# Glass Sundials in 17th Century London

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Stained glass sundials are among the most attractive and practical scientific instruments that have come down to us. While affording pleasure to the eye, they enabled owners to regulate their timepieces without the need to step outdoors. Invented in Germany in the early 16th Century, glass dials were most prevalent – in England at least – in the 17th Century, when they became quite a familiar sight in public buildings such as churches and the halls of colleges and livery companies, as well as private houses. More than 30 survive from the years 1620-1720; others are known from documentary sources, bringing the recorded total for the period closer to 60. By contrast, only one example is known from Elizabethan England – a small circular dial at Gilling Castle in Yorkshire, forming part of an elaborate heraldic window. (The Gilling dial bears the signature of Baernard Dininckhoff, an immigrant Bohemian artist, and is dated 1585).[1]

Regular production coincided with the greater availability of clocks and watches, and tailed off as these gradually became more reliable. The London Clockmakers' Company was founded in 1631, and glass dials began to appear in quantity about the same time. Examination of surviving examples leaves little doubt that the main centre of production was London, where a succession of glass-painters produced dials in a variety of shapes, sizes and decorative arrangements, while sticking closely to a common formula in the technical aspects of their work – 'dialling', as they would have termed it. These London makers were members of the Glaziers' Company, and though apprenticeship records for this period are lost, the common elements in their work reinforce other evidence of a small community of craftsmen sharing close personal links. The underlying consistency in their dial-work makes it possible to classify most of the surviving examples as 'London dials' – including two now in the care of the Oxford Museum of the History of Science – but provides little help in identifying the work of individual makers. Only a handful of dials are signed, but written records provide clues to a number of others. Apart from dials, heraldic displays formed the glass-painters' bread-and-butter work, since they could only tackle picture windows at times when the religious climate was favourable. One unexpected outcome of this investigation was the discovery that – to some extent and for a variety of reasons – several of these craftsmen were already known to students of scientific instruments through the writings of the geographer Dr E.G.R.Taylor.[2]

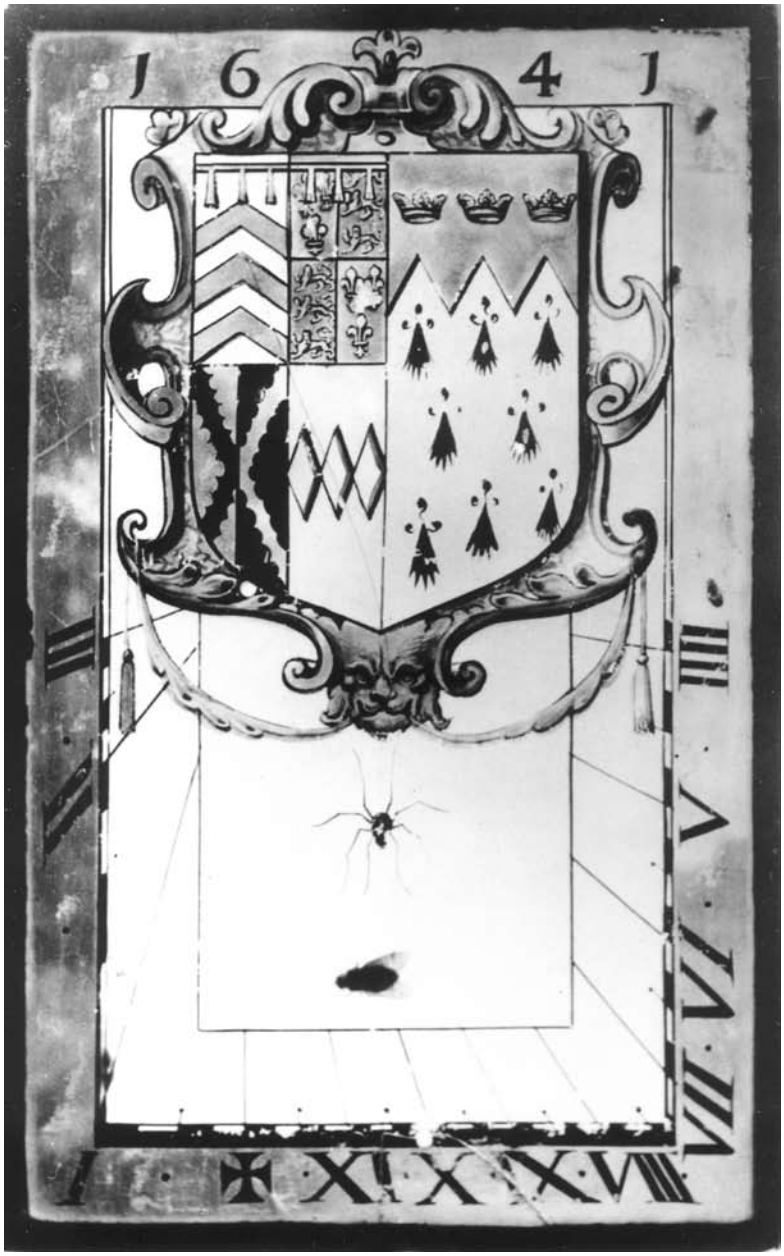


Fig. 1 *Dial with arms of Sir Thomas Barrington MP and his wife, née Judith Lytton; unsigned, but Sutton made the same couple another dial the same year. Last seen at Warneford Place, near Swindon, where photographed by P.S. Spokes in 1945 (© Mrs Ann Spokes Symons).*

## Baptist Sutton (c. 1600-1667)

Sutton emerged in the early 1620s as a distinguished maker of church windows, contributing to the short-lived revival of the art between 1609 and 1641, when a Puritan government banned religious images. (Most persuasively, he is credited with a series of scenes from the life of Jacob dating from 1621 at Abbot's Hospital, Guildford, three of which he later repeated at St Leonard's, Shoreditch, in 1634). Sutton married Anne Sparborough in 1622, and soon afterwards settled in Holborn, setting up shop in Chancery Lane alongside a senior glass-painter, Richard Butler, who died in 1638.[3] Both no doubt sought clients for their heraldic work at the nearby Inns of Court and Chancery, and among the wealthy private citizens of west London.

Butler is not known as a sundial-maker, but in 1627 Sutton included a small dial in a panel at Middle Temple Hall displaying the arms of the Chief Justice of the Common Pleas, Sir Nicholas Hyde. Unusually, the glass was both signed and dated.[4] In 1641 a Puritan MP, Sir Thomas Barrington, had a glass dial made for the London home he had leased in Great Queen Street, just across Lincoln's Inn Fields from Chancery Lane. The dial (Fig. 1) survived until recently in a house near Swindon: it bore the arms of Barrington and his wife and was made for a window declining some 41° E of due south, just about right for Queen St. Although Barrington's account books do not name its maker, they do record that he ordered a second dial from Sutton a few months later, presumably for his home in Essex.[5] Other undated dials share some of the decorative

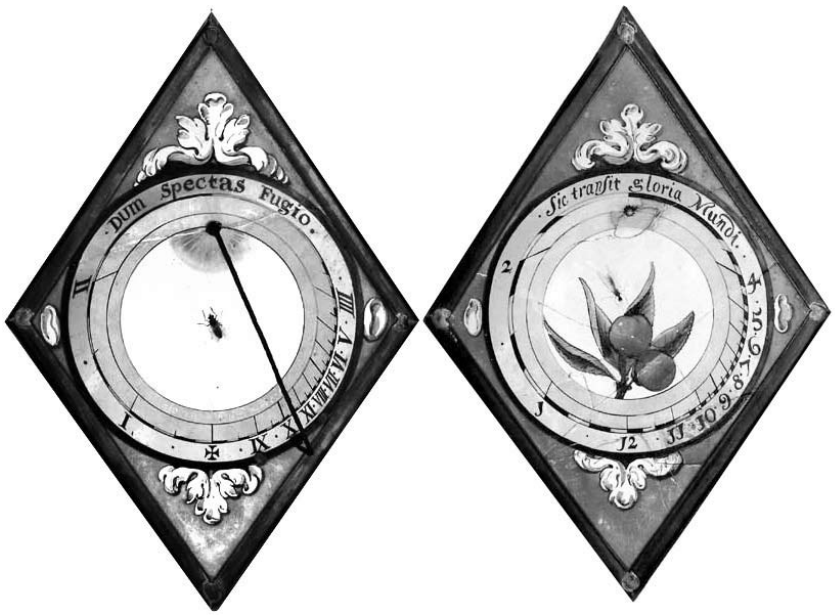


Fig. 2 *Pair of quarry dials made in 1664 for the Rectory at Northill, Bedfordshire; the left-hand dial (with unauthentic gnomon fitted on the wrong side) is signed almost imperceptibly by John Oliver (photo © Mike Cowham, from his* Sundials of the British Isles, *Cambridge 2005).*

features of the Barrington dial, suggesting that Sutton favoured renaissance-style ornamentation, including grotesque masks.

Records show that Sutton made glass sundials for at least two London churches, one in 1638-9 'used to sett the clock by...', and another in 1649/50.[6] But the best evidence for his activity in this field comes from one of the hundreds of obscure books unearthed by E.G.R.Taylor: Horologiographia Nocturna: Lunar Horologiography, by the London physician John Wyberd, published in 1639. As its title implies, the book is concerned with the use and design of moon-dials. For a typical horizontal dial in brass, Wyberd recommends Elias Allen as a suitable maker. He then adds these words:

> ...it would be an excellent way to have a Lunar Dyall drawne on glasse and placed in a window after the manner of those Sunne Dyalls which are most accurately made by my loving friend Mr Baptist Sutton, dwelling at the upper end of Chancery Lane, neere Holborn (being the author of the ensuing worke or Addition) who likewise will be able to perform these as accurately as the other, if it shall be required of him.[7]

The 'Addition' to which Wyberd refers parenthetically is a learned article on logarithmic scales – e.g. Oughtred's Circles of Proportion and Gunter's Line of Numbers – which was appended to Wyberd's book, and evidently written by Sutton.

Dr Taylor concluded from this that Sutton was a 'maker of engraved scales', overlooking other evidence of his true occupation. This led her to speculate that Baptist Sutton was father or uncle of the distinguished instrument-maker, Henry Sutton, and, by implication, of Henry's likely kinsman, William Sutton.[8] There is as yet no evidence to support this: Baptist and his wife had seven children baptised at St Andrew's Holborn between 1624 and 1640, but the only boys were two named Baptist, both short lived.[9] Henry and William both belonged to the Joiners' Company, but were apprenticed to different masters, Henry in 1638, William in 1642. William's apprenticeship record names his father as Henry Sutton, yeoman, of Kingston-on-Thames.[10] A link between Baptist and this older Henry cannot be entirely ruled out, but Sutton is after all a fairly common name.

In the 1640s, Sutton collaborated with Wyberd on a series of experiments on the specific gravity of various materials, reported at length in Wyberd's 1650 book Tactometria, or Geometry of Regulars. Wyberd explains that Sutton, 'a man well known in the City among artists', was helpful in securing the co-operation of the keeper of standard weights and measures at the Guildhall, 'who otherwise I found to be very nice and scrupulous in shewing of them'. The Gray's Inn lawyer Edmund Wingate – a mathematician who also shared their interests in dialling and logarithmic scales – had been due to witness one series of tests, but pressure of work prevented this.[11] In 1653, Sutton signed his name as the first owner of a fine copy of William Leybourne's Compleat Surveyor, now in the British Library.[12] Dr Taylor lost sight of Sutton at this point, but in fact his career had several years to run. He was probably the 'Sutton the mathematician' to whom Gray's Inn paid £1 2s in 1653-4 for 'delineating the dyall in the walks', and the same Inn certainly employed him for glass-painting in 1661-62.[13] Baptist seems to have retired about then, and was dead by November 1667, when administration of his estate was granted to his daughter Mary, wife of Richard Dutton (see below).[14]

## John Oliver (1616-1701)

Oliver has long been recognized as a maker of glass dials, but the handful of dials which can be positively identified as his all date from after 1660. It is difficult to distinguish his earlier work from Sutton's, since he used such a similar dialling method. Indeed it is reasonable to suppose – in the absence of apprenticeship records – that Oliver learned his dialling, and perhaps even his glass-painting, from the older master. Some undated dials can be attributed to him on stylistic grounds, however, by comparison with his known work. For instance, when he installed three large heraldic panels in the church at Northill, Beds. (signed and dated 1664), he presented the Rector with a pair of small quarry (diamond-shaped) dials, one of which he also signed (Fig. 2). The auricular style of decoration closely parallels that on a number of other dials, providing a linked sequence that brings us, eventually, to a direct-east dial at the Oxford Museum of Science. This is dated 1648 – a notably early date for a probable Oliver dial.[15] The two Northill dials also share particular styles of script with other dials of various shapes and sizes, which likewise points to Oliver as the likely maker.

Unlike Sutton, Oliver chose to settle in the heart of the City, in Trinity Lane (near the present Mansion House station), presumably hoping for custom from city merchants and the livery companies to which they belonged. He married Grace Smith in 1649 and she bore him five children (all baptised at Holy Trinity the Less) before dying in 1660.[16] During the 1650s Oliver joined a consortium of London glaziers to buy up glass-houses in Newcastle and so gain some control over supplies of window-glass to London.[17] Following the Restoration of the monarchy and church, Oliver secured some large-scale contracts for heraldic church glass, including the one at Northill mentioned above, and a parallel one in the City, at All Hallows Staining, both in 1664 for the Grocers' Company. He may also have worked in Oxford, perhaps restoring picture windows in college chapels. Oliver would most likely have continued as a leading glass-painter but for the Great Fire of 1666, which not only destroyed his home and workshop, but launched him on a new career. In 1668 he became one of the City surveyors with Robert Hooke and Peter Mills, measuring building plots and issuing certificates.[18] He took time off in 1670 to go to Oxford to marry his second wife, Susanna Speed, a granddaughter of the cartographer John Speed.[19] In the winter of 1675-6 he joined Christopher Wren's teams rebuilding the City churches and St Paul's Cathedral, and in 1686 became Master-Mason to the King, later working on Wren's extensions to Hampton Court. Despite this heavy work-load, Oliver found time to become a skilled map-maker and mezzotint engraver. All this left little room for glass-painting, though Oliver seems never to have stopped entirely, and he served as Master of the Glaziers' Company in 1685. Oliver's life was so varied, it is difficult to do justice to it

in a brief article; on the other hand a biographer would find equal difficulty in penetrating below the surface of his life, as he left hardly any documents of a personal kind.

Oliver qualifies as one of Dr Taylor's mathematic practitioners both as a surveyor and a map-maker. Despite knowing of his sundials and some other glass-painting, she described him as a 'Painter-Stainer', in effect placing him in the wrong craft.[20] This is a pity, as it confuses her account of the badge Robert Hooke devised in 1673 for the rebuilt Christ's Hospital School – Hooke took it to Oliver not to be fair-copied (as she puts it), but to have it painted on glass: Hooke's diary entry for 29 December 1673, reads in part:'...gave Mr Oliver a designe for Blewcoats badge'; but this follows another twenty days earlier: '...at Mr Olivers. Saw him paint glass.' A similarly enigmatic entry two years later suggests that Oliver may also have painted some kind of ceremonial glass panel for the College of Physicians, which Hooke completed about that time.[21] Though this is a minor niggle, Dr Taylor also misinterpreted the selling-addresses of Oliver's prints – various shops around the Old Bailey – as his home address; in fact he rebuilt his premises in Trinity Lane after the Great Fire, acquired other property nearby, and continued to live there until the very end of his long life.[22]

## Richard Dutton (c. 1640-1686)

Dutton was Baptist Sutton's son-in-law and successor – he had probably also been his apprentice, and clearly shared some of Sutton's mathematical interests. He took over Sutton's later house and workshop in Ely Rents, just east of Leather Lane and north of High Holborn, erecting over it a 'Sign of the Dial'. As Dr Taylor noted, this was one of the London shops from which copies of William Leybourne's book Dialling plain, concave, convex... could be obtained in 1682. She concluded from this that Dutton was 'probably a dial-maker', though she was unaware of his relationship to Sutton.[23]

What really caught Dr Taylor's eye was the discovery that he made a series of slides in December 1672 for the Scottish astronomer James Gregory (1638-75) to project with his dioptric lantern. This was a very early magic lantern, since the device was only invented about 1659. The London optical instrument-makers Richard Reeve (the elder) and Christopher Cock were selling them from about 1663.[24] Cock, who supplied Gregory's lantern, informed the mathematician John Collins, who was acting as Gregory's London agent in the matter, that Dutton was 'the sole Glasse Painter we have'. Clearly this was not strictly accurate, but perhaps indicates that he was at that date the only London maker of such slides, which required the glass-painter to work at a much smaller scale than usual. Although Dutton was required to supply only six or seven slides, the delivery of these delicate


Fig. 3 *Lost dial with arms of Pewterers' Company, London, probably by Richard Dutton, who made painted glass for the company's rebuilt hall in 1672. Illustration from Welch: History of the Pewterers' Company (Vol I) 1902, courtesy of the Society of Antiquaries (author's photo).*

objects from London to St Andrews engendered quite a lengthy correspondence between Gregory and Collins.[25]

It would not be long before the magic lantern, like the cinematograph in a later era, was exploited for its capacity to shock and amaze. Gregory gives no indication what his slides were intended to show, referring to his machine merely as a 'lantern for projecting the species'. However there is no indication that his purpose was other than purely educational. The same cannot be said of another early owner of a magic lantern, Samuel Pepys, who had one demonstrated by Richard Reeve (the younger) in August 1666:

> Comes by agreement Mr Reeves, bringing me a lanthorn, with pictures in glass, to make strange things appear on a wall, very pretty.

Pepys bought two telescopes and 'the lanthorn that shows tricks' from Reeve a few days later.[26] One is bound to wonder whether his slides were also made by Richard Dutton, and what strange marvels they showed.

Dutton married Mary Sutton in 1661.[27] He was the most prominent London glass-painter from the later 1670s until his early death in 1686, and served as Upper Warden of the Glazier's Company under Oliver in 1685. In 1672 he was employed to paint glass for the rebuilt hall of the Pewterers' Company – the contract almost certainly included a fine glass sundial, displaying the company arms, which appears to have been destroyed in the Second World War (Fig. 3).[28] Records show that Dutton made several other dials, including 'a dyoll in the Court Room' at the rebuilt Fishmongers' Hall in 1676-8.[29]

## William Price the Elder (c.1645-1710)

Price, the founder of a three-generation dynasty of glass-painters, grew up in Dutton's shadow, living in the same small area of Holborn (Ely Rents).[30] Price only emerged as a prominent glass-painter after Dutton's early death in 1686. Until then he seems to have been happy to assist Dutton, while making a comfortable living plain-glazing the fine new houses which were springing up in the western suburbs. Although he does not figure as one of Dr Gregory's mathematical practitioners, he might certainly have qualified for a mention by carrying on the art of dialling upon glass. In 1700 he advertised in the London Gazette, under the headline Glass-Painting Reviv'd, stating that at his premises near Hatton Garden...

> ... Gentlemen may have Church-History, Coats of Arms, Dials &c. Painted upon Glass, in what Colours they please, to as great a Perfection as ever...[31]

One example of his dial-work was painted for Gray's Inn in 1702, but seems to have disappeared since it was taken down during the Second World War (Fig. 4). It is not mentioned separately in the Inn's accounts, but Price was paid over £15 for glass-painting in 1701-3.[32] A comparison with Sutton's Barrington dial of 1641 shows that, however much the style of decoration may have altered over the years, the method of displaying the essential time-telling elements had barely changed at all.

## Characteristics of London dials

Taking his Barrington dial as a convenient starting-point, it can be seen that by 1641 (and probably earlier) Sutton had settled on a dialling formula which his successors were happy to follow:

1. the chapter-ring is done in yellow-stain (resembling a brass clock-face); the black hour numbers (usually Roman) displayed on it are interspersed with dots marking the half-hours.

2. the number XII – the meridian – is usually replaced by a four-armed cross (the type known to heradry as a cross pattée).

3. the central area is painted matt on the back to show up the shadow of the gnomon.

4. the hour-lines are interspersed with very short half-hour-lines drawn against the outer edges of this zone.

5. the quarter-hours are marked by a black-

and-white scale along three sides, just inside the chapter-ring.

6. where the dial is a single sheet of glass, the gnomon is attached to it (on the outside) by holes drilled in the glass – normally one near the top and three below; the lower holes are hidden in a black strip painted alongside the quarter-hour scale, or on the outer edge of the chapter-ring.

7. the innermost area is frequently enlivened with a fly, spider or other small creature, painted with the body on one side of the glass and the legs on the other, giving a lifelike effect.

A study of dated dials suggests that only a two changes were made to this specification over many decades:

1. the short half-hour lines in early dials terminate in a dot at the inner end, creating a lollipop effect not seen in later dials.

2. a second line is drawn around the central field in later dials, marking off a narrow strip which is left completely blank – possibly to help the eye catch the gnomon shadow.

Both changes seem to have occurred about 1655-60. Obviously some of the characteristics listed above can only occur in south-facing dials, but those designed for other orientations tend to conform as far as possible. By these criteria the Goldfinch dial – in a stairway window at the Museum of the History of Science in Oxford – is clearly a London dial, even though its authorship is unknown. Dials for direct east or west locations, which generally resemble scales rather than clock-faces (like the same museum's other dial already mentioned), have their gnomon mounting-holes hidden in two black strips to either side of the scale. The four surviving dials by or attributed to the York glass-painter Henry Gyles (1645-1709) share a few of these characteristics, but deviate markedly in others, indicating that his dialling method was arrived at independently. For instance his half-hour lines are drawn on the chapter-ring, and terminate with decorative finials, as on many clocks of the period. Gyles seems to have adopted the cross pattée only late in his career. The decoration of his dials also tends to be more 'literary' in character, drawing inspiration from Latin authors, and does not feature the trompe-l'oeil livestock so often favoured by his London counterparts.[33]

## Note

Some of the details contained in this article have previously appeared in the *Journal of Stained Glass*, **29** (2005) and in the *Bulletin of the British Sundial Society,* **18**(i) (March 2006). The former includes many references to articles on painted glass not individually cited here.

The author has made strenuous efforts to trace the present holder of the copyright for F.S. Eden, who died about 50 years ago.


Fig. 4 *Lost dial dated 1702 with arms of Gray's Inn, which paid William Price the elder over £15 for glass-painting in 1701-3; mono reproduction of hand-painted illustration by F.S.Eden (author's photo).*

Reproduction of the same image in the *Bulletin of the British Sundial Society*, and an appeal for information in the March issue of the *Newsletter of the British Society of Master Glass Painters* (both in March this year) have also produced no response.

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## Notes and References

1. A website operated by an American enthusiast, John Carmichael includes images of most surviving and recorded dials. It can be seen at: http://advance-associates.com/Sundials/Stained_Glass/

2. E.G.R.Taylor: *Mathematical Practitioners of Tudor & Stuart England 1485-1714* (Cambridge University Press 1954).

3. Harleian Society Publications Vol. XXX (1903): Registers of St Vedast Foster Lane, 12 (26 Dec 1622); Guildhall Ms 6667/2 register of baptisms at St Andrew's Holborn.

4. Illustrated in British Sundial Society *Bulletin*, **18**(i) (March 2006), p. 40, Fig 1.

5. Essex Record Office: D/Dba A14 & A2.

6. St Magnus the Martyr: Guildhall MS 1179/1 p 6; St Giles in the Fields: Camden Local Studies Centre: P/GF/M/1 & P/GF/CW/1.

7. John Wyberd: *Horologiographica Nocturna* ... (London: printed by Tho. Cotes, 1639), pp.14-15.

8. Taylor, (note 2), p. 219.

9. Guildhall Ms 6667/2: Parish register of St Andrew's Holborn.

10. M.A.Crawford: 'Instrument Makers in the London Guilds', in *Annals of Science*, **44** (1987), pp. 319-377.

11. J.Wyberd: *Tactometria, or Geometry of Regulars*, (London , R. Leybourne 1650), 267-287.

12. BL 530.m.5.

13. Gray's Inn: Ms Ledger A (FIN/1) 1583-1703, 185v & 199v.

14. Guildhall Ms 9050: Act Book of the Archdeaconry Court of London (18 Nov 1667).

15. Not on public view, but illustrated in Christopher St J.H. Daniel, 'Shedding Glorious Light', *Country Life*, 26 February 1987, pp. 72-75, Fig. 9.

16. Guildhall Mss 5287/1, 9155, 9156: parish registers of St Margaret Pattens and Holy Trinity the Less.

17. H J Powell: *Glass Making in England* (Cambridge University Press 1932), p. 94; PRO: PCC Wills 1655/161: John King, Citizen and Glazier.

18. ODNB vol 41, 754; Colvin: *Biographical Dictionary of Architects*, pp. 423-4.

19. Christ Church archives: Cathedral register 24 May 1670; PRO: PCC Wills 1640/183: Will of John Speed MD.

20. Taylor (note 2), pp. 115, 219.

21. *Diary of Robert Hooke 1627-80*, ed. H.W.Robinson and W.Adams, (London 1935), pp. 74, 77.

22. PRO: PCC Wills: Will of John Oliver 1701 (PROB 11/462 sig 157).

23. Taylor (note 2), pp. 250, 396.

24. My thanks to Deac Rossell, historian of the magic lantern and early cinema, for guidance in this unfamiliar field.

25. *James Gregory Tercentenary Volume*, ed. H.W. Turnbull (London G Bell, 1939), pp. 243-270.

26. Pepys: *Diaries* ed. R.C. Latham & W. Matthews (London, Bell & Hyman, 1970-83), Vol. 7 (1972), pp. 254, 257 (entries for 19 and 22 Aug 1666).

27. Harleian Society Publications Vol. XXX (1903): Registers of St Vedast Foster Lane, 24 (26 Dec 1661).

28. Guildhall Ms 7090/6: Court Book of Pewterers' Company.

29. Guildhall Ms 5561 Vol. 2, p. 324.

30. Tax return for Four Shilling in Pound Aid 1693-4: Transcription by Derek Keene, Peter Earle, Craig Spence and Janet Barnes for the 'Metropolitan London in the 1690s' project, based at the Centre for Metropolitan Studies (CMH) 1992.

31. J A Knowles: 'Glass-painters' Advertisements' in *Journal of Stained Glass,* **II**/1 (1927), pp.18-22.

32. *Pension Book of Gray's Inn*, ed. R.J. Fletcher, Vol. 2 (1910) p. 396.

33. One illustrated in British Sundial Society *Bulletin*, **18**(i) (March 2006), p.40, fig 1; all four in J T Brighton: *Henry Gyles: Virtuoso and Glasspainter*... (York Historian 4: 1984), plates 3, 7a, 7b, 9b.

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