booklets from the 17th to the 19th century).

Overview and comparison with illustration in publication from the year 1796 by W. and S. Jones. (p. 546)

Mathematical Inſtruments, &c. 245

Inſtruments for Geometry, Drawing, &c.

Variety of Pocket Caſes of *Drawing Inſtruments*, in Silver, Braſs, *&c.* Containing,

1 *Plain Compaſſes* for meaſuring Lines, *&c.*
2 *Drawing Compaſſes*, with three moveable Points, viz. an Ink Point for ſweeping Circles, or Arches of any determinate Thickneſs, a dotting Point, and a black Lead Point.
3 A *Drawing Pen*, either with or without a protracting Pin.
4 A *Sector* for finding Proportions between Quantities of the ſame Kind, as between Lines and Lines, Surfaces and Surfaces, *&c.* either of Box, Ivory, Braſs, Silver, *&c.*
5 *Plain Scales*, or,
6 A *ſquare Protractor*, or,
7 *Parallel Ruler*, which is alſo a Protractor, *&c.* } either of Box, Ivory, Braſs, Silver, *&c.*
8 A *Semicircle Protractor* of Braſs.

In the beſt Caſes, the Compaſſes are always made with Steel Joints, and the Knibs of all the Pens are made to turn up, or open with a Joint, in order to clean them, in which are alſo ſometimes put,

9 A Pair of *Hair Compaſſes*, ſo contrived on the Inſide of one of the Legs, that an Extent may be taken to an Hair's Breadth.
10 A Pair of *circular Compaſſes*, with which a Circle as ſmall as a Pin's Head may be deſcribed.

In a *Magazine Caſe* of *Drawing Inſtruments*, is generally contain'd all the above Inſtruments, together with the following Particulars.

11 A Pair of *Drawing Compaſſes*, with moveable Legs longer than thoſe of No. 2.
12 A Pair of *ſtrong Compaſſes*, with Calliper and cutting Points.
13 A Pair of *Beam Compaſſes*, for drawing larger Circles, and taking larger Extents.
14 A Pair of *Proportionable Compaſſes*, for the ready diminiſhing Plans or Drawings, in any aſſigned Proportion.
15 A 12 Inch *Braſs Sector*, of a peculiar Make.
16 A Pair of *Triangular* } *Compaſſes* for transferring three or four Points
17 A Pair of *Quadrangular* } at once, from a Map or any Drawing to another to be copied.
18 A Pair of *Compaſſes*, with two Pair of Points, whoſe ſhorter Legs are at all Openings always half the Diſtance of the longer ones.
19 A Pair of *Plat Compaſſes* for meaſuring Charts.

2 20 A

Mathematical Instruments, &c. 245

Instruments for Geometry, Drawing, &c.

Variety of Pocket Cafes of Drawing Instruments, in Silver, Brafs, &..
Containing,

1 Plain Compaffes for meafuring Lines, &c.
2 Drawing Compaffes, with three moveable Points, viz. an Ink Point for fweeping Circles, or Arches of any determinate Thickness, a dotting Point, and a black Lead Point.
3 A Drawing Pen, either with or without a protracting Pin.
4 A Sector for Ending Proportions between Quantities of the fame Kind, as between Lines and Lines, Surfaces and Surfaces, &c. either of Box, Ivory, Brafs, Silver, &c.
5 Plain Scales, or, }
6 A square Protractor, or, } -either of Box, Ivory, Brafs, Silver, de.
7 Parallel Ruler, which is al fo a Protractor, &.c}
8 A Semicircle Protractor of Brafs.

In the beft Cafes, the Compaffes are always made with Steel Joints, and the Knibs of all the Pens are made to turn up, or open with a Joint, in order to clean them, in which are alfo fometimes put,

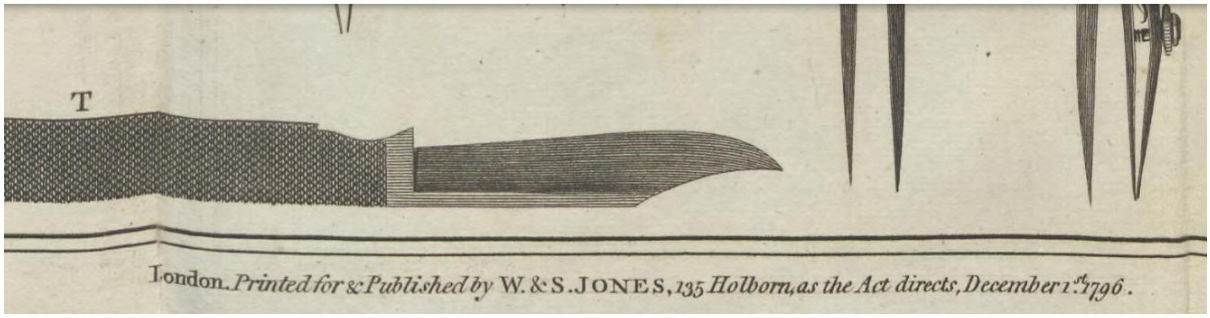
9 A Pair of Hair Compaffes, to contrived on the Infide of one of the Legs, that an Extent may be taken to an Hair's Breadth.
10 A Pair of circular Compaffes, with which a Circle as fmall as a Pin's Head may be defcribed.

In a Magazine Cafe of Drawing Instruments, is generally contain'd All the above Instruments, together with the following Particulars.

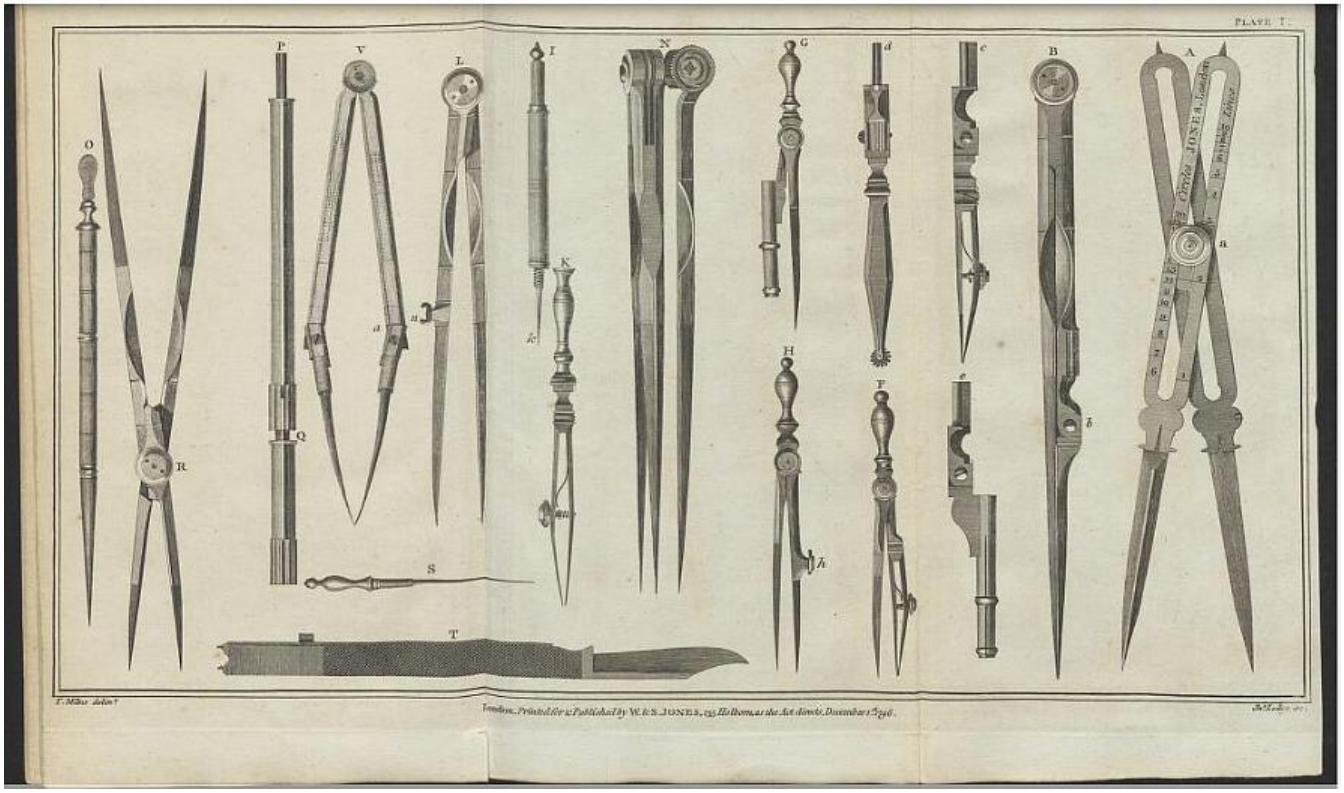
11 A Pair of Drawing Compaffes, with moveable Legs longer than thofe of No. 2.
12 A. Pair of ftrong Campaffes, with Calliper and cutting Points.
13 A Pair of Beam Compaffes, for drawing larger Circles, and taking larger Extents.
14 A Pair of Proportionable Compaffes, for the ready diminishing Plans or Drawings, in any affigned Proportion.
15 A 12 Inch Brafs Sector, of a peculiar Make.
16 A Pair of Triangular {
17 A Pair of Quadrangular { Compaffes for transferring three or four Points { at once, from a Map or any Drawing to { another to be copied.
18 A Pair of Compaffes, with two Pair of Points, whofe fhorter Legs are at all Openings always half the Diftance of the longer ones.
19 A Pair of Plat Compaffes for meafuring Charts. 2 20A

See for an overview with instruments page. 541 of the publication of W. & S. Jones. Geometrical and graphical essays : containing, a general description of the mathematical instruments used in geometry, civil and military surveying, levelling, and perspective : with many new practical problems : illustrated by thirty-four copper plates. Up to now I have not been succeeded to find any specialised information about the production of an upright portable case in which mathematical drawing instruments such as compasses, pins, etc. were taken to a workplace in the 17th to the 19th century. [16]

Geometrical and graphical essays : containing, a general description of the mathematical instruments used in geometry, civil and milit...



[16] All the mathematical instruments, in use by people with different occupations around 1800. (George Adams and William Jones) See: https://objects.library.uu.nl/reader/index.php?obj=1874-356558&lan=en



IV. ETYMOLOGY OF THE CONCEPT 'CASE MAKER'

The linguistic approach gives in 1836 the following English words for 'case-maker': case maker, sheath maker.[17]
More information about the word "case maker" was to find via the French Word "Gainier" (in the Dutch language "Schedemaker" or "Kokermaaker"). A special place is for the German word Futteral. Sometimes it is mentioned in combination with the words "Gainier, Case and Schede" but I think it is of a different order. [18]

In the magazine "Le Journal des Arts" is a special page about the activities of this caster or case maker. The employees work mostly under supervision of a professional case maker and are possibly specialised in the case making of one typical sort of case.
In an article of Sophie Flouquet entitled "Gainier d'art, Le Journal des Arts, Le 20 juillet 2007" is to read: *"...Par définition, le gainier fabrique des gaines, des étuis, des fourreaux ou des accessoires de bureau (écritoires, sous-main, coffrets...) qu'il revêt de cuir, mais aussi de tissu ou de papier. « De nombreux gainiers travaillaient à l'origine sur les revêtements de tissu des intérieurs d'armoire », souligne un professionnel. ....."* [19]

---

[17] F.A. Brockhaus, Vollständiges handwörterbuch der deutschen, französischen und englischen sprache: Nach einem neuen plane bearbeitet zum gebrauch der drei nationen ..., Leipzig, 1836.
Futteral n, etui, fourreau m, gaine f. case, covering, box, sheath.
Futteralmacher m, gainier m, sheath maker, case maker

[18] Christoph Ernst Prediger, [...] Buchbinder und Futteralmacher [...], Vierter und letzter Teil [..],Anspach, zu finden bey dem Autore, und bey Johann Wilhelm Ronnagel , Hof Buchhändler. 1753." With a lot of prints is shown the making of a "Futteral" (a case of paper/ cardboard for spoon, knife and fork). In German Dictonairies it looks that the word 'Futteral' means the same as "Case". In the book of Prediger the word 'Futteralmager' or cover maker is used when a bookbinder is making a protective cover for a special book. That is not the same as a case for more than one mathematic drawing instruments.

[19] See for the complete article of Sophie Flouquet: https://www.lejournaldesarts.fr/campus/gainier-dart-77632

Fragment of her article, mentioned above, about “Gainier d’art”
“…Le gainier fabrique ensuite la carcasse de bois, lors du « fûtage», ce qui nécessite la maîtrise de la menuiserie. Il découpe les différentes parties (fond, couvercle, côtés), les assemble par des clous et/ou de la colle (suivant l'épaisseur du bois), puis les ponce. Le gainier réalise l'ouverture en sciant le fût, ce qui permet d'obtenir le couvercle. La carcasse est alors poncée puis vernie. Le ferrage consiste à assembler le corps et le couvercle par des charnières en cuir ou en cuivre ainsi qu'à fixer serrure, poussoirs ou gachettes afin d'ouvrir et fermer l'écrin. Une fois la carcasse fabriquée, le gainier se consacre à son habillage. L'enveloppe de cuir peut être refendue et parée afin d'amincir le cuir de façon régulière: le gainier ou le « pareur >> (suit les sinuosités, contours et particularités de la peau pour l'amener à l'épaisseur souhaitée. Des peaux peu épaisses et fermes sont généralement employées: vachette, vélin (veau), maroquin (chèvre) ou basane (mouton). Il utilise parfois des peaux spécifiques comme les peaux de requins ou de raies tannées aux reflets émaillés, appelées << galuchat >», introduites par le gainier du même nom au XVIIIème siècle (meubles et objets << Art Déco » par exemple) ou des cuirs anciens.
Le gainier développe un véritable savoir-faire dans la décoration du cuir qu'il effectue en général lui-même: il sait le teindre, le patiner ou le peindre et connaît les techniques de dorure sur cuir (cuirs décorés d'or, cuirs repoussés originaux, cuirs repoussés dits « de Cordoue » ou cuirs dorés polychromes patinés; cuirs gaufrés et teints dits « Henri II »)…”

See: https://www.orphee.io/fiche/gainier
He works in collaboration with many other professionals: decorators, cabinetmakers, antique dealers, jewellers, goldsmiths, gunsmiths, eyewear makers and musical instrument makers.
To which should be added “mathematical drawing instrument makers" (JdH).

1757


TRUNK-MAKER 255

CHAP. LVI.

Of the Shagreen-Caſe-Maker, and Trunk-Maker.

THE firſt of theſe Tradeſmen is employed in making Shagreen Caſes for Watches, Tweezers, &c. and Chests for Plate. There is ſome Ingenuity in the Buſineſs, and it affords reaſonable Profits to the Maſter: The Journeymen earn Fifteen or Sixteen Shillings a Week, and are pretty conſtantly employed. It requires neither much Strength, nor any previous Education; a Youth may be bound to it about Fourteen Years of Age.

The Trunk-Maker is a very uſeful Trade: He makes Trunks, Portmanteaus, &c. they generally of the ſame Leather-Buckets; and between both reaſonable Profits. The Genius required to fit a Maſter. Lad for this Trade has nothing particular in it: He muſt be a more Dunce who cannot acquire it in leſs than ſeven Years. A moderate Share of Strength is neceſſary: A Lad may be bound about fourteen or fifteen Years of Age, and when out of his Time may earn from Twelve to Fifteen Shillings a Week.

The Box-Maker is no more than a Handling Sort of Joiner: He is employed chiefly in making Boxes of the ſame Caſes for packing up all manner of dry Goods. Box-Maker requires more Strength than Brains; and a Journeyman earns the common Joiner's Wages, about Fifteen Shillings a Week.

CHAP.

The London Tradesman
By R. Campbell Eſq; L O N D O N:
Printed by T. Gardner, oppoſite St. Clement's Church in London
in the Strand MDCCLVII [Price 3s, bound.]

TRUNK-MAKER 255
CHAP. LVI.
Of the Shagreen-Caſe-Maker; and 'Trunk Maker. ,

Sect. 1. Of the Shagreen-Cafe-Maker.
The firſt of theſe Tradeſmen is employed in making Shagreen Caſes for Watches, Tweezers, &c. and Chests for Plate. There is ſome lngenuity in the Buſineſs, and it affords reaſonable Profits to the Maſter: The Journeymen earn Fifteen or Sixteen Shillings a Week, and are pretty conſtantly employed. It requires neither much Strength, nor any previous Education; a Youth may be bound to it about Fourteen Years of Age.

The text in "The London Tradesman" may explain the lack of a clear overview of the production of pocket cases for mathematical instruments in the 18th century: "It requires neither much Strength, nor any previous Education; a youth may be bound to it about fourteen Years if Age." This remark ignores the fact that the complexity of such an object and the variations in which the execution must take shape, require a necessary prior knowledge of the application. The necessary ergonomics and effectiveness of such an object require the necessary empathy of the maker. In my opinion, having insight as a 14-year-old into the professions and wishes of the user groups is not yet an issue at that age. Of course, it is true that the precision, required for making such utensils. can be learned at 14 years old. For this, a good workshop foreman is needed who directs and monitors the manufacturing process.

Perhaps the text should rather be seen as an indication that one should start learning the skills to produce these kinds of complex objects at an early age. The eye-hand coordination and the necessary work discipline can still be trained well at that age. Recording the various steps in the production process is then the task of a foreman. It is possible that, just as with instrument makers, many home workers in the 18th and 19th centuries were active in the field of making instrument cases, which is why the recording of data about the manufacturing process is lacking. It is not impossible that many women were involved in instrument case making at home in the 18th and 19th century.

Diderot et d'Alembert: Encyclopédie - Suite du Receuil des Planches sur les Sciences et les Arts, Paris, 1765
GAINIER (Boutique, Travail, Outils & Ouvrages)

Text at Plate 1 (Workshop of case makers 1765) - Attelier de gainerie au 18ème siècle - Encyclopédie Diderot et d'Alembert. CONTENANT SIX PLANCHES PLANCHE I : Le haut de cette Planche repréfente un attelier de Gainier, dans lequel font plufieurs ouvriers occupés à différens ouvrages, un, fig. 1 à scier des tablettes de bon; un autre, fig. 2. à doubler des étuis, un autre, fig. 3 à couper de l'étoffe pour garnir des petits étuis, un autre, fig. 4. à charger les tablettes, un autre enfin fig. 5 à coller de l'étoffe pour doubler l'intérieur d'un étui.

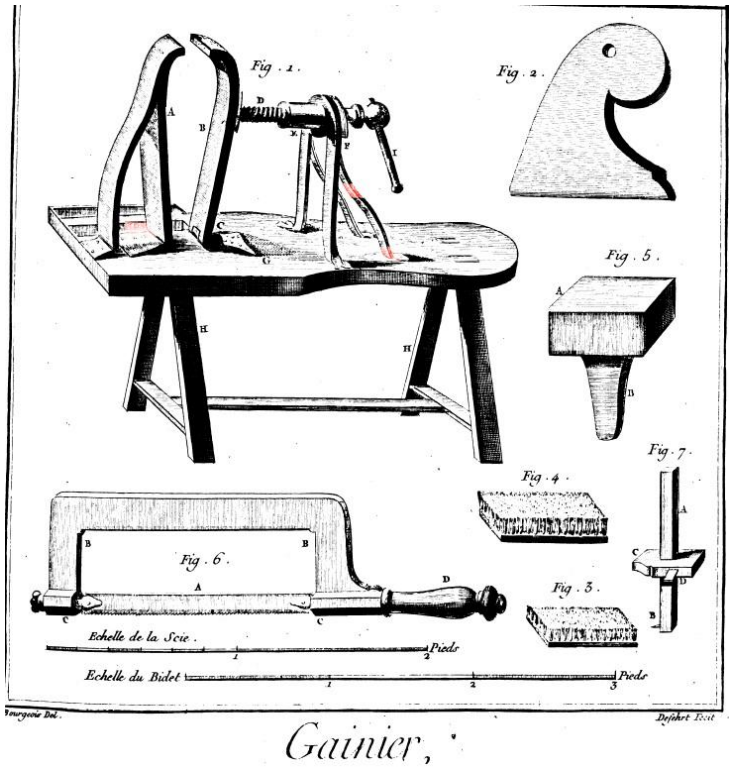


Fig. 1. Bidet à vis.
A. le mors dormant:
B. le mors à charniere:
D. la vis,
E. la boite de la vis:
F. le fupport:
G. la table:
HH. les piés;
I. la manivelle de la vis

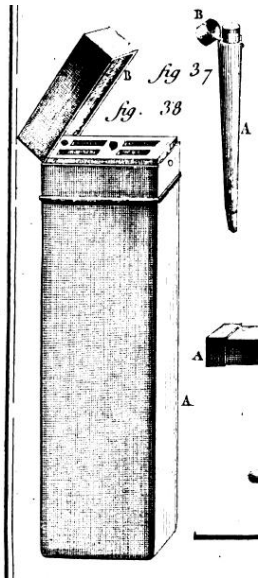
Fig. 2. Poliffoir.

Fig. 3. & 4. Broffes ou vergettes.

Fig. 5. Taffeau.
A le taffeau:
B la pointe.

Fig. 6. Scie à refendre.
A le fer de la fcie:
BB la monture:
CC les tourets:
D le manche.

Fig. 7. Trufquin.
A la tige:
B la pointe:
C la platine:
D la clavette



Diderot et d'Alembert: Encyclopédie - Suite du Receuil des Planches sur les Sciences et les Arts, Paris, 1765
Gainier - Planche II ,
Fragment fig. 38
Étui de Mathématiques
A le corps de l'etui
B le couvercle

The resemblance of Figure 38 (right side of image above) to classical Italian models of the 15th and 16th centuries is striking.

John Robertson mentions in the introduction to his book (1757) "A treatise of such mathematical instruments, as are usually put into a portable case [...] ", a number of features of cases for these instruments: different sorts (simple and with shagreen skin) and different sizes : Max.Height = 17 cm. (6 11/16 Inch or height 4.5 Inch.
"SECT. I. CASES of Mathematical Inftruments are of various forts and fizes ; and frequently confift of fuch articles only as fuit the fancy or occafion of the perfons who buy them : See the plate fronting the title page : THE fmalleft collection put into a cafe, commonly confifts of, I. A flat ruler or plane fcale, having fcales of equal parts on it. II. A pair of compaffes, one of whofe points may be taken off, and its place fupplied, either with A crayon for lead or chalks ; or A drawing-pen for ink. WITH thefe inftruments only, a tolerable fhift may be made to draw moft mathematical figures."[20]

[20] John Robertson, A treatise of such mathematical inftruments, as are ufually put into a portable case.[], London, 1775. p. 1. https://archive.org/details/bim_eighteenth-century_a-treatise-of-such-mathe_robertson-john-librari_1757

Pocket case with mathematical instruments for drawing mathematical figures. Around 1800.

A description of pocket and magazine cases of mathematical drawing instruments, in which is explained the use of each instrument,[...] by J. Barrow, private teacher of the mathematics. London, 1792. p. (5)
The Description and Use of a Cafe of Mathematical Drawing Inſtruments.
Inſtruments for drawing mathematical figures are generally fold in fets, and fitted into a cafe, which, when ſmall and portable, is called a Pocket Cafe ; but when large, and a variety of inſtruments inferted, a Magazine Cafe of Inſtruments

Magazine case of instruments, early 19th century, 1 ½ x 4 x 8 inches. Blue velvet inside, . The second layer shows a division into raised ridges that taper in some places to hold instruments in place. There is also a recess for a tightening screw. Instruments have tightening screws with a flat head. The content of this

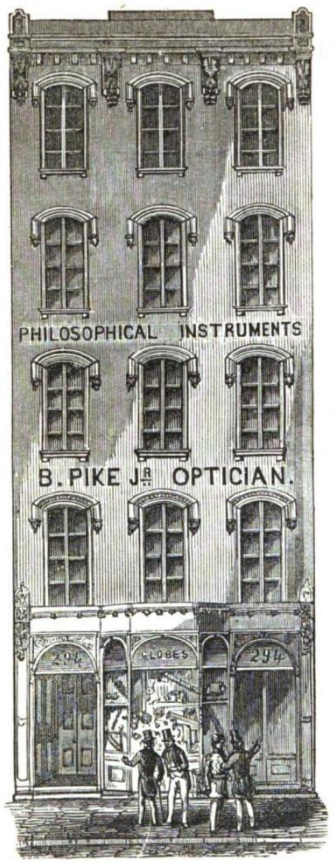
magazine is a mixture of mathematical instruments of the Victorian period. The divider is probably a Winsor & Newton, electrum divider, 5 ¼ inch., ca. 1900.

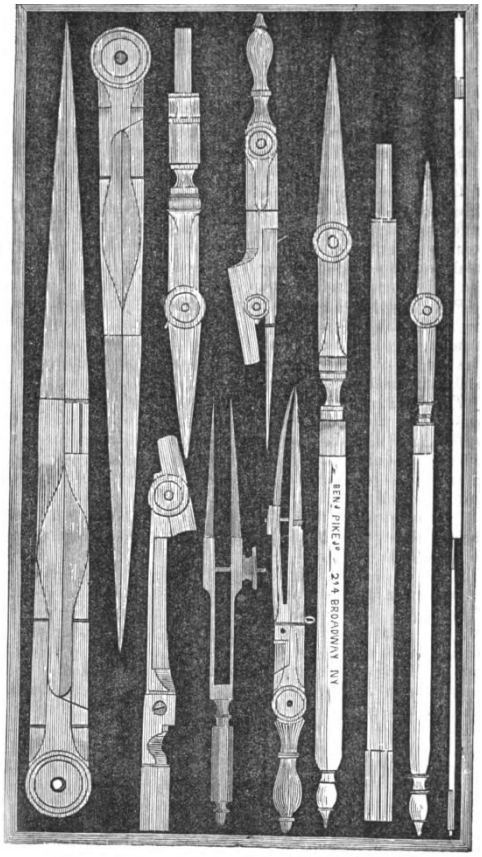
The Monthly Review or, literary journal, enlarged : from september to december, inclusive, mdccxcii, with an appendix. Volume IX. London,1792, p. 352

Art. 58. The Description and Use of Pocket Cafes of Mathematical or Drawing Instruments containing particularly a familiar Explanation of the Use of the Protractor, Plain Scale, Sector, Gunter's Scales, Marquois's Parallel Scales and the Proportional Compasses with feveral Examples in Trigonometry Arithmetic &c Together with plain Instructions for making the feveral Kinds of Sun Dials Illustrated by Copper plates By N Meredith Optical and Mathematical Instrument Maker to his Royal Highness the Duke of York 8vo pp 47. 1s. Author, No 91. New Bond Street .

Young persons who procure cafes of mathematical instruments, if they are not under masters but are obliged to be their own tutors (which though the hardeft is often the best mode of acquiring knowledge,) will also wifh for an explanation of their respective ufes. A field of expedients will then open for facilitating practical operations that may otherwise prove very embarrassing. To fuch solitary ftudents therefore this pamphlet will be a welcome assistant.

1856





Some illustrations from Pike's book. His shop in New York, the pocket case and the flat Mahogany box with instruments.

Pike's illustrated descriptive catalogue of optical, mathematical, and philosophical instruments, manufactured, imported, and sold by the author ; with the prices affixed at which they are offered in 1856, with upwards of 750 engravings, mostly original designs from the instruments of his establishment in the various departments of electricity, galvanism, magnetism, pneumatics, hydrostatics, mechanics, optics, astronomy ,surveying, electro- magnetism, chemistry, &c ., & c .navigation, meteorology, designed to aid professors of colleges , teachers , and others, in the selection and use of illustrative apparatus , in every department of science . by Benjamin Pike , jr . , optician. in two volumes . vol . i. second edition, enlarged. New York : published and sold by the author, at his optical, mathematical, and philosophical instrument manufactory, 294 Broadway, a few doors above the park . 1856 .

In this book all the instruments are illustrated and explained. In part I all the mathematical instruments are shown.

V. MY FIRST EFFORT TO MAKE A POCKET CASE FOR MATHEMATICAL DRAWING INSTRUMENTS WITH A HINGED HOOD

Starting point was an image of a top view of a 'shape sorter or template' that belonged to a pocket case for mathematical instruments. and was seen on the internet last year. Later I did not get the impression that this

was designed as a separate part of the design of a pocket case, but that it was more the result of subtle sanding. Possibly with a thin layer of paint on it. Of course, the clearly arranged top view is decisive for the content of instruments in the pocket case.

Due to lack of specialized (professional) literature, I started working experimentally with wood, saw, knife, glue and clamps. I have made several attempts to make a mathematical instrument case from thin wood (single-layer veneer). Poplar wood was used as wood, as is used in multiplex (triplex) that is easy to split and shape when wetted with boiling water. The grain direction of the veneer is vertical. The veneer was cut into shape with a Stanley knife. Below are some pictures of the first attempt based on a photograph of a large shape sorter or template on the internet.








Some images of my manufacturing process of a portable case for mathematical instruments.
Luckily I have found later some sources about making pocket cases. The following chapter describes global the process.

THE SUCCESSIVE STAGES OF THE WORK TO MAKE A POCKET CASE NOW AND IN THE 18TH CENTURY

The case maker makes the wooden framework during the modelling process of the 'drum', which requires mastery in carpentry.
He saws the various parts from carefully selected thin-walled planks (bottom, hood, sides) of e.g. poplar wood and assembles them into one whole using glue (bone glue or polyvinyl acetate). Sometimes drying under tension or pressure must take place using (post) elastics and/or glue clamps and, if necessary, internal profiles.
The frame is then filed and sanded smooth where necessary.
The case maker makes the lid by sawing through the drum (an oval, cylindrical one at a certain height, which creates the hood).
The frame is then sanded and varnished. This creates extra strength on the outside.
The assembly consists of mounting both the lid/hood to the body using copper hinges, as the attachment of a springy metal strip with a depressible button that protrudes slightly to the outside and serves to open the lid/hood.
To check whether the instruments fit in the tubes and do not fall out immediately when the tube is turned, a paper layer can be applied inside the housings if necessary. This creates some frictional resistance so that the mathematical instruments remain in place but are still immediately available.

Once the carcass has been made, the application of the covering is next. Sometimes specific fish skins are used, such as shark or ray skins tanned with lightened accents, called "Shagreen", introduced by the leatherworker of the same name in the 18th century
The covering of fish skin can be trimmed to make the skin even in thickness, according to a decorative pattern. The upholsterer follows the curves, contours and properties of the fish skin layer as those of the case. The handling and roughness of the skin surface must be decorative, functional and ergonomic.

VI. My second effort to make a pocket case for mathematical drawing instruments

My second attempt to make a mathematical instrument case is partially based on an original old pocket case. The second attempt shows a model in use in the 1st half of the 18th century with a sliding lid or sliding hood. An 18th, early 19th century fish-skin case served as a scale model and example. In the background, the previously made, filled model – partly provided with marbled paper – is visible.



The preparation of the carcass



Positioning of the instruments





Positioning of the instruments, covering of the outside of the new case, both cases seen from above.

Wood glue was used as glue. Elastic bands keep the stacked wooden parts in position during drying. After drying, strips were added for sealing. The scale model is provided with a sliding cap. Some models from the early eighteenth century have a similar closing piece. To prevent the pin of the compass from penetrating the thin wooden base, an aluminium cap was inserted at the bottom of that column. This homemade pocket case is covered with a layer of fine painter's linen soaked in Indian ink - anno April 2025 - filled with some instruments (side and top view). Case with sliding hood. Visible are outside the portable case a brass ‘proportional divider’ or ‘Plain Compaffes for measuring Lines’ and from ca. 1770 by Jacques Canivet: a folding brass sector (compas de proportion). An original case next to the newly made sliding case (April 14th 2025).
The production of a 'portable mathematical instruments pocket case' or non-flexible storage case with a lockable lid/flap/cap for mathematical instruments as a form of packaging/storage is a subject that has unfortunately remained underexposed due to the focus of many users, collectors and authors to the contents

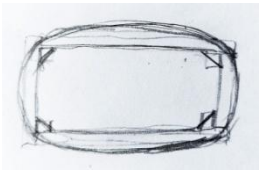
(compasses, drawing pens, measuring instruments, proportional divider, scale ruler, parallel ruler, sector, protractor etc).

The manufacturing of such portable cases for mathematical instruments is the work of specialised cabinetmakers, mostly based on earlier cases for other objects like ..... [21]
In 1866 there was already a second-hand market for these cases including their contents in the second half of the 19th century and possibly earlier. One firm that advertised them was: WM. LAWLEY'S, 78, Farringdon-street, [London] City.[22]

VII. RECONSTRUCTION OF A PORTABLE OR POCKET CASE FOR MATHEMATICAL DRAWING INSTRUMENTS

Only on pictures of old pocket cases for mathematical drawing instruments something can be seen of the internal construction. That is why I start to make a reconstruction myself.

BASIC PARTS


A

B

A Some wooden upright parts of a pocket case for mathematical instruments without the lid: upright sides and B. Top view to bottom. The bottom is a rectangle thin piece of wood. In the corners diagonally cut beams are glued.


I

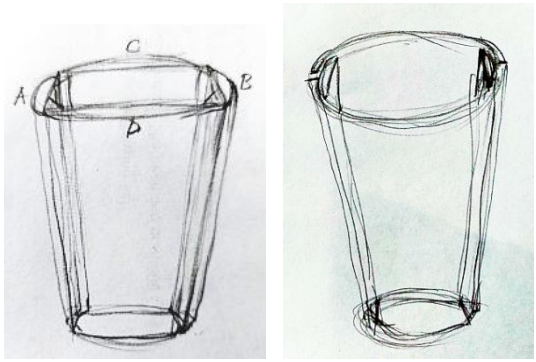
II

III

I Pocket case without his bottom. II The interior of an average pocket case is made of wood. III View of the outside-underside of thin wood of the pocket case that served as an example for a reconstruction. Image I and II are not from the sample pocket case.

[21] Elizabeth Deans Romariz: The design for portable cases for drawing instruments also relates to prevailing forms of pocket etuis carried, for instance, by doctors, scientists, and surveyors, 2017.

[22] In March 9. 1866 an advertisement in THE ENGLISH MECHANIC AND MIRROR OF SCIENCE. p. 363 shows many patents are described in the fields of Engineering, Building, Inventions, Manufactures, Industrial Progress, Electricity, Photography, Chemistry, Astronomy etc. There However information about the construction of drafting cases is until 2025 nowhere to find.
https://journals.lib.unb.ca/index.php/MCR/article/view/28667/1882521430 or : https://wrap.warwick.ac.uk/id/eprint/38878/

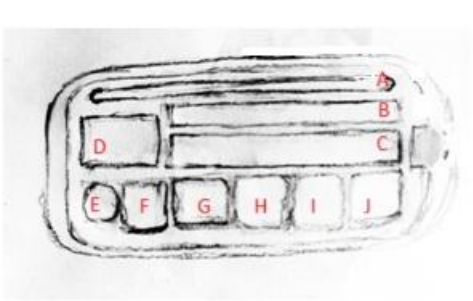


Schematic representation of the inner structure; a tapered rectangular tube with the corners sanded all around and later the outer structure

The (gently curved) rectangular board is surrounded by rising wooden sides. Initially, a slightly tapered tube of planks (poplar wood?) of approx. 3 mm thick is used here. In the corners, a bevelled vertical support beam is glued on the inside.
A and B are narrow, rounded, vertical side surfaces for the attachment of the hinge and the closing lip, respectively. C and D are wider side surfaces to protect the contents behind them. All surfaces are slightly inclined. Inside, in the corners, there are thin, bevelled, rectangular connecting bars.
When sanding the oval outer shape, this support beam/ bar forms the connection between the side surfaces. For the inner construction, easy-to-sand wood was chosen.
The bottom (see II above) consists of a thin wooden plate of approx. 6.6 cm long and a few mm thick. The wood grain runs lengthwise. The slightly curved sides are formed in boiling water from thin, trapezoidal planks, three times thicker than 1mm peeled veneer.

SCHEMATIC OUTSIDE COVERING

The outside of the next construction layer is formed by a thin tube consisting of a layer of veneer of 1 mm. that tapers downwards. It is important, before use, to dry the moistened veneer, held by elastics, around a natural wooden cylinder.
This outside tube is not applied until the inner work is finished. This layer consists of flexible (poplar wood?) of 6.5 inches high that is cut for the hood/ cap at about a quarter of the total height. The outside gradually tapers on all sides towards the foot. For the construction of the casing (cf. a flat cup shape, without a bottom, two circle segments must be used that are glued together to the narrow sides. Before all that there must be placed the hinge and the inner part of the spring-loaded closing lip.
For the reconstruction, plywood was immersed in boiling water and the veneer layers of the plywood were carefully cut loose with a long knife. The thickness of the veneer is 1 mm. The direction of the grain is as vertical as possible in the centre. The shape of the hinged hood should fit seamlessly, without kink, to the lower part and should be marked out in time and cut with sharp metal shears.



N.B. The images are of two different shape sorters or templates for mathematical instruments belonging to a pocket case. The starting point for this top view is the hinge (not visible) for the hood on the left and the push button for unlocking on the right. The location for the thin protractor. scale or a arithmetic ruler at A.

The locations B and C are for a parallel ruler, as well as for a sector. D is for a compass and E is for a pencil holder and F to J for drawing instruments like retractable ink point/ pencil point, drawing pen (with hair pin) etc.

The interior is divided with thin wooden partitions that, depending on the user's needs, consist of a number of downward tapering rectangular (obelisk shaped) insertion tubes/ channels for the instruments. These tubes/ channels taper slightly at the bottom (the narrowest are 7 mm wide at the top, others are 5 mm.). Some of the instruments, if needed, are clamped in a natural way, with the thickest parts upside like the ink point, the dotting point and the pencil or crayon point as plug-in modules for the compass. Some drawing instruments should be inserted into the channel with the pin side at the top. The compass is inserted into the tube/ channel - which is often somewhat wider - with the hinged part at the top.
When filled with instruments, the top of the whole forms a kind of ascending display window. The hinged lid is located on the left side of the short side of the case and the lock button is located on the right side.

THE HINGED LID

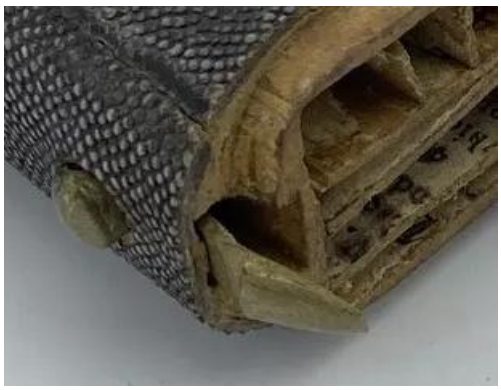
Outer (triangle hinge sides) and inner view

The attachment of the upper part: the hinged lid is complex. The attachment to the case is difficult to see without dismantling the entire - in our time expensive – case (lower and upper part). The way in which the triangle hinge is fixed with pins on the inside of the lower case is not visually approachable. The hinged part is secured at the top and bottom with rivets or nails or tacks (small, sharp nails with a flat end, here at the inner side) against one of the small sideboards of the case. It seems that these rivets, nails or tacks were applied before the outer layer (fish skin) was applied. But the securing on the inside cannot be explained properly. Perhaps a thin layer of veneer is placed at the inside against the head of the rivet, nail or tack.
The triangle hinge sometimes consists of two triangular attachment parts, one attached to the case at three points. Sometimes from the inside with copper nails that are pinched off and flattened on the outside of the case, so that, on close inspection, a rectangular piece of metal can be seen and not a round one like a rivet (nail).
The attachment of the triangular hinge part to the inside of the holder hood appears to have been done from the outside and the ends of the (head) nails have been hammered flat. This hinging part of the case is at the upper side flat unlike the underside at the bottom. A triangular hinge sometimes contains three pivot points, but sometimes also five

THE PUSH BUTTON

Or the clasp with spring knob or protruding button for opening the pocket case.





The construction and mounting of the depressible locking pin on the opposite side is also almost impossible to see without dismantling. The production of the replica of the somewhat wider, slightly curved closing lid is also no easy task. Fortunately, existing models clearly show how the closing lid should connect internally to the tube in which the instruments are inserted.


Clasp with spring knob or protruding button for opening. The clasp fitted behind a open rectangle (the protruding spring strip) in the cap in closed position. Internal locking case cover with clasp (opposite side: hinge). The small metal plate with open segment is clamped between the open part of a wooden partitions.

The opening of the case cap by means of a slightly protruding button, fixed to an upward protruding spring strip, on the narrow front of the case. The locking hook is attached to the strip at hood height. When placing the hood over the locking hook (without pressing the button), the frontal overhanging part of this pin is secured in an opening that is part of a metal (copper) rectangular recess, parallel to the frontal surface of the locking pin. When pressing again and simultaneously lifting the cap, the closure is opened. Both actions prevent unexpected releasing of the content

VIII. Plates to the geometrical and graphical essays by the late George Adams, London 1803

Plate 1 Mainly Drawing Instruments

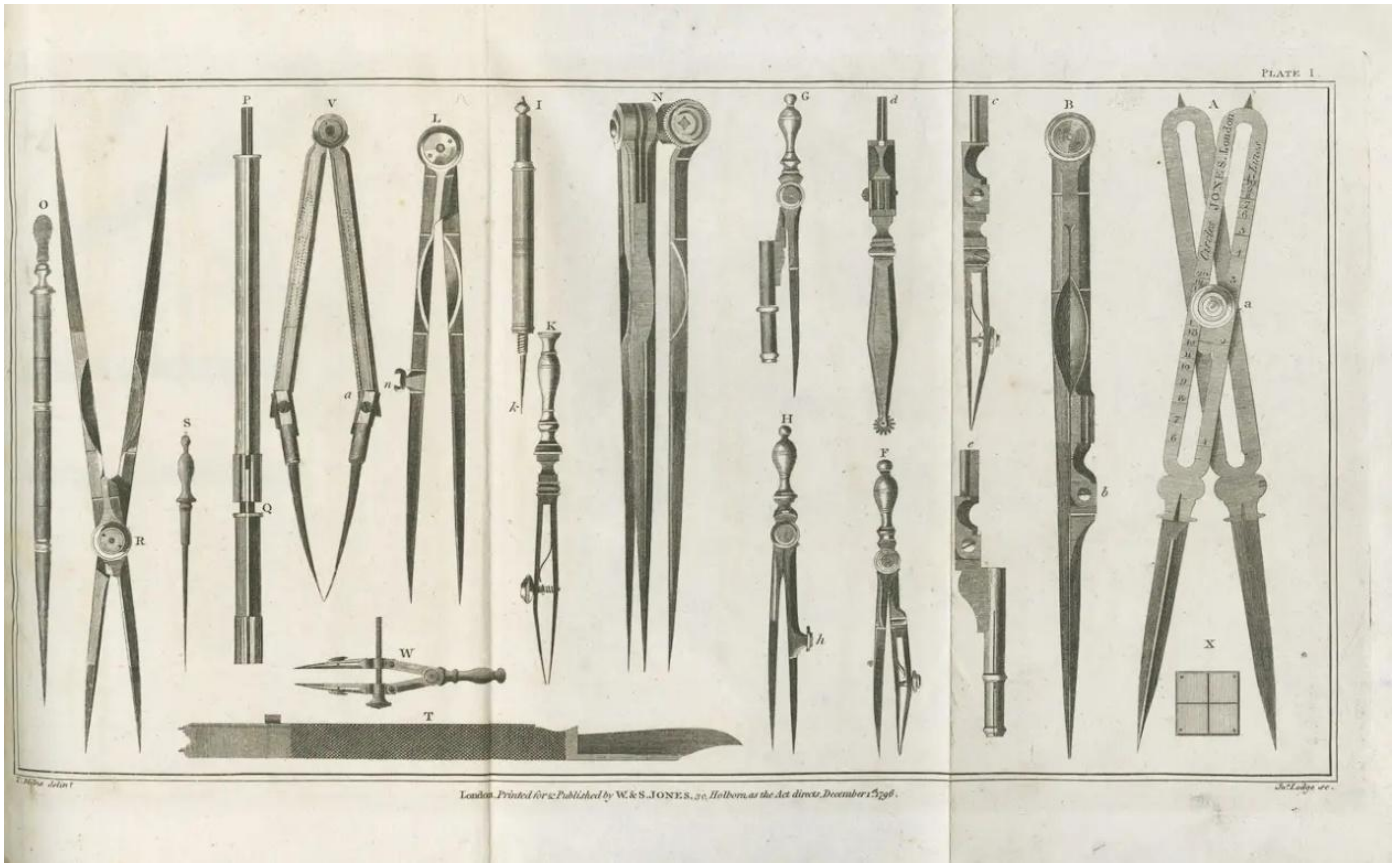


Figure names starting from right to left
A, is a pair of proportional compasses, without an adjusting screw.
B, a pair of best drawing compasses: b, the plain point with a joint; c, the ink point (top-side); d, the dotting point (top-side); e, the pencil or crayon point (bottom-side); PQ, additional pieces fitting into the place of the moveable point b (see A), and to which the other parts are fitted.
F, a pair of bow compasses for ink (top-side); G, a ditto for a pencil (top-side); H, a pair of ditto with a plain point for stepping minute divisions; h, a screw to one of the legs thereof, which acts like the spring leg of the hair compasses.
L, the hair compasses;, the screw that acts upon the spring leg.
I K, the drawing pen; I, the upper part; k, the protracting pin thereof; K, the lower, or pen part.
N, a pair of triangular compasses.
V, a pair of very portable compasses which contains. the ink and pencil points within its two legs, at a.
O, the feeder and tracing point.
R, a pair of bisecting compasses, called wholes and halves.
S, a small protracting pin.
T, a knife, screw-driver, and key, in one piece.

PLATE 2 MAINLY RULERS

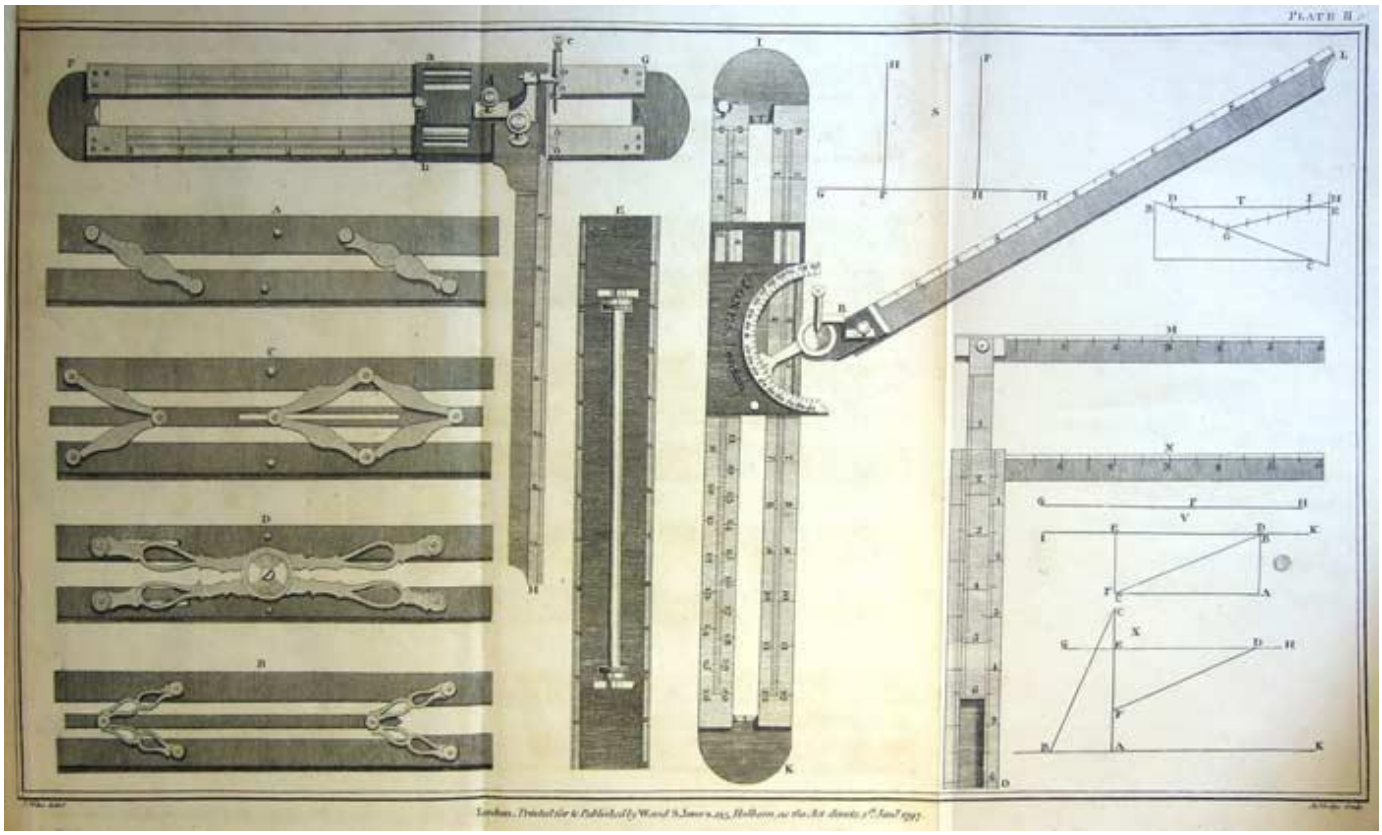


fig. A, the common parallel rule.
B, the double barred ditto.
C, the improved double barred parallel rule.
D, the cross barred parallel rule. Of these rules, that figured at C is the most perfect.
E, Eckhardts, or the rolling parallel rule.
FGH, the rectangular parallel rule.
IK L, the protracting parallel rule.
MNO, Haywood's parallel rule.

PLATE 3 MAINLY MEASURING INSTRUMENTS

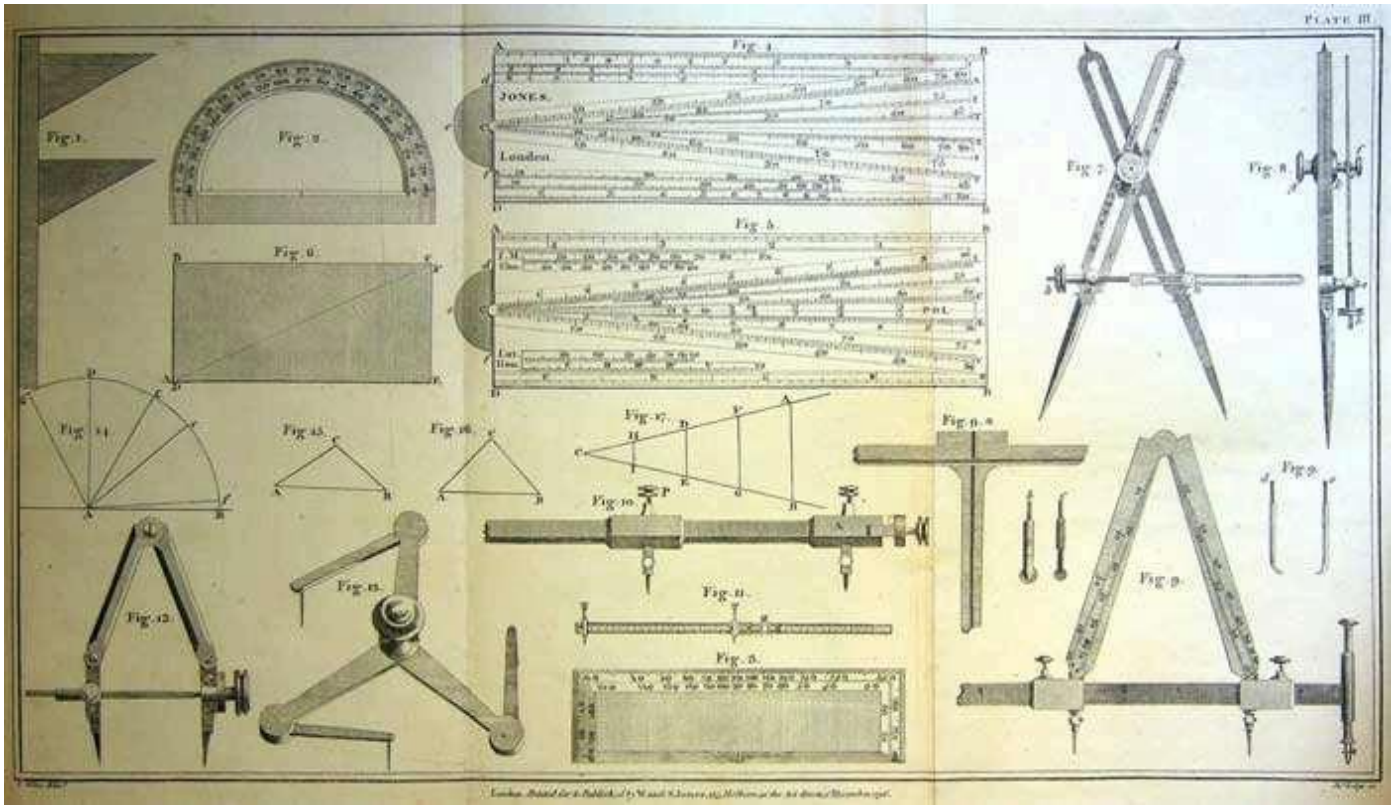


Fig. 1, the German parallel rule.
Fig. 2, a semicircular protractor (see top-side left); fig. 3, a rectangular ditto (see bottom-side center).
Fig. 4 and 5, the two faces of a sector (see top-side center).
Fig. 6, Jackson's parallel rule.
Fig. 7 and 8, two views of a pair of proportionable compasses, with an adjusting screw. (right-top corner)
Fig. 9, a pair of sectoral compasses. In this instrument are combined the sector, beam elliptical, and calliper compasses fig. g, a, the square for ellip-ses; bc, the points to work therein; de, the calliper points.
Fig. 10, a pair of beam compasses.
Fig . 11, Sisson's protracting scale.
Fig. 12, improved triangular compasses.
Fig. 13, a pair of small compasses with a beam and micrometer head adjusting same.

The strictness of geometrical demonstration ad-mits of no other instruments, than a rule and a pair of compasses. But, in ,in proportion as the practice of geometry was extended to the different arts, either connected with, or dependent upon it, new instru-ments became necessary, some to answer peculiar purposes, some to facilitate operation, and others to promote accuracy. It is the business of this work to describe these instruments, and explain their various uses. In performing this task, a difficulty arose relative to the arrangement of the subject, whether each instrument, with its application, should be described separately, or whether the description should be introduced under those problems, for whose performance they were peculiarly designed. After some consideration, I determined to adopt neither rigidly, but to use. Source of images and text above : Common Names of the principal Instruments (PLATES TO THE GEOMETRICAL AND GRAPHICAL ESSAYS BY THE LATE GEORGE ADAMS, London, 1803)

IX. SOME FRAMES (OR CONSOLES FOR PLUG-IN MODULES)

Each portable case for mathematical instruments has a large number of slots in the top plate, one round and several small rectangular openings. A top plate shows space for as many vertically placed instruments as possible on a small surface. Often, the gamble of space results in a non-standard arrangement. Only the more advanced cases of precious metal with stingray skin covering have well-fitting openings for the selected drawing instruments. As is usual with cheap sets of drawing instruments, there is often no one-to-one correspondence between the slots in the wooden case and the instruments stored in it. Wealthy enthusiasts used to buy pre-filled complete sets with well-fitting instruments. Some draftsmen often bought cases and drawing instruments separately, and only bought what they actually used and could afford. Over time, instruments were also lost, broken or replaced by holders of a slightly different size.

A MARINERS POCKET TOOLKIT

Place for (from left to right and top to bottom):
- a semicircular protractor at top,
- a pair of triangular compasses (exceptional), or a pair of best drawing compasses with a joint for an ink point or a crayon point, or a pair of proportional compasses (with or without a adjusting screw), a sector (brass and bone, ivory or wood), a parallel ruler (brass and ebony),
- a compass/ divider (small), a crayon or lead pencil holder, a proportional divider (brass, bone, ivory or wood), a drawing pen (2 parts), a pair of beam or bow compasses, a tracing pen, an ink point

ARCHITECT TOOLS AND INSTRUMENTS

an ivory, bone or ebony ruler,
a pair of triangular compasses or a pair of proportional compasses or an ivory (bone or boxwood) sector with hinge point of brass
a sector ruler with hinge point of brass,
a compass, a divider, a pen,
a substantial pair of brass and steel dividers with a removable point
a large brass double penholder that can be screwed
a small brass and steel pair of dividers
a semicircular protractor
one removable brass point with a small wheel, one removable steel ink point, one removable brass point for a pen holder
eventually a (French brass) sector, "Pied de Roy" or another brass sector signed "demi pied de roy"

DRAFTING POCKET TOOLKIT

with place for
- a (brass) protractor,
- a compass with place for three types of removable brass points (with a small wheel, with a steel ink point and with a pen holder),
- a scale ruler, a sector of boxwood with brass hinge,
- six places for small instruments

It looks there is no place for an ebony parallel ruler

MATHEMATICAL POCKET TOOLKIT

With place for a crayon holder or drawing pen, either with or without a protracting pin. at the left side, two brass compasses, the top of a ?, two removable brass points and a thin ivory scale ruler

CARTOGRAPHER/NAUTICAL TOOLKIT

a (boxwood) scale ruler, a (bone) sector, an ebony and brass parallel ruler, a brass protractor, a sector, div. rulers

MOST COMPLETE TOOLKIT FOR THE POCKET CASE

William Jones, THE DESCRIPTION AND USE OF THE POCKET CASE OF MATHEMATICAL INSTRUMENTS, London, 1793, page 19.

The following Collection forms the most complete Magazine Case of Mathematical Instruments, from which Portions are commonly ſelected, at the pleaſure and wants of the Purchafers, and are packed either in flat Pocket Fiſh Skin Cafes, [...].

For the Pocket Cafe.
A pair of Compaſſes with Ink and Pencil Points to ſhift, and an extra Piece to lengthen the Compaſſes for deſcribing circles of larger radii, &c.
A pair of Hair Compaſſes
A pair of Bow Compaſſes
Two Drawing Pens and Pencil
A pair of ſmall Hair Compaſſes with Finger Head Piece
A pair of Proportional Compaſſes
A pair of Triangular Compaſſes
A Knife, Screw Driver, &c. in one Piece
A Parallel Ruler
A Sector
A plain Scale and Protractor in one

X. COVERING OF POCKET CASES FOR MATHEMATICAL DRAWING INSTRUMENTS

About coverings of pocket cases is a lot of information. Covering of boxes and cases is since the middle ages an important subject in Japan, China and Western Europe. Mainly there is a lot of literature due to restoration activities. [23]

[23] See for more information about fish skin and covering of cases:
- https://founders.archives.gov/documents/Jefferson/01-25-02-0305
- https://ringlat.livejournal.com/29416.html,
- https://www.britishmuseum.org/blog/how-conserve-fish-skin-bag
- https://americanhistory.si.edu/collections/object/nmah_1122126
- https://collection.sciencemuseumgroup.org.uk/search/objects/object_type/drawing-instrument-sets
- https://collection.sciencemuseumgroup.org.uk/objects/co60730/four-inch-pocket-case-of-drawing-instruments-by-t-heath
- https://www.academia.edu/35144532/Shagreen_The_History_and_Conservation_of_Decorative_Ray_Skin_in_Furniture

The fish skin covering of a pocket case with mathematical instruments is made of multiple vertical skin strips. The direction of the fish scales is of great importance. The incidence of light and the small nuances in the natural pattern play an important role. At a distance, fish skin even looks like gray velvet. But the sliding resistance when gripping shows the opposite. The gradual tapering, together with the possibility to easily handle the instrument case so that it does not slip away when holding, makes the case very ergonomic.
Possibly is here used salmon as fish skin, stripped of scales.

The fish skin covering of a case is made of multiple vertical skin strips. The direction of the fish scales is of great importance. The incidence of light and the small nuances in the natural pattern play an important role. At a distance, fish skin even looks like gray velvet. But the sliding resistance when gripping shows the opposite. The gradual tapering, together with the possibility to easily handle the instrument case so that it does not slip away when holding, makes the case very ergonomic.
Possibly is here used salmon as fish skin, stripped of scales.

A B C D E F

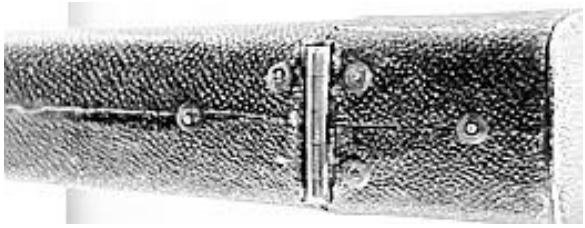
Case views: A. Left-side (push button right), B. Frontal-side with push button, C. Right-side with hinge right, D. Back-side with hinge. E. Bottom-side and F. top-side . The bottom –side is more rectangular. The pattern progression is clearly visible and a bottom point through the fish skin (at E) shows the position of the sharp point of the large compass. At the top-side (short oval axis) the pattern is very small (almost even) and the top-side is slightly curved (some mm., see images 2 and 4 – left to right). Sizes: Max.Height = 17 cm. (6 11/16 Inch), Bottom (long axis = 6 cm., short axis = 3,5 cm.), Top (long axis= 7.2 cm., small axis = 3,7 cm. The hood starts at 12,6 cm.
Looking at the different parts of the case, the covering consists of one vertical strip of fish skin at A, and one much wider strip running across B, C and D, also going from coarse to fine. This gives the impression that the main view is side C.

The dimensions of such portable mathematical instrument pocket cases vary depending on the length and number of instruments related with the profession of the user. If the user was well to do then the fish skin of his case could be Ray skin Shagreen. Ray skin (Dutch: “Rogge huid”) has its largest placoid scales down the middle of the back, with the other scales gradually diminishing in size towards the edges.

XI. DATING POCKET CASES

DUE TO THE DESIGN OF THE HINGES

Perhaps is dating and origin from pocket cases with mathematical drawing instrument, except through names of makers/dealers on instruments such as rulers, sectors, etc., possible by elements as hinge shapes, decoration by the marble pattern inside the lid. To find out more about the origin and time of creation by using the hinges of the covers of the pocket cases and the decoration pattern in the top of the lids as time capsules research is important in large collections with similar objects.



An example (handmade?) brass hinge from 1830 is shown here:

Unfortunately, it is difficult for me as the owner of only one case to delve further into this subject. The hinge on the right dates from 1830. Unlike the other two attachment parts, it has two attachment points per triangle. Unlike the other two attachment parts, it has two attachment points per triangle. Often something about the shape and dimensions can be found by studying photos of the hinges and their attachment under the cladding.



Right: Trade card of John Folgham, a well known Shagreen Case Maker for all sorts of clients in the second half of the 18th Century (ca. 1750) in London. (The British Museum, London.) On the left a classic metal pocket case for mathematical instruments covered with expensive shagreen. Outside England production of mathematical instrument cases is also known in the Georgian Period. The same type of mathematical drawing instruments and there cases were also made on the European mainland long before and around 1800.

THROUGH THE CLASP

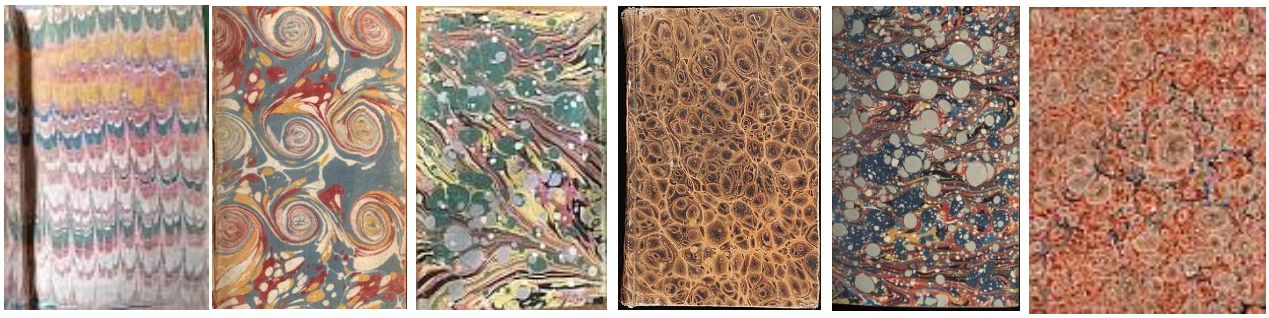
With spring knob or protruding button for opening the pocket case.


THROUGH THE LOCKING PLATE OR THE MARBLE PAPER ON THE INSIDE OF THE LID

At the top, on the inside of the lid, a marble pattern on paper is usually visible in English mathematical pocket cases.

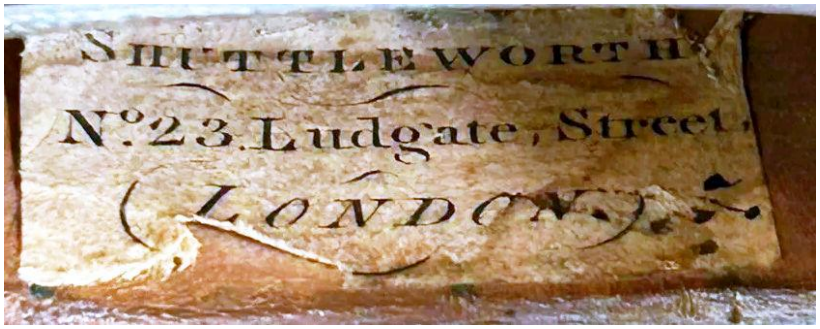
Left: The rectangle locking plate of metal, fastened behind a wooden bridge.

Some marble patterns in lids of pocket cases (ca. end 18th century and begin 19th century)
Perhaps the marbles are helpful for determination of date and producer of pocket cases.



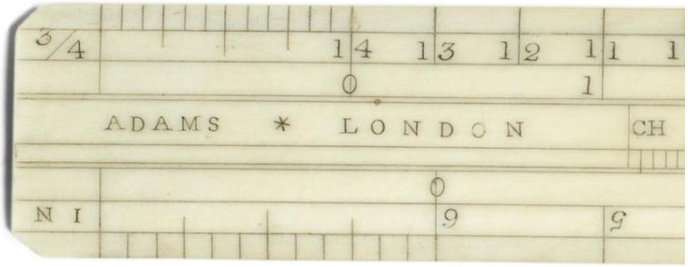
Endpapers or end sheets with marble patterns, in French & English books (1719 - 1735- 1794 - 1825 - 1830 - 1885).

NOTES INSIDE THE LID/ HOOD



In many lids of upright standing fish skin cases for mathematical (drawing) instruments are small notes legible. You can see numbers divided by a slash or a name of an owner (possibly even the maker). Sometimes a label is attached to the inside with the name of the supplier.[24]

Sometimes the makers name is found on an instrument. This does not mean automatically that all other unmarked instruments in one case come from the same supplier.



XII. Production of Pocket cases In England and Outside England

It looks that in England there are no special names of makers of upright standing fish-skin pocket cases known. A lot of these mostly identical cases, especially the black/ dark gray fish-skin cases, are made in large numbers. Perhaps is making cases a part of the work of the instrument makers industry. Are these made by young workers at mathematical instrument sellers as a training activity or made by leather workers? Who make these cases for drawing instruments? But then mutual differences are expected. The question is: who made the almost identical dark grey fish skin cases around 1800?

Interesting is a treatise by John Fry Heather, Assistant Mathematics Master, published in 1856.
J. F. Heather, M.A., A treatise on mathematical instruments, including most of the instruments employed in drawing, for assisting the vision, in surveying and levelling, in practical astronomy, and for measuring the angles of crystals: in which their construction, and the methods of testing, adjusting, and using them, are concisely explained. Third edition, with corrections, London, John Weale, 59, High Holborn, 1856. p 171

[24] See for information about makers and sellers of mathematical instruments and how to mark these and the cases:
Dr. Jasmine Kilburn-Toppin, 'Instrument makers, shops, and expertise in eighteenth-century London', Cardiff University, 2022
https://orca.cardiff.ac.uk/id/eprint/151313/1/Instrument%20makers%20chapter%20to%20LS.pdf
For more information see:
https://www.oldbaileyonline.org/record/t17430519-29?text=%22mathematical%20instruments%22%20&%20%22fish%20skin%20case%22

(digital: p 185 of 216). At page 171 is a List of mathematical, optical, and philosophical instruments manufactured by WILLIAM ELLIOTT AND SONS, 56, Strand, LONDON.
https://sliderulemuseum.com/Manuals/A_Treatise_of_Mathematical_Instruments_1856_By_JF_Heather.pdf

ELLIOTT: MOSTLY BOXES OF WOOD IN THE 19TH CENTURY

As can be read, the content of the supplied instrument cases are determined by a number of large educational institutions and then supplied by one manufacturer (Elliott). There are two types of cases: cases and magazine cases. The shape of a pocket case from Elliott gives a somewhat flat impression in photos, with a slight narrowing towards the bottom. The firm was founded by William Elliott (active 1807-53). In 1850 William formed a partnership with his sons, Frederick & Charles (Elliott & Sons) and the firm became Elliott Bros from 1854 after the death of father William (JdH).

The following Listing of mathematical instruments (flat wooden box) cases is by Elliott in the book of J.F.Heather: For the Royal Militairy Academy, The College of Civil Engineers at Puthey, King's College at London, College at Cheltenham, Cadets at Addiscombe. Cases by Elliott are mostly boxes of wood filled with instruments.

Case of Instruments, as supplied to the Royal Military Academy	2	12	6
Ditto, as supplied to the College of Civil Engineers at Putney .	3	10	0
Ditto, as supplied to King's College, London	2	15	0
Ditto, as supplied to the College, Cheltenham	3	3	0
Ditto, as supplied to the Cadets at Addiscombe, 3*l.* 3*s.*, 3*l.* 13*s.* 6*d.*, and	4	4	0
Magazine Cases of Instruments made of Brass, German Silver, or Silver, from 10*l.* 10*s.* to	50	0	0

Negretti & Zambra's Encyclopaedic Illustrated and Descriptive Reference 45 CORNHILL EC AND 122 REGENT STREET W LONDON, after 1878, p. 227. Mathematical drawing instrument. See:
Sets of drawing instruments in cases

The search term "Mit Fischleder umkleide Foudrale für mathematische Zeichen Geräte im 18e Jahrhundert" gives not many hits.
See for: "Foudrale recouverte de cuir de poisson pour dispositifs de symboles mathématiques au XVIIIe siècle" a hit like "La dynastie Langlois – Lordelle – Canivet – Lennel, « fabricateurs » d'instruments de mathématiques à Paris au XVIIIe siècle".

Swiss Manufacturer of a wooden case with drawer for Math. Instruments:

The Swiss Department of the Great Exhibition in London:
In the official descriptive and illustrated catalogue of the Great Exhibition of 1851..., part 3, p. 1053 is mentioned Frederic Hommel-Esser from Aarau in Switzerland:
81 HOMMEL- ESSER, FREDERIC, Aarau, Canton of Argovie -Manufacturer.
A complete case of mathematical instruments made of German silver and English steel. The compasses open with a peculiar and equable movement, and the workmanship of all the joints, screws adapt them for describing small circles &c accurately. The drawer at the bottom is for the reception of India ink colours, pencils &c. Pair of pocket compasses of fine German silver and English steel open in a case to show the construction.

[The study of mathematical and physical sciences are much pursued in Switzerland and many of the cantons deservedly enjoy a high reputation for the manufacture of optical and physical instruments especially those of Aara, Geneva and Zurich. There are many eminent mathematical instrument manufacturers in the Canton of Argovie whose instruments are much sought after for their beautiful finish and moderate price. Almost all the towns of Switzerland possess workshops for the construction of musical instruments. Pianos and other instruments are exported. The trade in musical boxes is special to the watch-making cantons Geneva and the small town of St. Croix, in the Canton of Vaud are the principal seats of this trade. – D.C,]
See: https://www.mathinstruments.ch/en/gallery/inv-0.008.html

Ivy Pinchbeck, Women workers and the Industrial Revolution, 1750-1850. London: George Routledge, 1930. x + 342 pp.
CRAFTSWOMEN AND BUSINESS WOMEN p. 285
"....In heavier trades or those requiring technical training, a widow usually engaged able workmen to assist her, while retaining the management in her own hands, as shown in the following notice at Newcastle (1779): " M. Hawthorn, Widow of the late John Hawthorn, Watchmaker of this town, tenders her grateful thanks to the friends of her late husband ; and begs to acquaint them and the public, that she will carry on the said Business (having engaged able workmen therein) and hopes for the continuance of their favours, which she will at all times studiously endeavour to merit." Jewelry, Trinkets, Watches, Music and Musical Instruments."

See: https://eh.net/encyclopedia/women-workers-in-the-british-industrial-revolution/
"Women, or mothers, were also responsible for raising and educating their children. In addition, they were responsible for cooking and feeding the family. This required women to be well-educated in medicinal and culinary uses of herbs and plants, needlework, reading, and writing. "

See: https://journals.openedition.org/artefact/443?lang=en
Fig. 3. – Carte commerciale de l'opticien Edward Scarlett
At the top of fig. 3 is a case with mathematical instruments is depicted
See also page 21.

CONCLUSION

Perhaps this study, including the reports with some illustrations/photos of my own hand, will open a number of hitherto unknown sources on the production of ergonomically designed portable cases for mathematical drawing instruments and their makers. Few makers are known by name. They hardly ever sign their holders for storing instruments
In my opinion is the name of the maker of a mathematical drawing instrument not direct identical with the name of the maker of the case in which these instruments are kept for travel and use.

In the online database named 'Dictionary of English Furniture Makers 1660-1840, originally published by W.S. Maney and Son Limited, Leeds, 1986' are only a few names to find of case makers with a relation to Shagreen, mathematical instruments or without a specific branch name.
https://www.british-history.ac.uk/no-series/dict-english-furniture-makers/c [accessed 19 May 2025

Added by W.S. Maney and Son Limited about the code 'cm' and 'D':

> *"One problem encountered, was the compiler's tendency to list joiners and cabinet makers under a single heading, which is why some tradesmen in the Dictionary, especially in northern towns and villages, are recorded as 'joiner/cm'.*

> *Owing to the sheer multiplicity of references culled from Directories we decided to acknowledge all such information by the letter 'D' when citing the source. Full details of titles and dates are entered on cards in the master index."*

- Burton, John, Townhead Cross, Sheffield, Yorks., cm and case maker (1814–18). Trading at no. 4 in 1818. [D] . cm means ?.....
- Brown, Thomas, Prince's St, Leicester Sq., London, and 11 Brewer St, u, cabinet and case maker (1784). Trade card of Brown of 11 Brewer St in Banks Coll., BM. [D; poll bk]
- Carter, William, Newgate St, London, case maker. Trade card, c. 1760, in MMA, NY.
- **Duck, John, 26 Fashion St, Spitalfields, London, cm, u and mathematical case maker (1826–28). [D]**
- Ellet(t), Samuel, 9 Charterhouse Lane, London, cm, u, undertaker and case maker (1839). [D]
- **Folgham, John, Shagreen case maker (1760-1802)**
- Greathead & Haslehurst, 25 St John's Sq., London, dealers in tortoiseshell and case makers (1790). [D]
- Kelly, John, 27 Dartmouth St, London, cm and case maker (1801). In February 1801 took out insurance cover of £500 of which £300 was for utensils and stock. [GL, Sun MS vol. 419, ref. 715218]
- Lambley, James William, Birchole St, Birmingham, case maker (1793). [D]
- Millard, W., 9 Skinner St, Snowhill, London, trunk, chest and case maker (1835). [D]
- **Laurikens(?), Mark Anthony, 37 Greenhill Rents, Smithfield, London, shagreen case maker (1810). Insured his household goods for £300 in December 1810. [GL, Sun MS vol. 449, ref. 852162]**
- Lea, J., 19 Poppins Ct, Fleet St, London, case maker (1826). [D]
- **Spriggs, William, London, cm, case maker, shagreen case maker (b. 1746–1805). Born at Chelmsford in 1746 and app. to John T. Castall of Wood St, Cheapside, London in 1759. Later he established his own business in Old Fish St. A tortoiseshell veneered tea caddy is known in a private collection with a late 19th-century written note attributing it to this maker.**
- Thom(p)son, Guy, 2 Duke St, West Smithfield, London, cm and ebony inkstand maker (1776–1803). Took out Sun Insurance policies in 1776 for £400, utensils and stock accounting for £300; and in 1782 for £600, £450 on utensils, stock and warehouse. Listed as not having voted in Oxford poll, 1802. [D; GL, Sun MS vol. 248, p. 488; vol. 302, p. 247] Heal records trade card of Guy Thompson, cm and case maker. See Thomson & Fiske at this address.

Some names of possible mathematical instrumental case makers around 1800 and before in relation with famous mathematical instrument makers:

- Adams family: 1734-1772 active George Adams sr 1704 -1772 , 1750 - 1795 George Adams jr, , 1760 - 1830 Dudley Adams
- W & S Jones (John Jones, 1737 – 1808) , William Jones (1762 – 1831) , Samuel Jones (1770 – 1859)
- Thomas Blunt (C. Blunt - Optician, and Mathematical Instrument Maker, (formerly of Cornhill)), a.o., London (Thomas Blunt (1739~45 - 1823), Charles Blunt (1775 - after 1853), Thomas Blunt, Jr. (1789 - after 1823), Edward Blunt (1798 - 1826), T. Blunt, Blunt & Son, T. & T. Blunt, and E. Blunt
- William Elliott (active 1807-53) and family
- Edward Halse & Philip Jacob (combination active between 1808-1822)

- Aslin, Avary, 15 Lower Smith Street, Northampton Square, Clerkenwell, London. Shagreen & Morocco Case Maker. (Calv. 15) Science Museum London
- BOLTON, THOMAS England, fl.1808-45, MIM Set of Mathematical Instruments, case = X; Garden Dial = X. Bryden says (Bollon?), 1808-18 and rule maker; Clay and Court thought instrument set c.1780; may be two makers. 6 Colmore Row (1808; Colmore Row (1818); 61 and 62 Loveday Street; all in Birmingham. Bryden 9; Taylor 2(1782); Clay and Court; Dewhirst; Crawforth 6.
(http://historydb.adlerplanetarium.org/signatures/all.pl)

After a lot of research I have the idea that the information I am looking for is only to be found in the (hidden) archives and financial accounts of the firms that sold mathematical drawing instruments in the 18th century. The information is not present in trade catalogues and books about the instruments themselves. The instrument manufacturers liked to sell especially filled cases. Research in company archives is needed to determine, through accounts, bookkeeping and case law, whether the portable, upright standing, fish skin cases were supplied by the instrument makers or were made on behalf of the dealers by independent, but specialised, 'case makers'. Perhaps the cases were made outside London, in the provinces or even imported from abroad. The question is: who filled the cases the manufacturer or the trader/ dealer? Where are the empty instruments etuis coming from?

This almost hidden niche caught my attention as retired teacher of drawing. In my own high school days and at the teacher training to become a drawing teacher I was still busy making line drawings as a student.

Sometimes free work pieces but also results, cross-sections etc. Research into the history behind the tools was left to our own detective work. I only got around to that at a later age. Too bad actually. It was precisely during my student days that the transition to new techniques took place and, a little later, technical drawings and designs are made by using the computer. Working with draw pens and ink seemed outdated. The increasingly advanced printers did that work. At the teacher training college where I worked from 1977 as a teacher of drawing didactics, I came into contact with the computer as a word processor but also as a means of creating websites, discovering digitized images from the early Internet and later developing software myself and building and maintaining websites.

Given my historical interest and my familiarity with computers and internet searches, I have been able after my retirement to visit many digitized sources from home, locate locations, and find and study the views of others. The process of digitizing books that are part of the world heritage by Google has certainly contributed to this. With great pleasure I have looked at and analyzed the information that can be found on the internet on this subject: the uprising pocket case for mathematical drawing instruments.
Much information, including in the form of photos, can be found via websites such as BNF Gallica, Ebay, the Louvre, the British Museum and the Science Museum in London, Auction houses etc. .
I hope that this modest study will be of assistance to others interested in and working in the field of ancient drawing instruments and their cases and would be happy to receive suggestions on sources that have escaped me so far.

24/05/2025 © By Jaap den Hollander (NL) - jcdhollander@ziggo.nl

Website: https://www.jcdenhollander.nl