

## CYCLOPAEDIA OF TELESCOPE MAKERS

### Part 6 (Sin-Syk)

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#### S

SINDEN David - eminent optical instrument maker, *Sinden Optical Co. Ltd., Stella, Haugh Lane, Addison Industrial Estate, Ryton, Tyne and Wear, England NE21 1TE*. Chief optician at Sir Howard GRUBB PARSONS *Newcastle* in 1962, SINDEN represents the present-day GRUBB PARSONS, having worked with George MANVILLE and Joseph MEWETTE, following ARMSTRONG who was instructed by Sir Howard GRUBB, himself. This is a particularly interesting firm since it provides optical experience which can be traced back to the 3rd Earl of ROSSE (Birr Castle) and Thomas GRUBB (Dublin) in the early 19C. Modern optical techniques and skills are applied today in the construction of moderately large (48-inch) astronomical mirrors, and specialized prototype systems. Past achievements have included diverse instruments such as a 20-inch Shafer/Maksutov, a 36-inch Cassegrain, a 16-inch Ritchey Chrétien (with aspheric field corrector), a 16-inch guider system for the William Herschel Telescope, large camera obscura systems, toroidal mirrors and apochromatic objectives. At Sir Howard GRUBB PARSONS some of the world's largest telescopes of the 20C were constructed under SINDEN's careful eye. The list includes the 98-inch Isaac Newton, the 155-inch Anglo-Australian and the 150-inch UK Infra-red telescopes. Examples of GRUBB PARSONS instruments, made during SINDEN's period, are to be found in Scotland and UK, Canary Islands, Italy, Canada, Australia, Switzerland, USA, Denmark, Japan and Greece. This list of countries can be extended to SINDEN optics in Sweden, South Africa, Canada and India.

SISSON G.M. - theoretical optician to Sir Howard GRUBB PARSONS and Co., *Newcastle, 20C*. He contributed widely to design of 98-inch Isaac Newton Telescope (RGO Herstmonceux), associated with MANVILLE.<sup>1</sup>

SISSON Jonathon - 1690-1749, mathematical instrument maker, *The Sphere, Corner of Beaufort Bldgs, Strand, London (1722-37)*, father of Jeremiah. SISSON constructed astronomical mirrors, and was assistant to GRAHAM.<sup>2</sup>

SISSON Jeremiah - fl. 1736 until after 1788, instrument maker, succeeding his father Jonathan at the same address, c. 1747. Recorded at *Southwark, London (1780, possibly residence)*.<sup>3</sup>

<sup>1</sup>See *Vistas vol.3, p.92*.

<sup>2</sup>See SIMON, Tayl. 143 and King p.114.

<sup>3</sup>See SIMON. He used a trifilar parallel-wire micrometer for some of his instruments (A Turner ESI p.143, Fig.29). SISSON is known for his *universal equatorial mounting*, and made several improvements to surveying instruments, particularly the theodolite. At Armagh Observatory there is a fine equatorial altitude telescope (George III Collection, JMcF p.184), Tayl.218. See SISSON's dome (1773) in Fig.290.

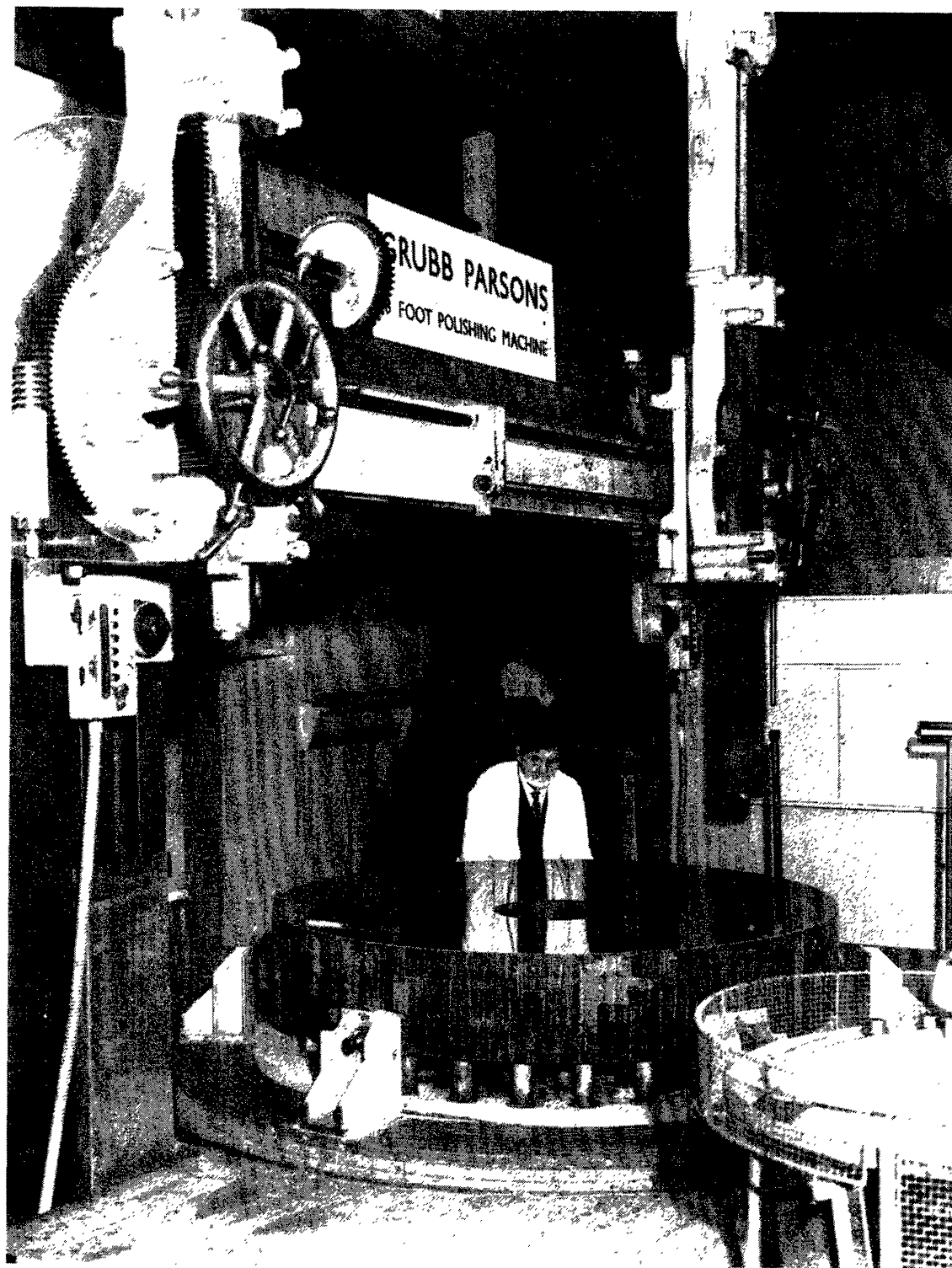


Fig. 284. The 71-inch Cassegrain mirror (thickness 14 in) at GRUBB PARSONS (Courtesy of NEI Grubb Parsons) during David SINDEN's time as chief optician.



**Fig. 285.** David SINDEN, chief optician with GRUBB PARSONS, with one of his recent 36-inch Cassegrain mirrors at SINDEN OPTICAL Co. Ltd.



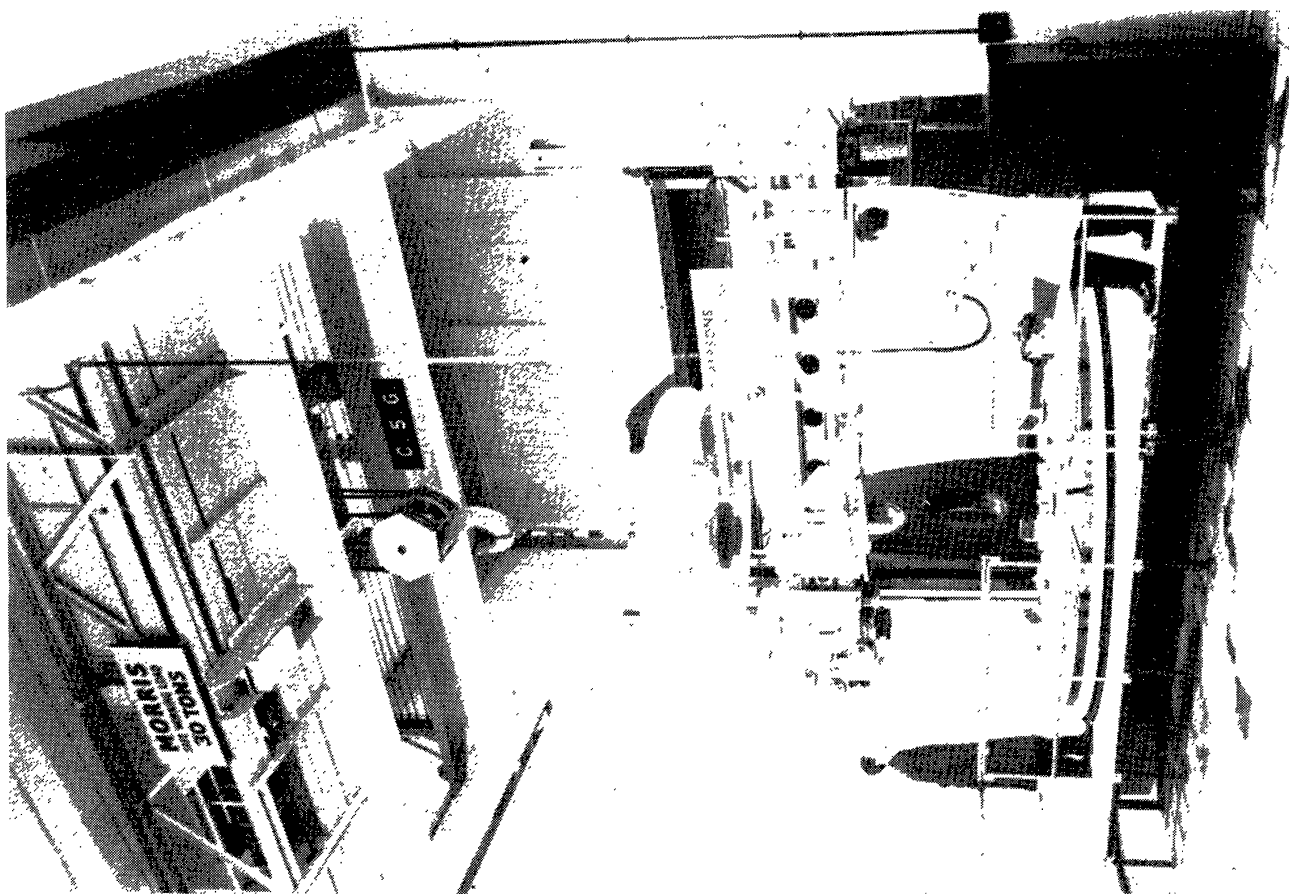
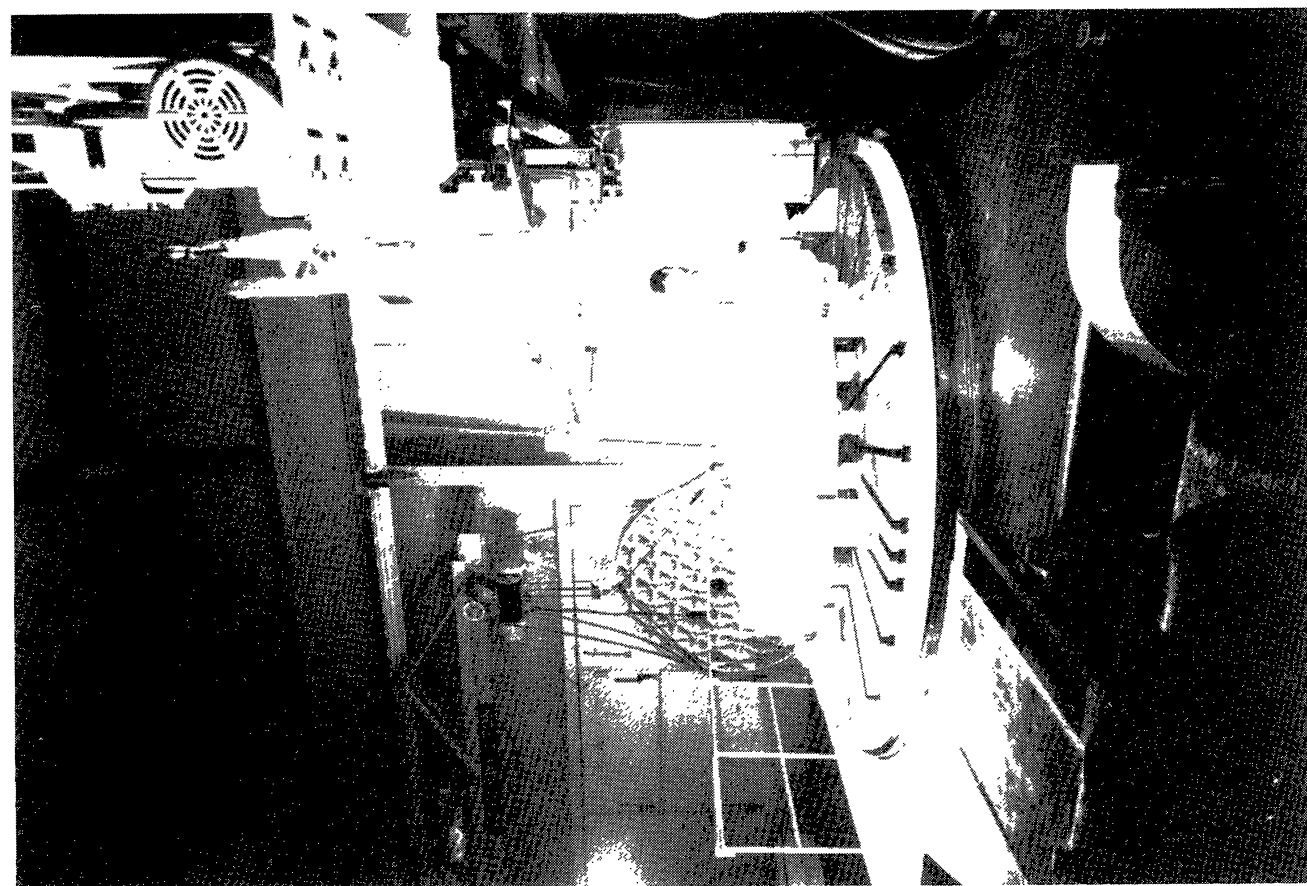


Fig. 286. The 98-inch mirror for the Isaac Newton Telescope at the GRUBB PARSONS works 1965/66 (Courtesy NEI Grubb Parsons).  
See also under C. A. PARSONS (*Cyclopaedia Part 5, Figs. 184-188, IAJ 22 (1), 1995, and Part 2, IAJ 21 (1), 1993.*)

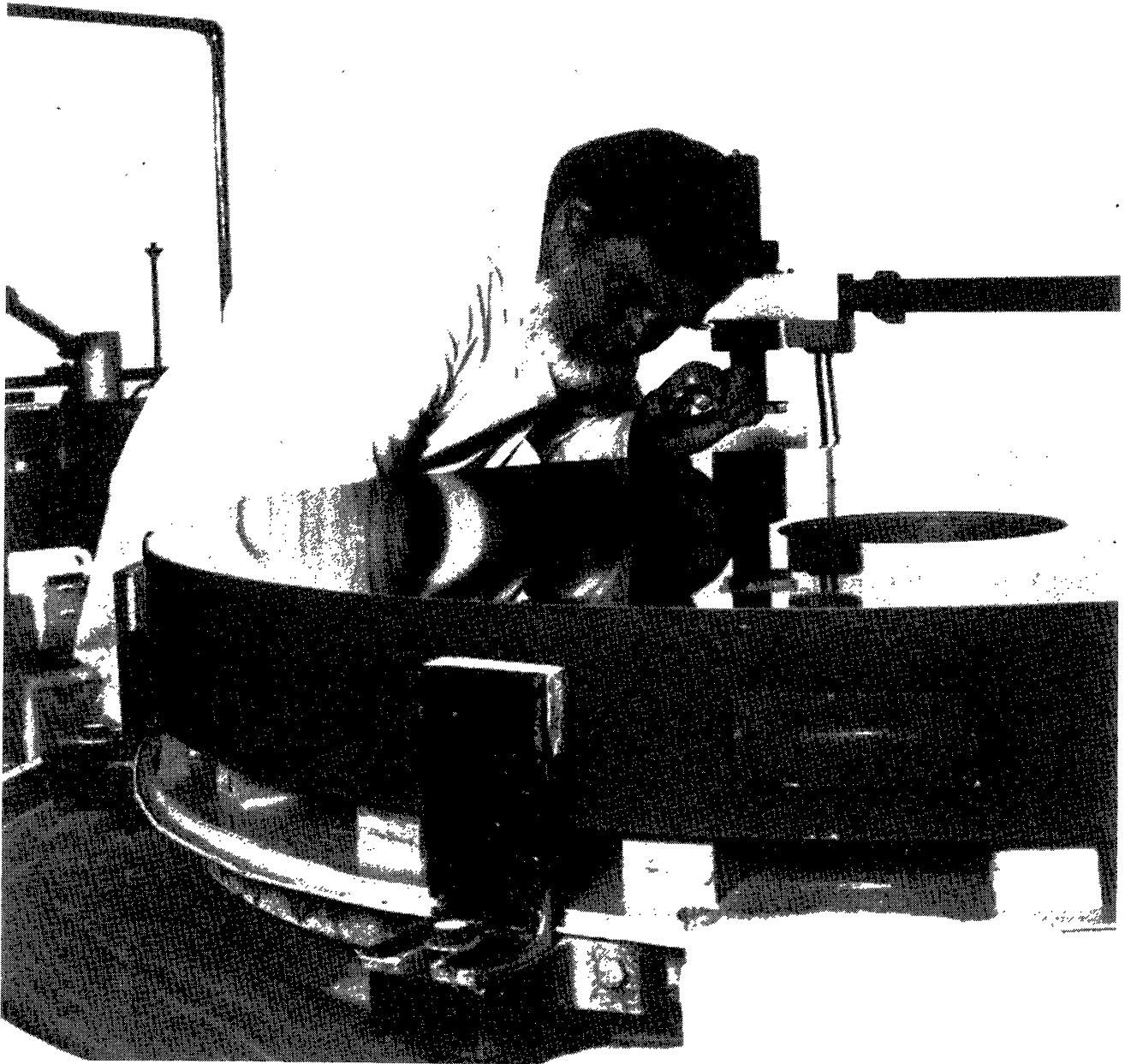


Fig. 287. A fast  $f/3$  mirror, 48-inches in diameter, depicted with its maker, David SINDÉN.



**Fig. 288.** The 36-inch Cassegrain mirror for Japan under the watchful eye of its maker, David SINDEN, at SINDEN OPTICAL Co. Ltd.



SLATER Thomas - optically figured CRAIG's 24-inch f/25 object glass, (1852). RENNIE provided the tube and wall-mounting near *Wandsworth Prison*.<sup>4</sup>

SMALL William - physician and tutor, *William and Mary College, Williamsburg, Virginia*, associated with NAIRNE and DOLLOND instruments, and interested in improving telescopes and microscopes, fl.1762-75.<sup>5</sup>

SMEATON John - eminent engineer, mathematical instrument maker, *Leeds* (1742), *Furnival's Inn Court, London* (1750), *South Street, Gray's Inn, Holborn, London* (1772), 1724-92. He is known as the father of civil engineering, and his name is remembered, in the present context, in the Smeaton block (an equatorial wedge which converted an alt-azimuth into an equatorial telescope mounting). SMEATON married HINDLEY's grand daughter.<sup>6</sup>

SMITH Addison - spectacle maker, mathematical, optical and philosophical instrument maker, *Opposite Northumberland Street, Strand, London*, and *St Martin's Lane, near Charing Cross, London* (1764), *481 Strand* (1779-83), *79 Charlotte Street, Rathbone Place, London* (1783). He was in partnership in 1763-68.<sup>7</sup>

SMITH Caleb - inventor whom the Royal Society called upon to assist in a critical comparison of various instruments (e.g. by SHORT) in mid-18C. SMITH was joined in this by others such as GRAHAM and SCARLETT.<sup>8</sup>

SMITH James - English mechanical engineer, TULLEY's foreman., late 18C or early 19C.

SMITH James - associated with BECK, and in partnership in 1847.<sup>9</sup>

SMITH John (II) - optical instrument maker, *Archimedes and Three Golden Prospects, London*, and *The Archimedes in Ludgate Street, London* (1716-27). He married John MARSHALL's daughter.<sup>10</sup>

SMITH John (III) - mathematical instrument maker, *York*, and *King's private Observatory, Kew, Richmond, Surrey* and *Royal Exchange, London*, fl.1740, 1780.<sup>11</sup>

SMITH Robert - author of *A Compleat System of Opticks* (1738).

SMYTH William Henry (Capt./Vice-Admiral) - hydrographer, gentleman astronomer, *Bedford*, replacing KATER on the Board of Visitors of the Royal Observatory, b.1788, d.1860. Author of *Speculum Hartwellianum* 1860. SOUTH sold his TULLEY equatorial to SMYTH, and it subsequently passed to LEE *Hartwell*.<sup>12</sup> This 5.9-inch refracting telescope was re-

mounted using a stouter polar axis (English mounting) supplied by George DOLLOND and an improved clock drive added designed by SHEEPSHANKS. On the basis of observations largely made on this instrument SMYTH published his famous *Cycle of Celestial Objects*. SMYTH was associated with the eminent amateur astronomers, LASSELL, DAWES, PODGSON and EPPS.

SNART John (II) - optical, mathematical and philosophical instrument maker, *122 Tooley Street, London* (1799), *215 Tooley Street* (1805-27), and recorded as still working in 1832.<sup>13</sup>

SNART Neriah (Miss) - optician, mathematical and philosophical instrument maker, *215 Tooley Street, London* (1832-39), *35 King Street, Borough, London* (1840-47).<sup>14</sup>

SNELL Willebrord - remembered for his deduction of the sine laws of refraction, 1580- 1626.

SNOW R - prominent English amateur astronomer, *Ashurst, Kent*, 19C. He owned a 2.75-inch transit instrument by SIMMS and a 3.9-inch equatorial refractor also by SIMMS, observing over the years 1834-54.

SOCIÉTÉ GENEVOISE - optical and other instruments, *5 Chemin Gourgas, Geneve*, supplying catalogues, c.1893-1913.<sup>15</sup>

SOCIÉTÉ OPTIQUE et MÉCHANIQUE DE HAUTE PRÉCISION - *Paris*. The firm produced optical instruments, notably binoculars.

SOLEIL Jean Baptiste Francois - optical instrument maker, *Paris*, 1798 -1878. The firm was taken over by DUBOSCQ, his pupil and son-in-law.<sup>16</sup>

SOLOMONS Elias - spectacle maker, optician, *37, 36, 27b Old Bond Street, London* (1838, 1840-45, 1849-59, respectively), and recorded as working in 1864.<sup>17</sup>

SOLOMONS Samuel and Benjamin - optician, telescope maker, mathematical and philosophical instrument and spectacle maker, *5 New Road, St George's East, London* (1838), *39 Albermarle Street, Piccadilly London* (1840-75), *76 King Street, City, London* (1843), and recorded as still working in 1879.<sup>18</sup>

<sup>4</sup>See King 254. BREWSTER was of the opinion that the objective was of poor quality.

<sup>5</sup>Taylor p.272.

<sup>6</sup>See SIMON.

<sup>7</sup>See SIMON.

<sup>8</sup>See King p.85.

<sup>9</sup>There is some confusion in *Cyclopaedia Part 1* over BECK and SMITH which will be corrected on completion of this work. SMITH was not American.

<sup>10</sup>See SIMON.

<sup>11</sup>See SIMON.

<sup>12</sup>We record another George LEE, mid-19C, manufacturer of optical

and nautical instruments, *Portsea and 3 Palmerston Road, Southsea.*, according to Turner 19C, p.20, which does not appear in the *Cyclopaedia*.

<sup>13</sup>See SIMON.

<sup>14</sup>See SIMON.

<sup>15</sup>See Handlist.

<sup>16</sup>See Turner 19C, p.147, and Anderson et al.'s, Handlist.

<sup>17</sup>See SIMON.

<sup>18</sup>See SIMON, and ChRApr88, ChRNov93 lot 164, Sotheby's London Feb85. Taylor (p.481) records Abraham SOLOMONS at *6 New Road* (fl.1838), G.M. SOLOMONS at *9 East Bedford Sq., Commercial Rd.*, (fl.1838)

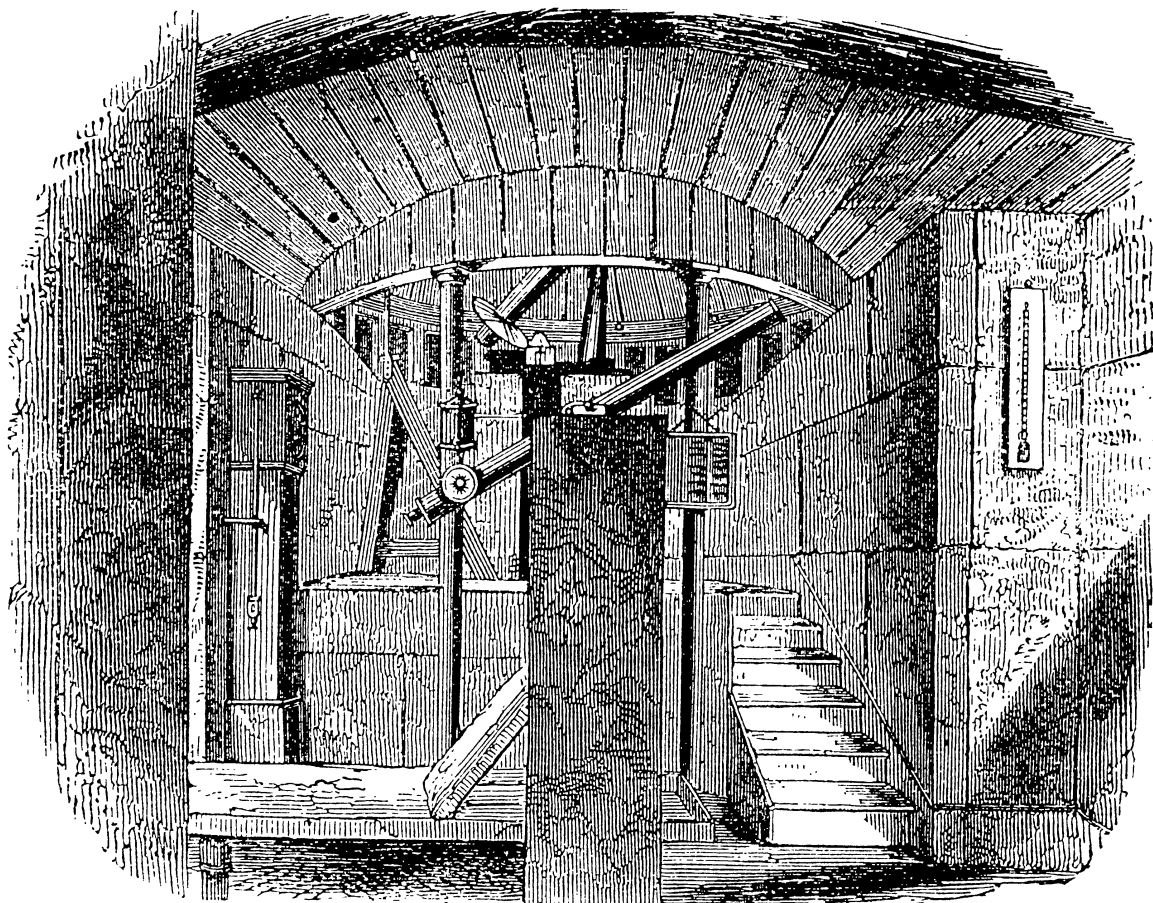
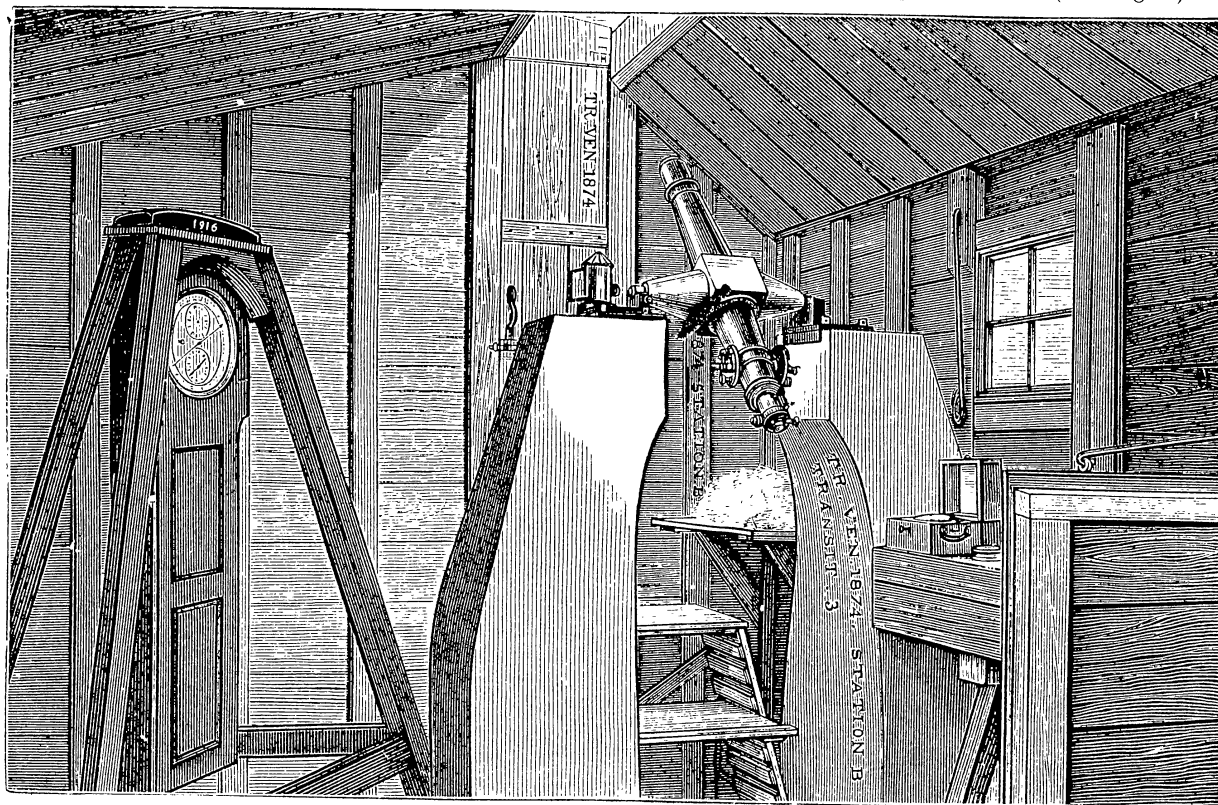


Fig. 289. During 1834-54, the English amateur astronomer, R. SNOW, worked with two SIMMS instruments, a 2.75-inch and 3.9-inch refractor at his private observatory in Ashurst, Kent (top figure). In the 19C the finest optical instruments, constructed with high precision engineering, could be utilised to make valuable measurements. The passage (& ingress and egress) of Venus across the face of the Sun in 1874 was timed using quite small telescopes. Telescopes were temporarily stationed at strategic global locations (lower figure).





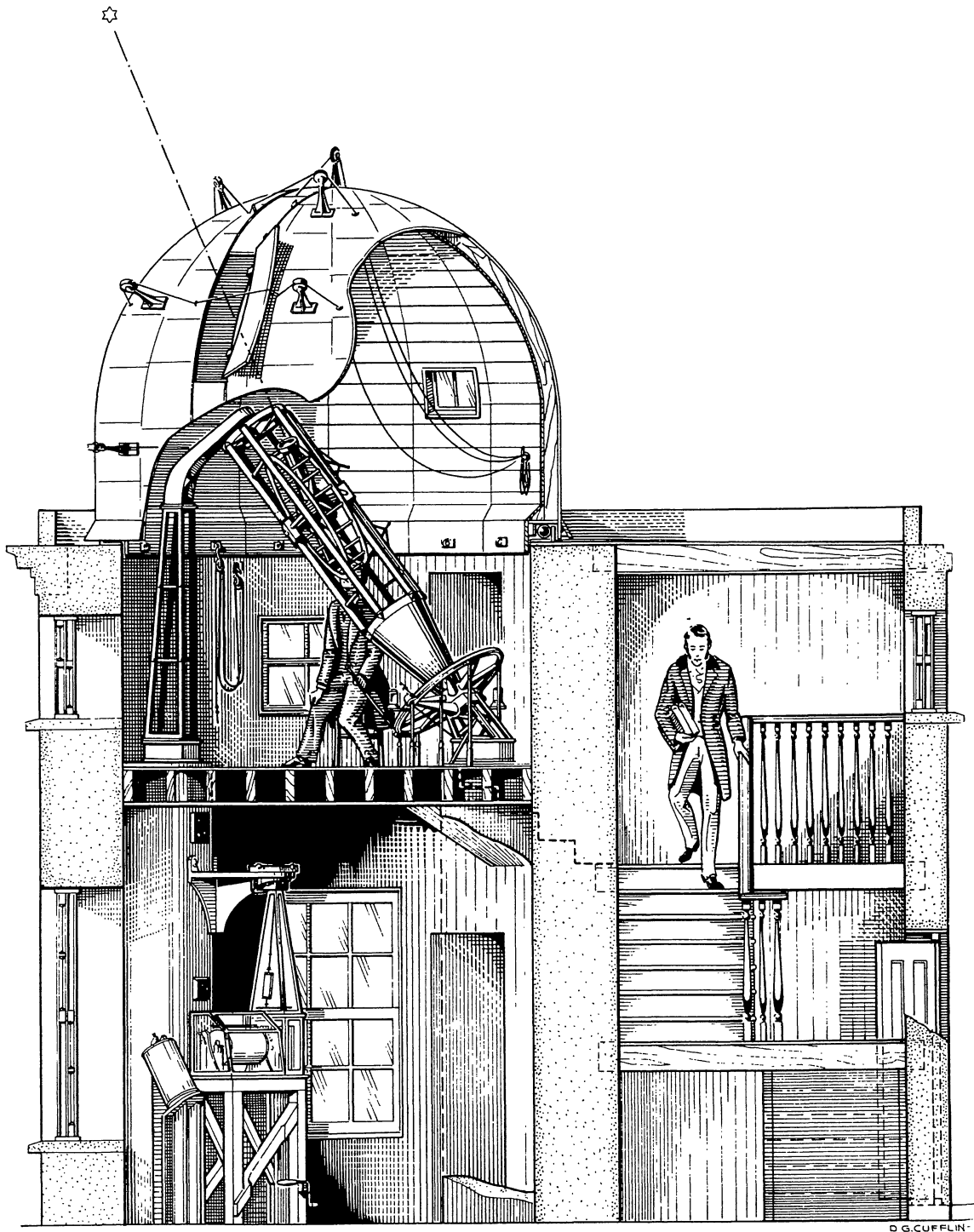


Fig. 290. An illustration of SISSON's dome (1773), used to house the SHUCKBURGH equatorial refractor (1816). N. B. The piers of the mounting were actually of stone (drawing after the late D.G. Cufflin 1971). AIRY's chronograph (1852) may be seen on the ground floor.

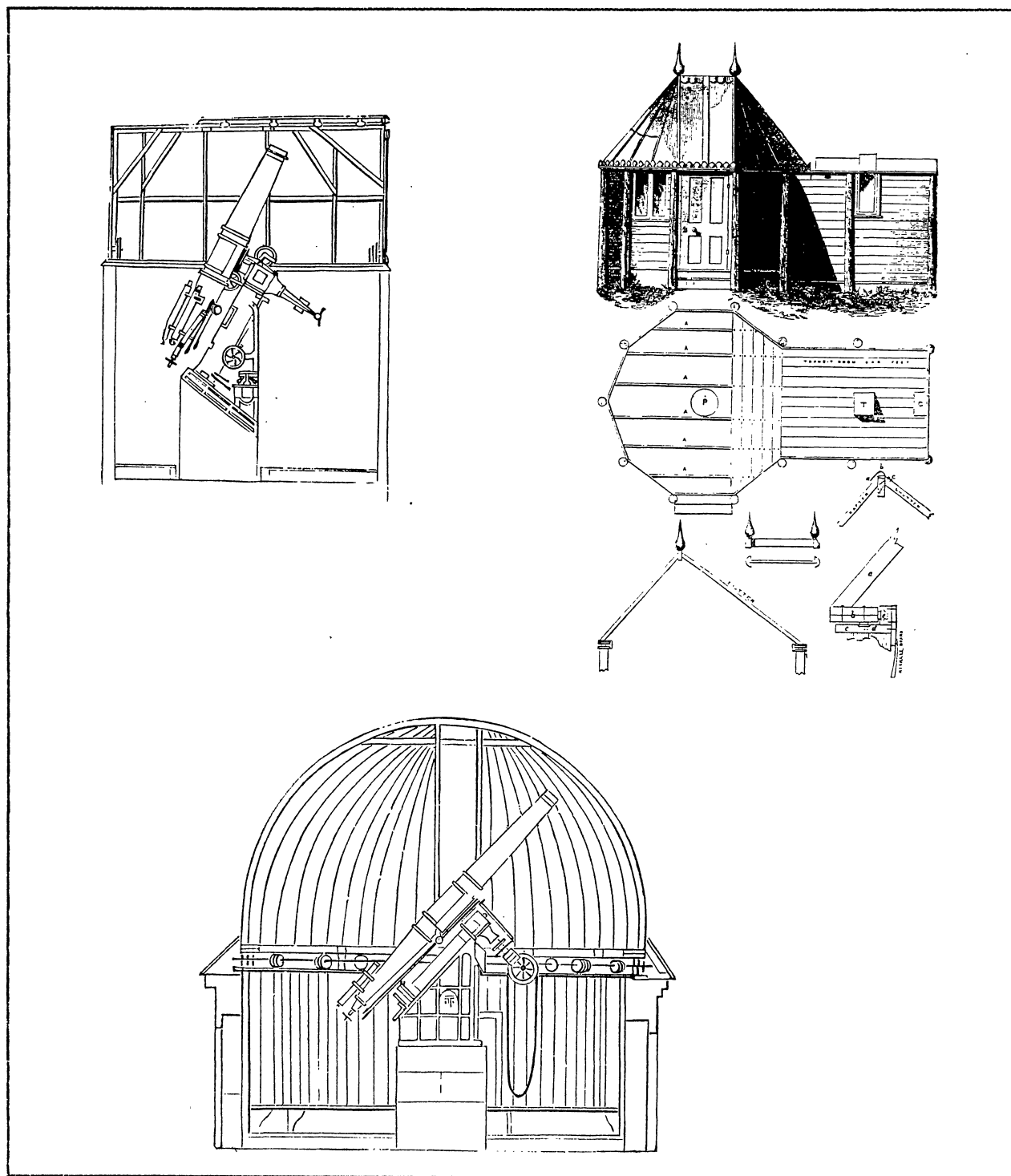
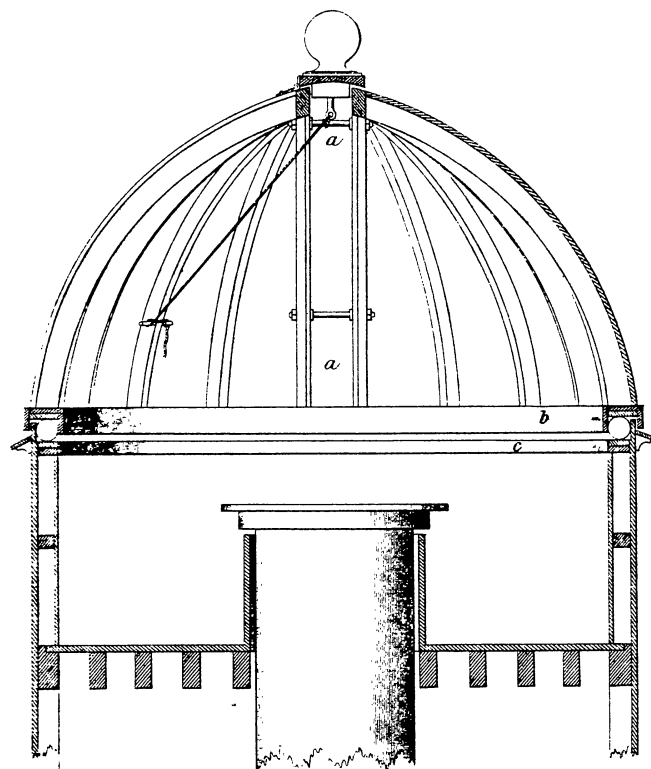


Fig. 291. Three examples of early telescope housings, the drum model similar to a modern turret (left), the ROMSEY model (right) and the familiar hemispherical dome (below). In many present-day large "domes" at mountain locations (2000 -4000m), it is now recognised that bad-seeing frequently arises due to the hemispherical shape, and designs are often radically different.

*Pearson's Dome*



*Smeaton's Dome*

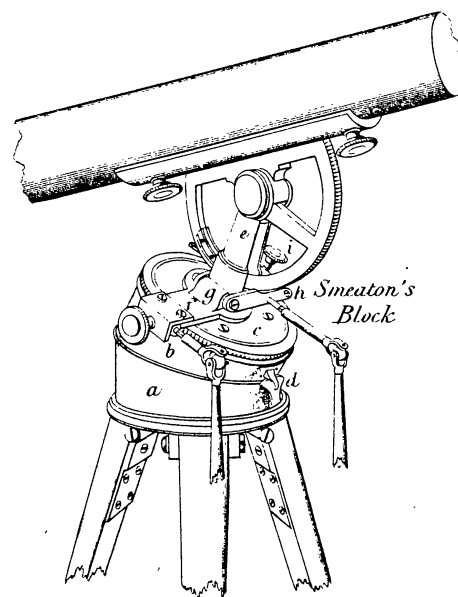
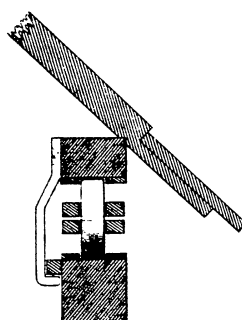
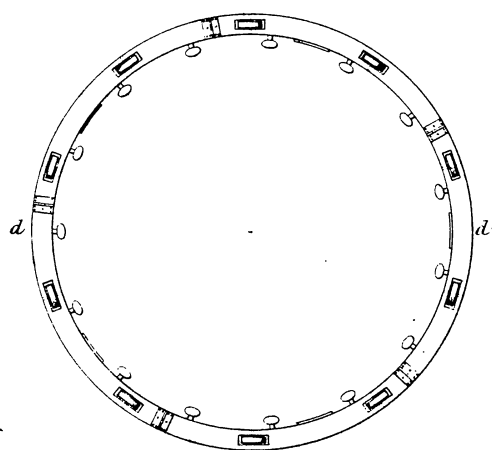
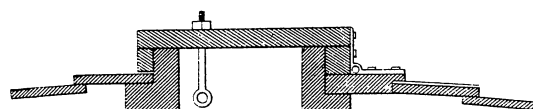
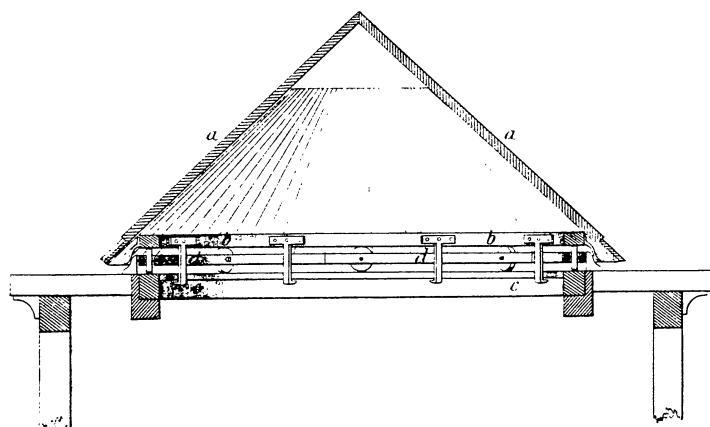


Fig. 292. Two early telescope housings, the SMEATON (late 18C) and PEARSON (early 19C) domes are depicted, and also the so-called SMEATON "block" for converting an altazimuth mounting into an equatorial (From Pearson 1819).



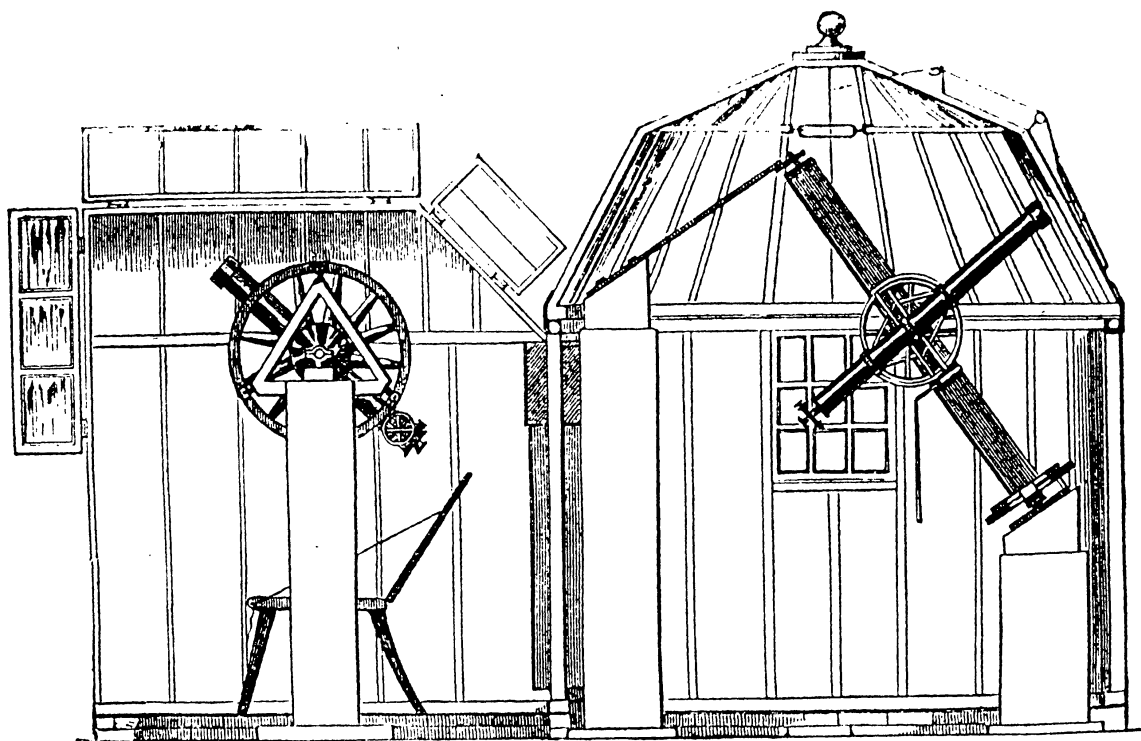


Fig. 293. An English equatorial and a transit instrument at DREW's private observatory at Southampton (1847-57). N. B. The large instrument and its housing appears to obscure the transit observer's southern meridian below the equator (top). DREW possessed a 3.75-inch DOLLOND equatorial refractor and a 3.25-inch JONES (1835) transit circle. Several 19C amateur and semi-professional *gentleman* astronomers had fine observatories, not least, King George III in the Old Deer Park (Illustr. Courtesy Cen. Libr. Richmond). Notable examples are : G. KNOTT at Woodcroft & Knowles Lodge (Cuckfield, Sussex) had a 7.3-inch f/15 CLARK refractor and a DOLLOND filar micrometer. W. R. DAWES had a DOLLOND 3.75-inch f/16 telescope (Ormskirk, Lancs, 1831) mounted like SMYTH's; later a 6.25-inch f/13.5 reflector (1834-39, mirror from J.HERSCHEL, DOLLOND mount); a 6.5-inch f/15.5 MERZ /MAHLER refractor (1845, Cranbrook, Kent); an 8.5-inch f/13 CLARK refractor (1859, Hopefield Obs. Haddenham, Bucks, now at Temple Obs. Rugby). Baron DEMBOWSKI had a 5-inch PLOSSL dialytic telescope (1852-62) and a 7.5-inch MERZ refractor (1862). I. FLETCHER had a 9.5-inch f/15.5 COOKE objective (1860), mounted privately, and 4.14-inch f/17 COOKE, mounted in square tube, with 9.7-foot polar axis on German equatorial mount (Tarnbank, Cumb.). Lord WROTTESELEY (b.1798, d.1867, pres. Roy.Soc, a founder of Astr.Soc.) had a 7.75-inch GUINAND /DOLLOND refractor on English equatorial mount (Blackheath & Wrottesley Hall). G. B. BISHOP used a 7-inch f/18 DOLLOND refractor on English mount (1836, Regent's Park, London). Some of these semi-professionals rivalled established observatories' instruments. See also other English *gentleman* astronomers, Count BRÜHL, COMMON, COOPER, Earl of CRAWFORD, CROSSLEY, GROOMBRIDGE, the HERSCHELs, HUGGINS, LASSELL, LEE, NEWALL, ROSSE, SMYTH, Sir James SOUTH, in various Parts of *Cyclopaedia*.



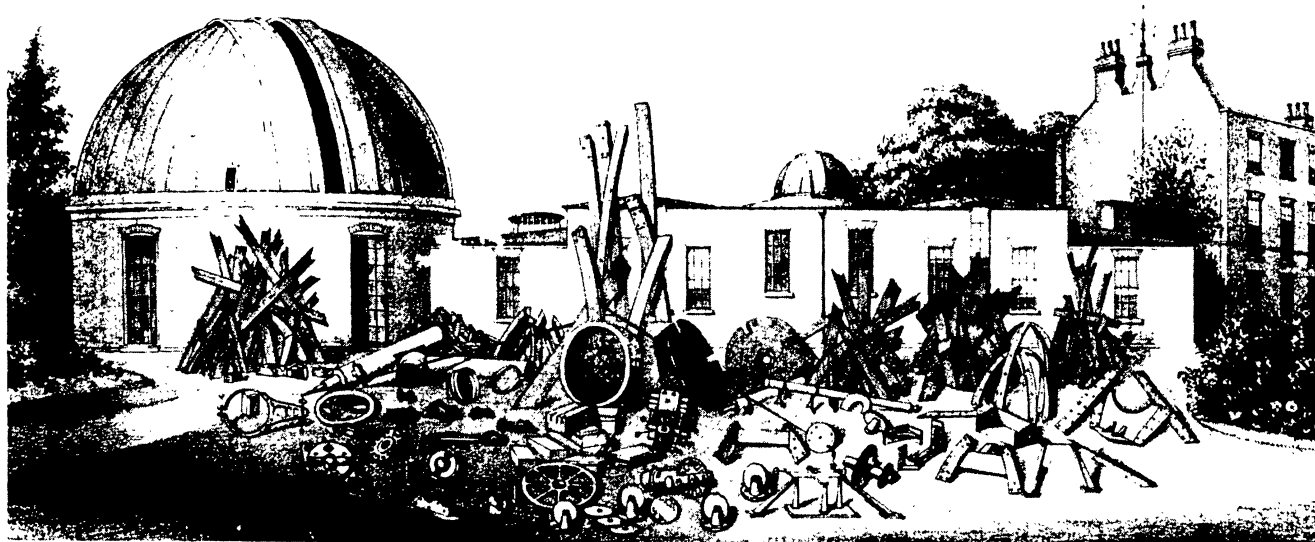
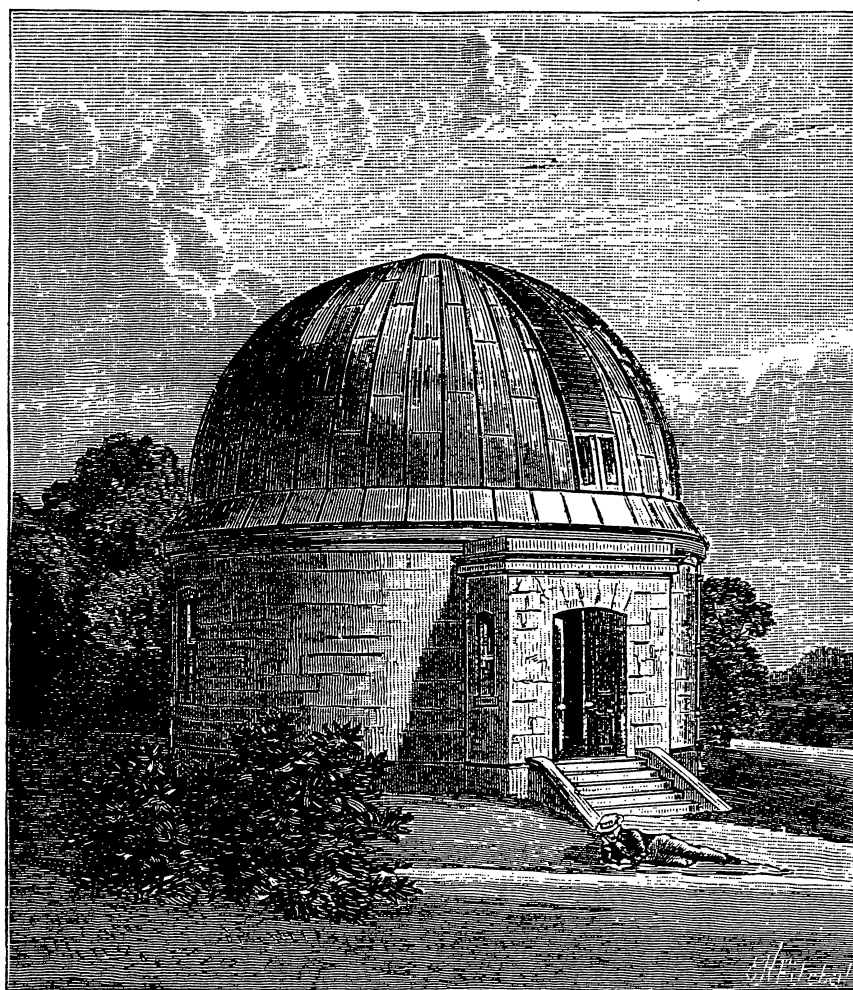


Fig. 294. The Campden Hill observatory of Sir James SOUTH in an illustration (1839) depicting the demolishing of the telescope (not the optics)! Also shown is a portrait of Sir James SOUTH. He was actively observing (1816-24) at Southwark, with John HERSCHEL on double stars (1821-23), and at Kensington (1826- ). SOUTH believed that the mounting for his CAUCHOIX 12-inch (11.7-inch,  $f=19$  foot) telescope, by TROUGHTON and SIMMS was poor. The 'SOUTH' objective was later presented to Dunsink Observatory (1862) where it was mounted by Thomas GRUBB, and housed in a fine dome at Castleknock (shown).





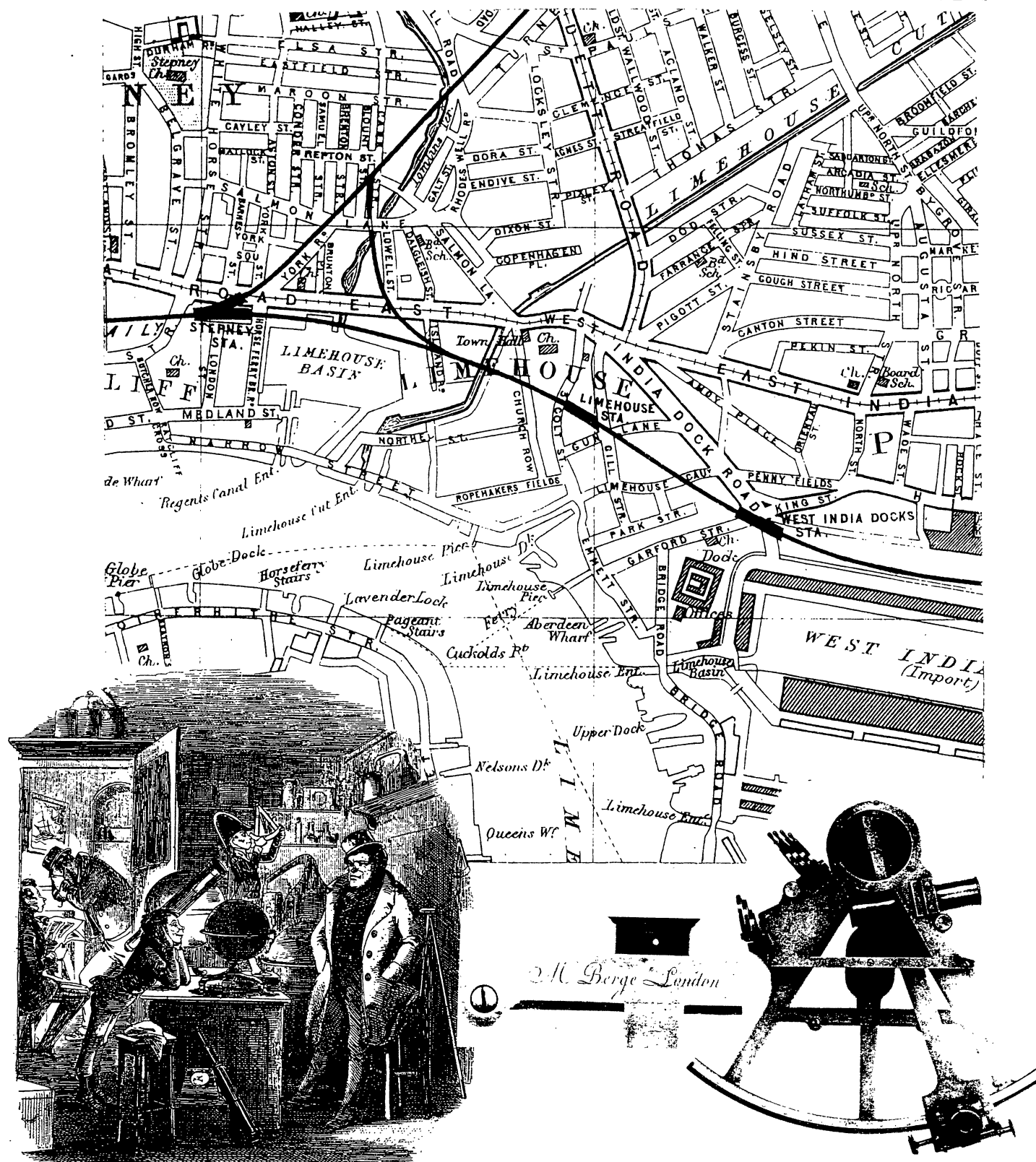


Fig. 295. Map of Limehouse (near W.India Dock), London (c.1900). Richard RUST (1740-87), the eminent Ratcliff mathematical instrument maker was to be found here. John ADAMS (fl.1758-96), teacher and maker was at the Ratcliff Cross Mathematical Academy in 1780. William SPENCER (II) is recorded here 1839, after serving his apprenticeship with Samuel BROWNING, 1801-11. James HUGHES was also at Ratcliff Cross, Limehouse (fl.1817-22). See also 1843 map in Fig. 298. The SPENCER and BROWNING families, and the RUSTs (the great Richard RUST, their master) supplied naval, mercantile and other sea-faring men with navigational instruments, marine sextants and quadrants. The inscription SBR in ivory indicated quality, and graduated circles were considered trustworthy when stamped with an anchor being made on a RAMSDEN-type machine. See also Wapping area (Fig. 297).



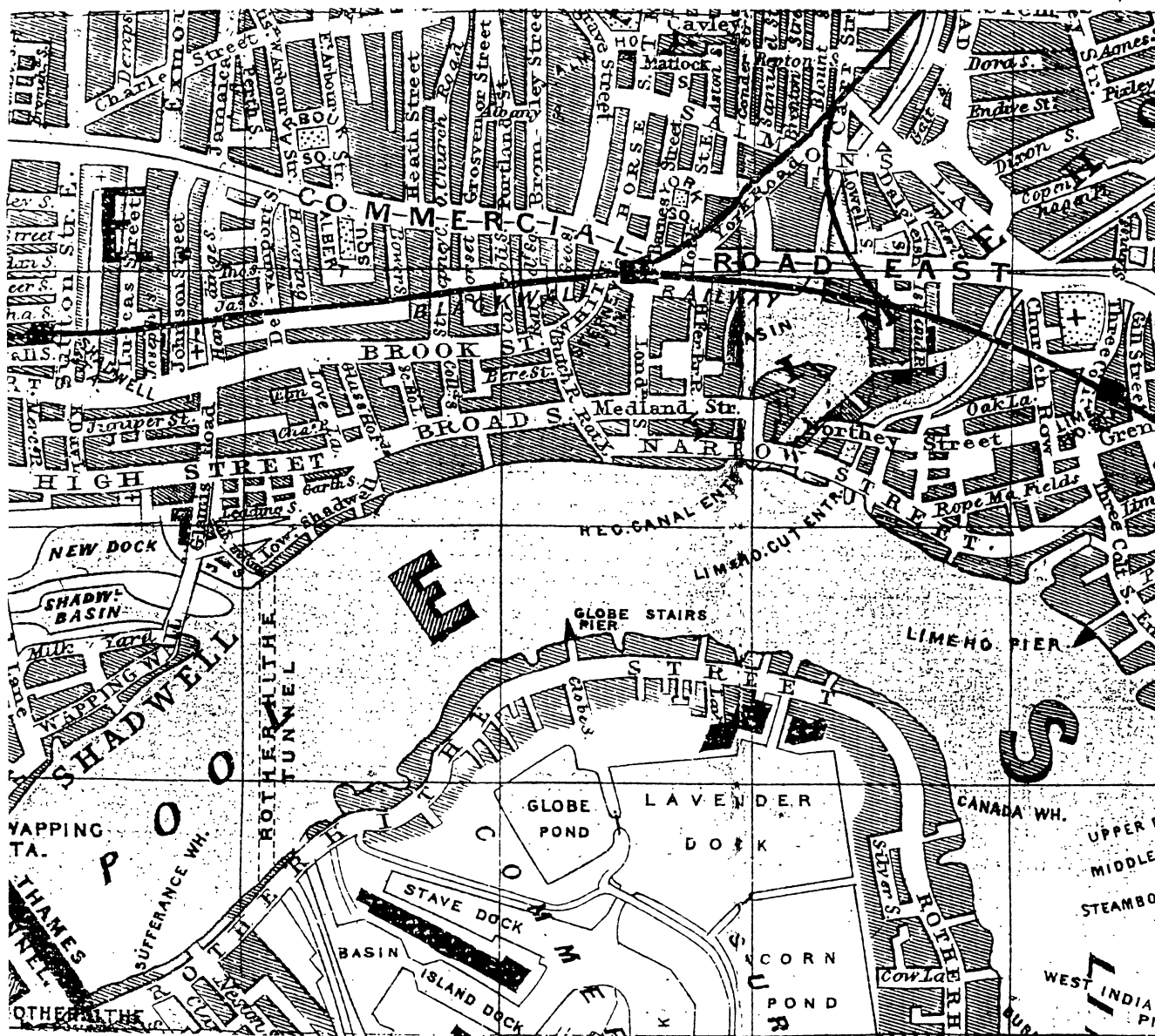
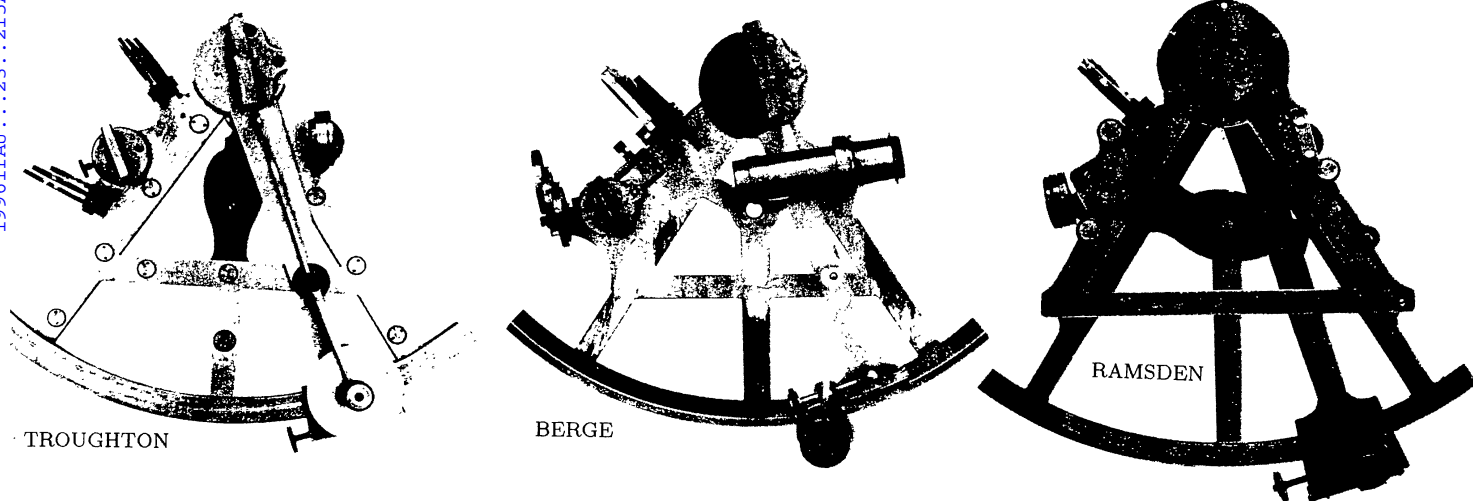


Fig. 296. Map of Limehouse, London (c. 1900). So many changes have occurred along the River Thames that it is difficult to find unspoilt 19C dock entries, stairs and wharves. The atmosphere of dockland and instrument maker is, however, well recorded by Charles Dickens in *Dombey & Son*. Several marine sextants are illustrated (Courtesy Christies S.Kensington).

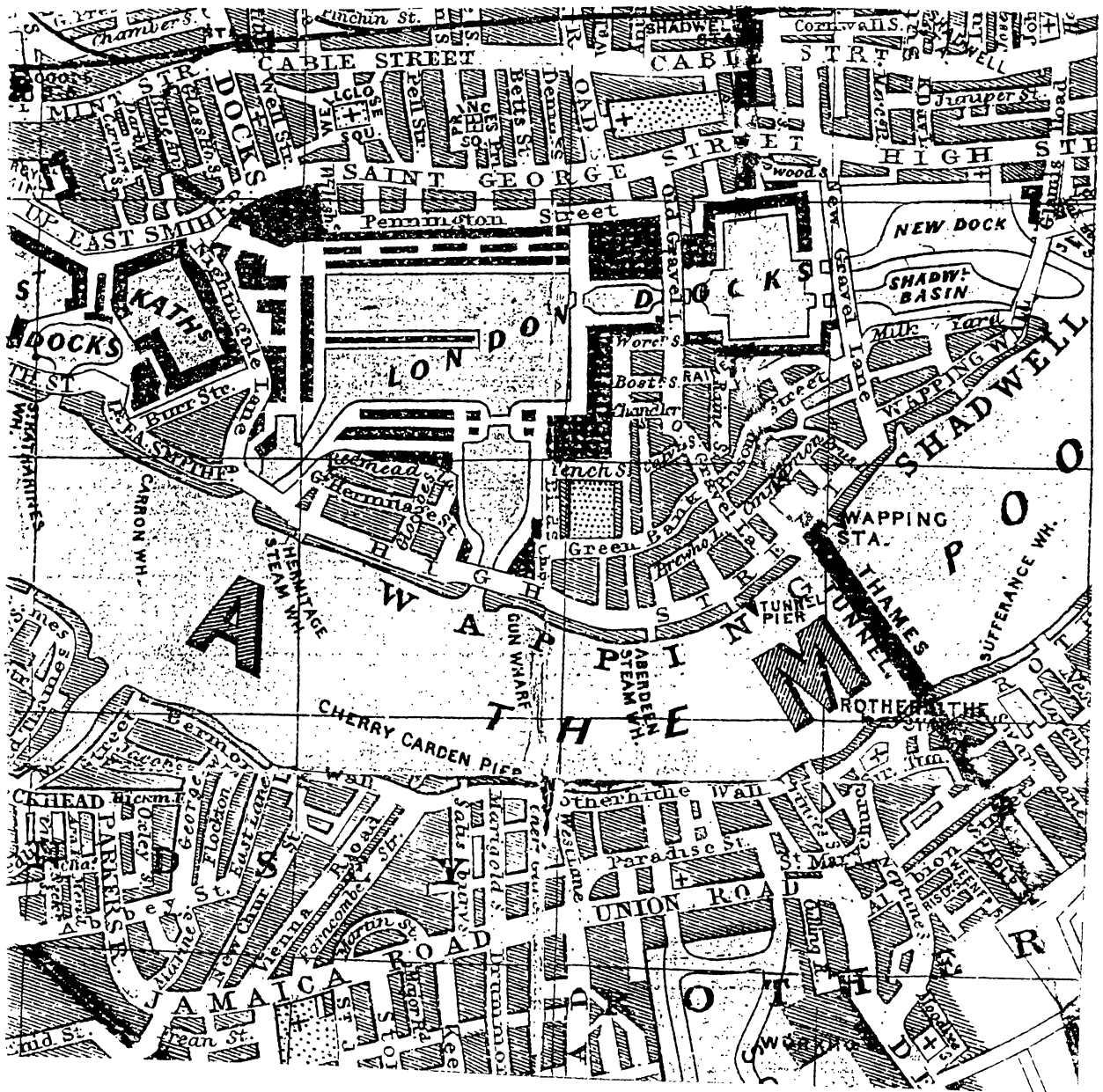


Fig. 297. Map of Wapping, London. Wapping was an area rich in instrument makers in the 19C. Proximity to the docks ensured business for the RUSTs, the BROWNINGs and the SPENCERS. Competition was serious and, in fact, some members of these families moved on to other great docks such as Liverpool and Glasgow.

SOMALVICO Joseph - optician, mathematical and philosophical instrument maker (including barometers, thermometers, hydrometers), 2 Hatton Garden, London (1839-65), 16 Charles Street, Hatton Garden, London (1901), and 81 Holborn, London.<sup>19</sup>

SONNEFELD - German optician, designed 4-lens system, utilised in the AG zone astrographic catalogue.

SOUTH James (Sir) - English gentleman astronomer, *Blackman Street, Borough, London and Campden Hill, Kensington*, 1785 -1867. SOUTH and others founded (1820) the Astronomical Society (later renamed RAS, 1831). He possessed an observatory at *Borough* (1816) and at *Kensington* (1826), with Edward TROUGHTON equatorials, a 3.75-inch (f/16) Peter DOLLOND refractor, and a transit instrument. He was associated with John HERSCHEL in positional astronomical observations to determine proper motions of stars. Later SOUTH possessed an 11.7-inch (f/19.5) CAUCHOIX object glass which he had mounted by TROUGHTON and SIMMS.<sup>20</sup> At *Passy, near Paris* SOUTH observed with a 7-foot focus refracting telescope.

SPENCE William - Irish engineer, *Cork Street Foundry and Engineering Works, Dublin*, fl.1872-76. He was involved with 3-foot telescope of Lord ROSSE.<sup>21</sup>

SPENCER William (I) - instrument maker, *London*, associated with Samuel (I) BROWNING, b.c.1751, d.1816. He was in partnership with Samuel BROWNING, and had three sons, Samuel, John (I) and William (II). The friendship and business connections between the SPENCERS and the BROWNINGs lasted three generations. Both families owed much to the RUST family. Richard RUST trained his son, Ebenezer RUST, who then joined Samuel (and possibly John (I), also trained by Richard RUST) BROWNING and William SPENCER (later of SBR fame in circle graduation). Richard RUST's grandson, also an Ebenezer, would have been contemporary, and of similar age, to Samuel, John (I) and William (II) SPENCER as well as Samuel, Richard and John BROWNING.

SPENCER Samuel, John (I) and William (II) - sons of William (I), b.c. 1763, 1778 and 1786, respectively, the first two apprenticed to Richard RUST, the last to Samuel BROWNING. William (II) is recorded at *Limehouse, London*, bound to Samuel BROWNING 1801, freed 1811, working in 1839.

SPENCER John (II) and William (III) - sons of William (II), both b.c.1824. They would have been contemporary, and of similar age, to William Spencer BROWNING who was working in *Liverpool* (1854).<sup>22</sup>

SPENCER John (III) - clock maker, philosophical and optical

<sup>19</sup>See SIMON, and Philips Dec87. On a small telescope in the R.Andrews collection the inscription SOMA PRICE appears.

<sup>20</sup>SOUTH was involved in a scandalous destruction of his equipment (1834), offering his telescope mounting as scrap metal. The CAUCHOIX object glass was later donated to *Dunsink Observatory, Dublin*. See *Cyclopaedia, Part 2, Fig.55c*.

<sup>21</sup>Journ. Hist. Astron. vol.12, p.223, 1981.

<sup>22</sup>The name Spencer was carried over to the BROWNING family. The famous John BROWNING *Minoris, later the Strand*, maker of spectroscopes, telescopes and numerous instruments in the 19C and early 20C, was the son of William Spencer BROWNING.

instrument maker, 30 St Enoch Square, Glasgow (1862-64), 39 Union Street, Glasgow (1865-69).<sup>23</sup>

SPENCER J - microscope maker, 13 Aungier Street, Dublin, c.1870.<sup>24</sup>

SPENCER William James - 167 Grays Inn Road, London.<sup>25</sup>

SPENCER BROWNING AND RUST [William (II), Samuel (I), Ebenezer (I)] - an anchor was inscribed on many mathematical instruments, octants and sextants<sup>26</sup> indicating that a RAMSDEN-type scale divider was used in construction. The original partners had died by 1819 but the firm continued until c.1839 recorded at 66 High Street, Wapping, London and earlier at 327 Wapping (1784-96), and 66 High Street, Wapping from 1797 (also at No.67).<sup>27</sup>

SQUIRE Jane - English lady, giving lessons on astronomy and navigation, c.1731-43.<sup>28</sup>

STANCLIFFE John - mathematical instrument maker, *York* (details unknown), and 26 Little Marylebone Street, Cavendish Square, London (1779 and 1793-1812). STANCLIFFE finished a dividing engine in 1788 and started business in sextants.<sup>29</sup>

STANHOPE Charles (3rd Earl of) - Lord Mahon, a gentleman scientist/inventor, interested in optics, *Chevening, Kent*, 1753-1816. He drew up plans for erecting telescopes of immense size (a speculum of 72-inch diameter, focal ratio f/5.3), hopefully to magnify many thousand times.<sup>30</sup> The optician, VARLEY, recorded in 1820 that STANHOPE considered a fixed-focus telescope for which the observer remained in a heated room.<sup>31</sup>

STEAVENSON W. S - physician, 20C, well-known in astronomical circles, and an active amateur observer. In the present context, he compiled a list of HERSCHEL's instruments at Bath.<sup>32</sup>

STEBBING George - optician, compass maker, freed 1816, 66 High Street, Portsmouth, and Broad Street (1805-45), 60 High Street (1810), 99 High Street (1816).<sup>33</sup>

<sup>23</sup>See SIMON.

<sup>24</sup>G. Turner 190C p.168. We are unaware of a connection between J.SPENCER and John (III) SPENCER, above.

<sup>25</sup>The author is uncertain as to W.J.SPENCER's family connection, but this record is from R.Pearsall's *Collecting and Restoring Scientific Instruments*, London 1974.

<sup>26</sup>See e.g. CHrSep86, CHrNov86, and Brown (1979).

<sup>27</sup>See SIMON, and later connection with Alexander ADIE. SPENCER BROWNING and Co. (without RUST) were flourishing in 1843. See Anderson et al.'s *Handlist of Sci. Instr. Makers' Trade Catalogue 1600 -1914*, Sci.Museum/NMS Inf.Ser.No.8,1990. We also point out that the SBR *Wapping* firm may not be straight-forwardly traced to BROWNING *Minoris* and later the Strand.

<sup>28</sup>See E.G.R. Taylor p.19.

<sup>29</sup>See SIMON.

<sup>30</sup>See King p.200.

<sup>31</sup>The 3rd Earl of ROSSE completed his 72-inch telescope in 1845, but possessed only a 36-inch in 1839.

<sup>32</sup>See *Trans. Opt. Soc. vol.26, 1924/25*.

<sup>33</sup>See SIMON.



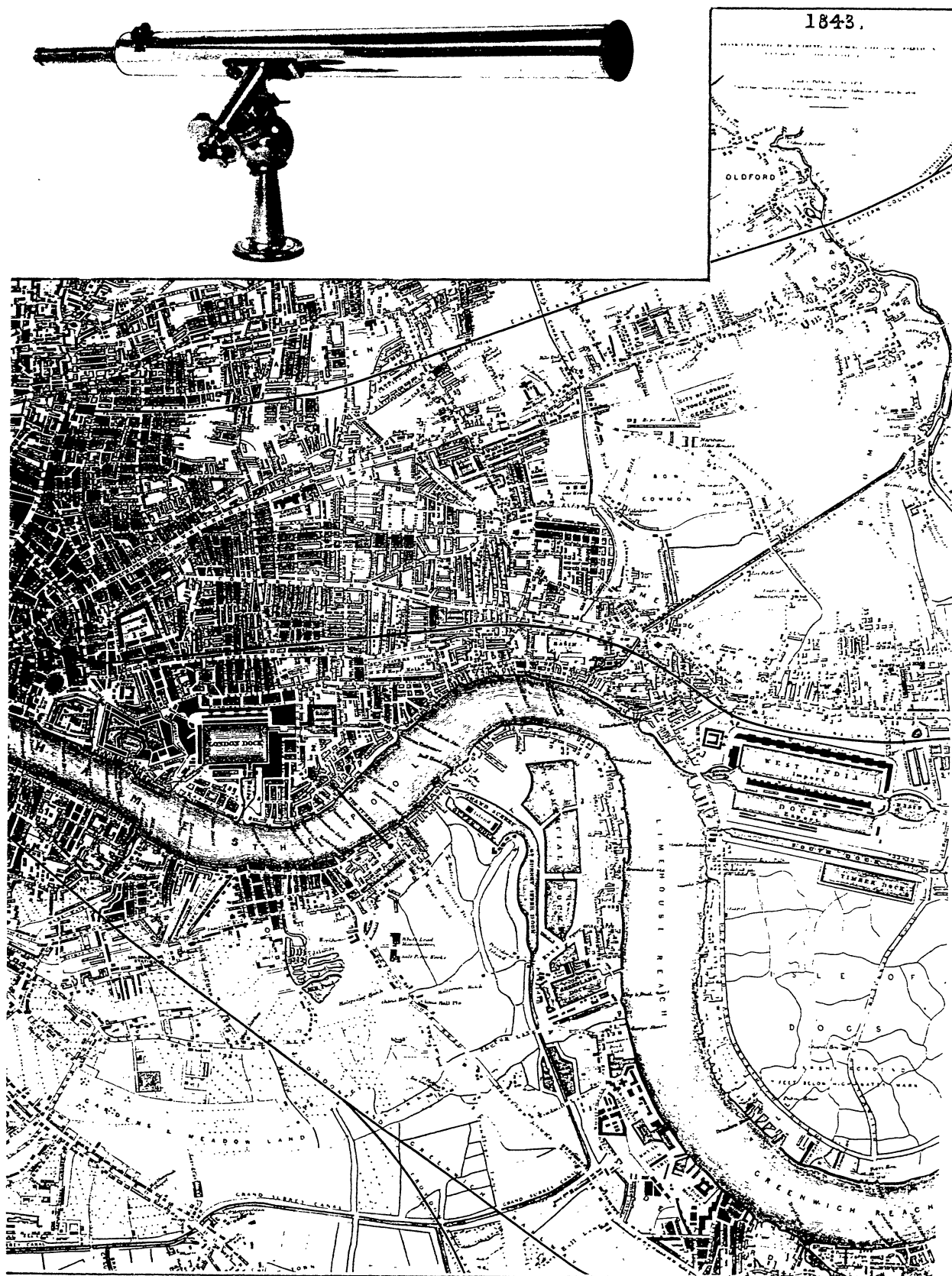


Fig. 298. The Thames from The Tower to Greenwich Reach (1843).

A 3-inch refractor by S & B SOLOMONS (fl.1838-79) is also shown (Courtesy Christies, S.Kensington).

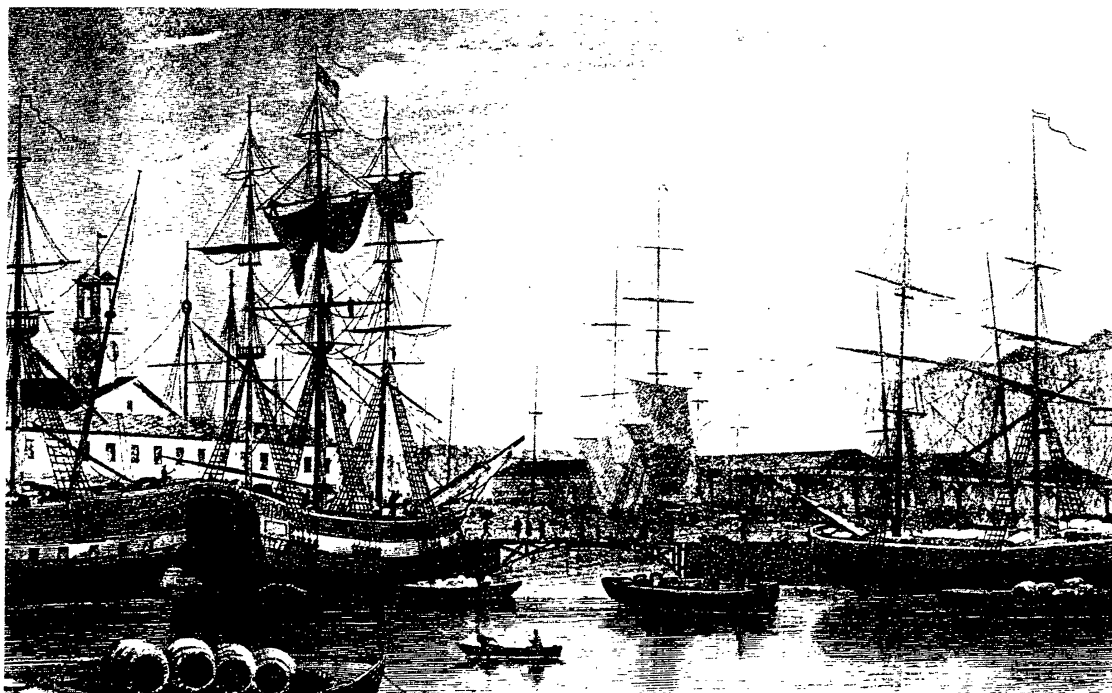
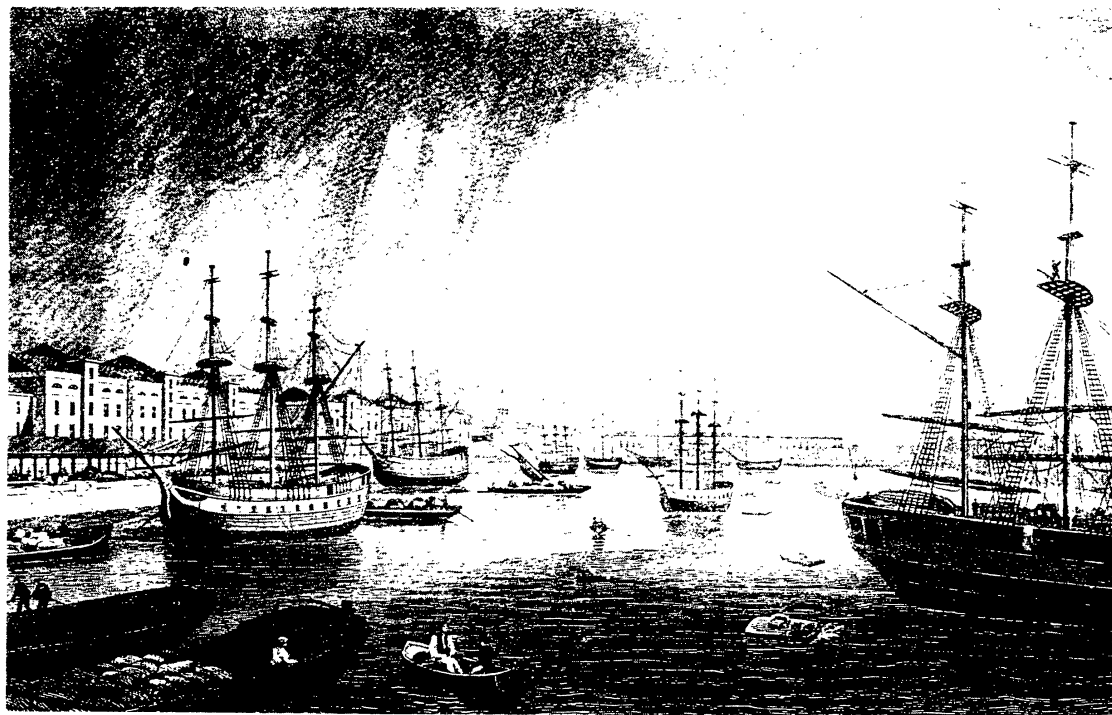


Fig. 299. Illustrations from T. H. Shepherd 1829 : West India Import Dock, Poplar (top), and St Katherine's Docks, from the Basin

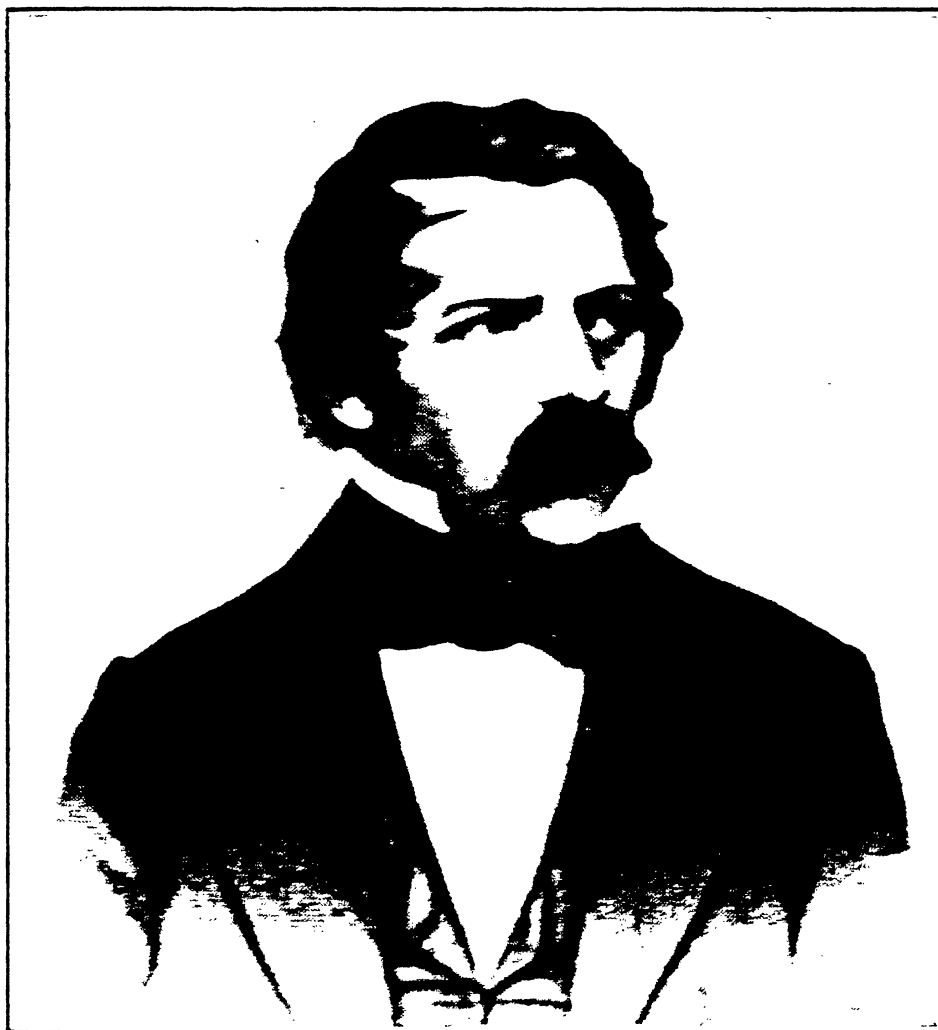
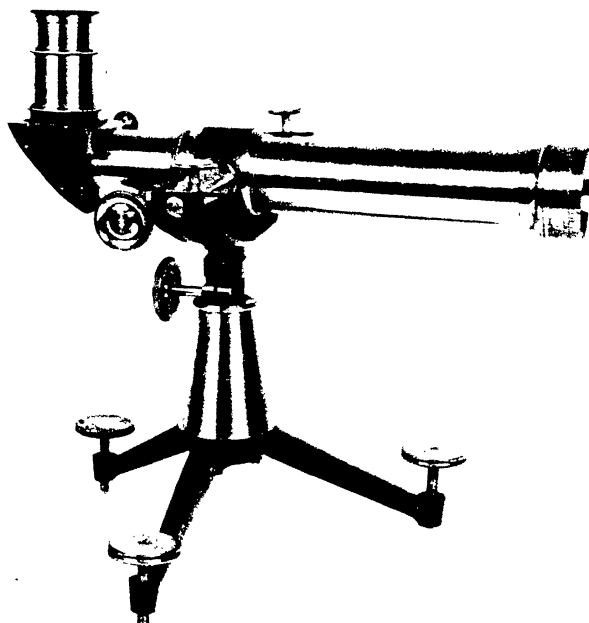


Fig. 300. A 27mm reading telescope c.1860 by STEINHEIL (Courtesy Teyler's Museum), and a portrait of K.A. STEINHEIL (1801-70), founder of a major optical workshop (1854) in Munich.



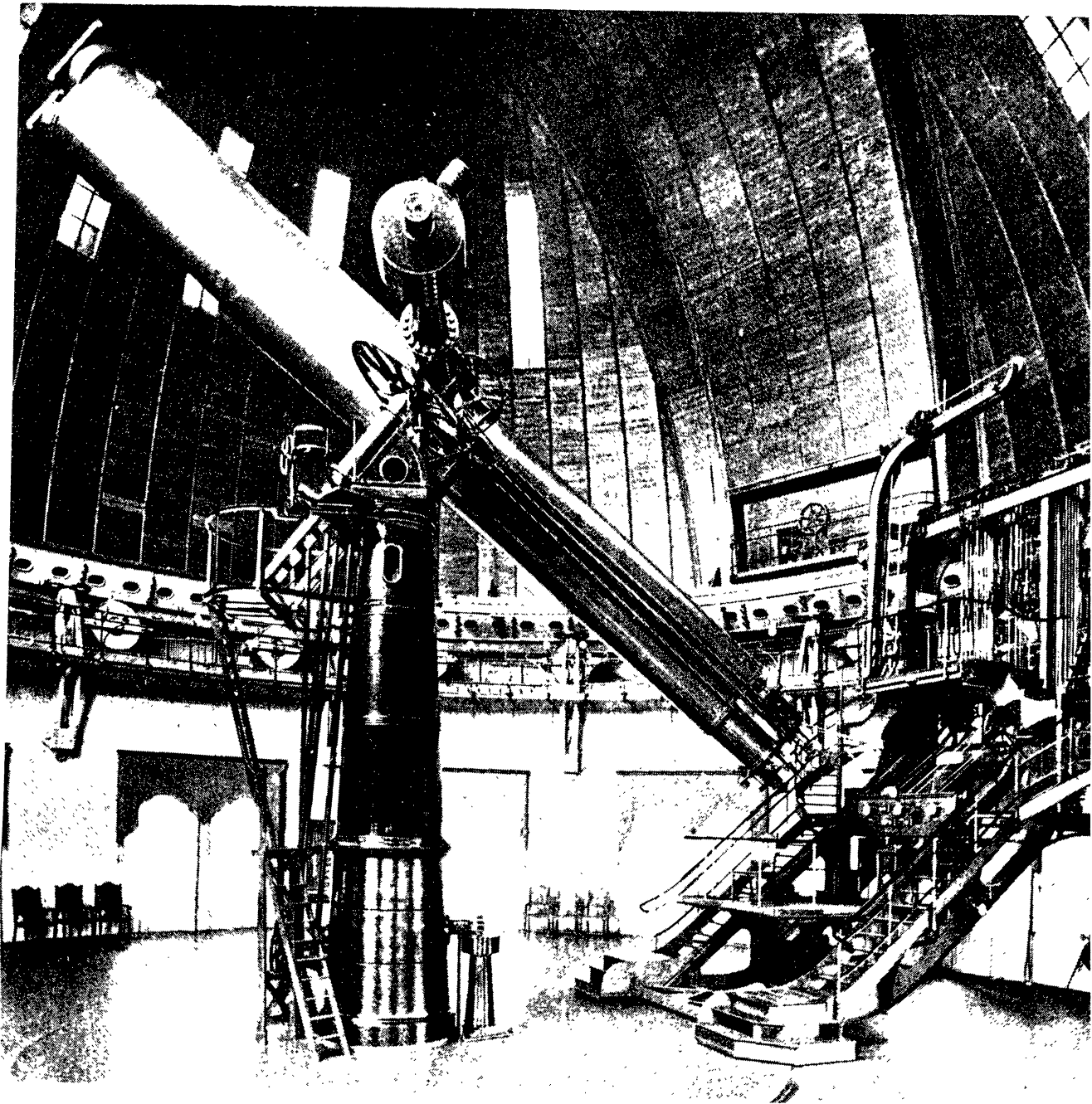


Fig. 301. Potsdam Observatory's double refractor, an 80cm photographic, and a 50cm visual refractor by STEINHEIL /REPSOLD (c.1900).

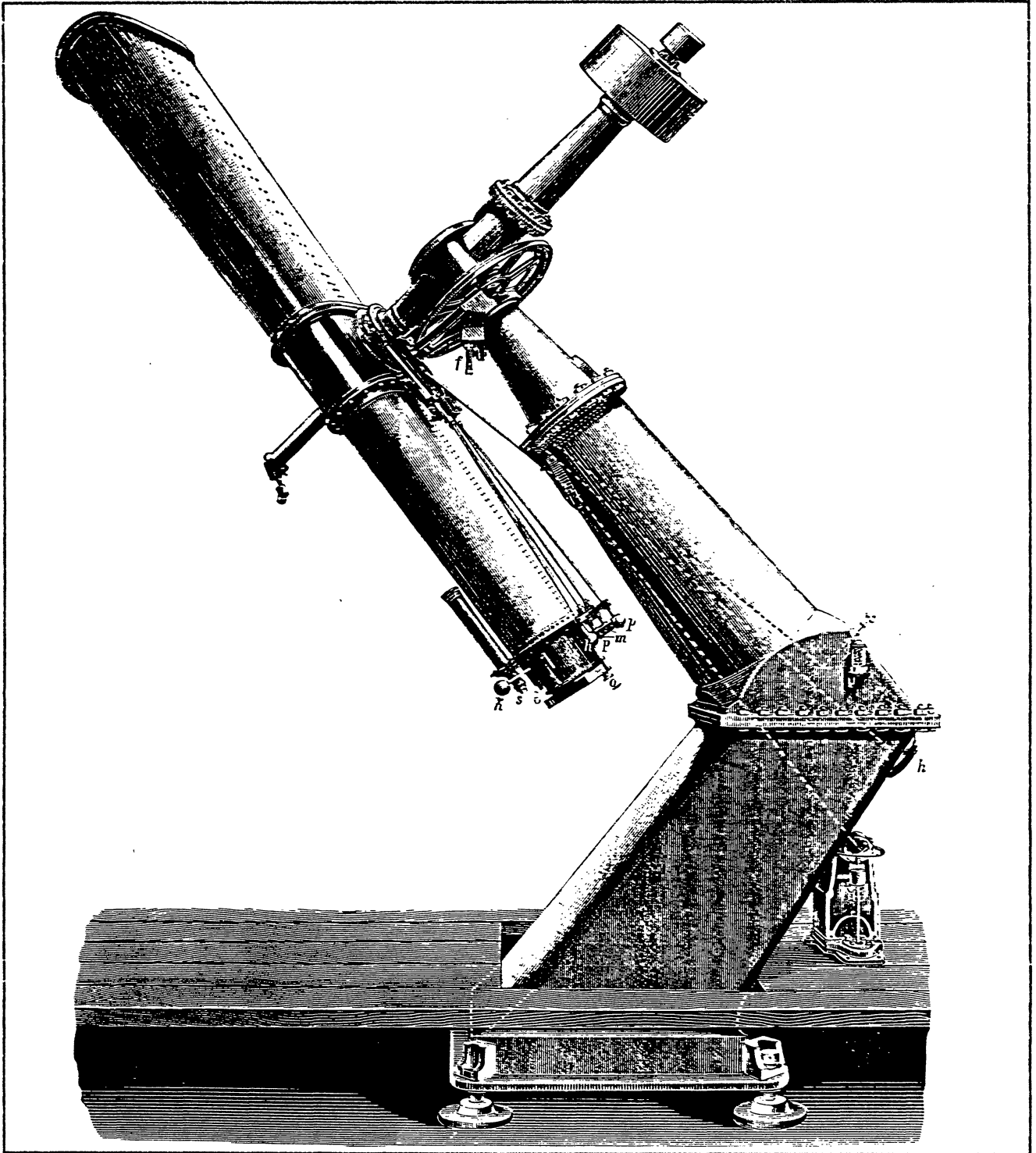


Fig. 302. Photographic telescope by STEINHEIL (optics) and REPSOLD (mounting) at Potsdam Observatory, 13-inch f/10 (p.g.) and 9-inch (vis.) refractors. See *A&A* 13, 81, 1894.

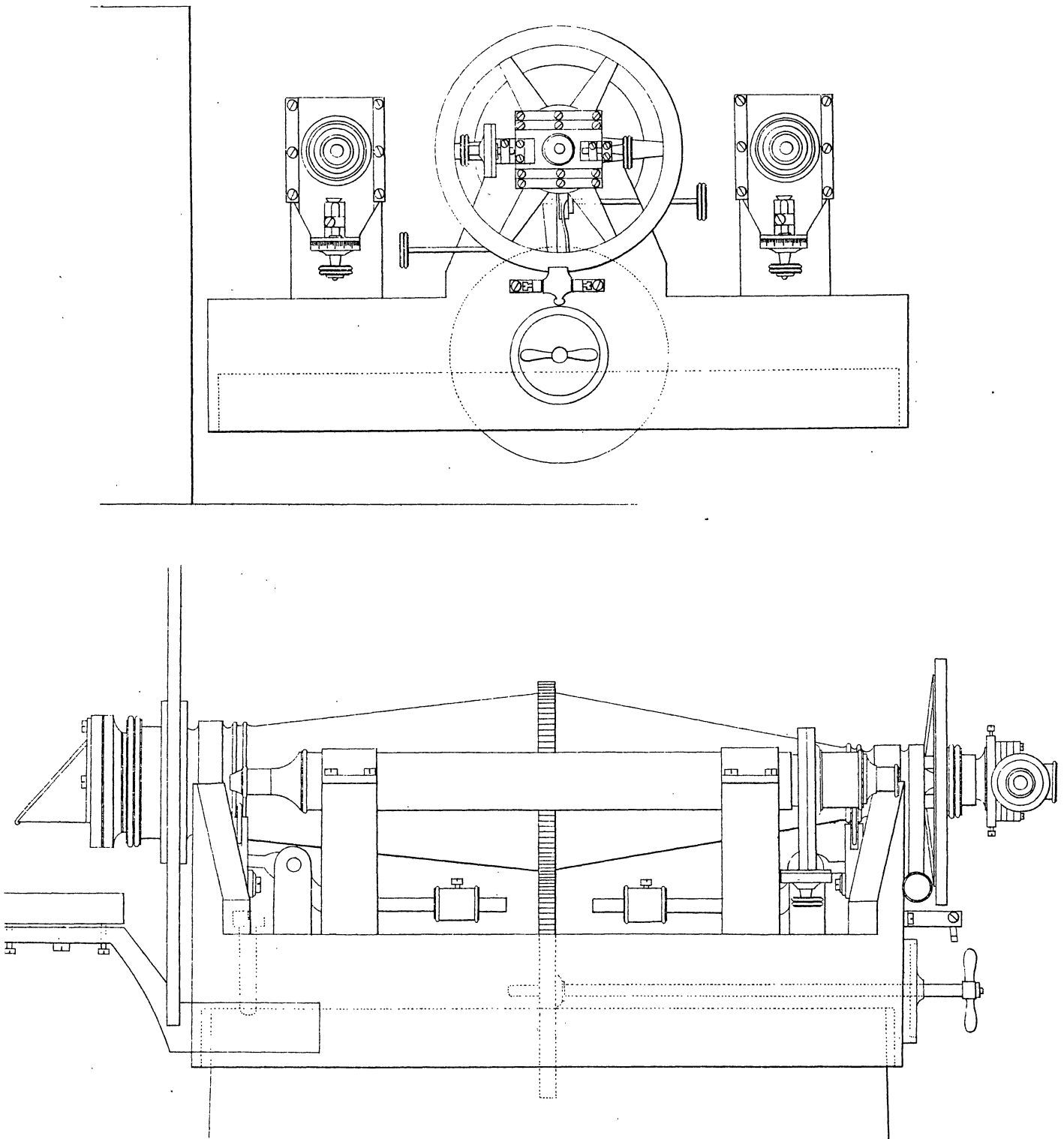


Fig. 303. Drawings (two elevational views) for the STEINHEIL meridian circle (Courtesy *Astr. Nachr.* 1849). See also Fig. 304.



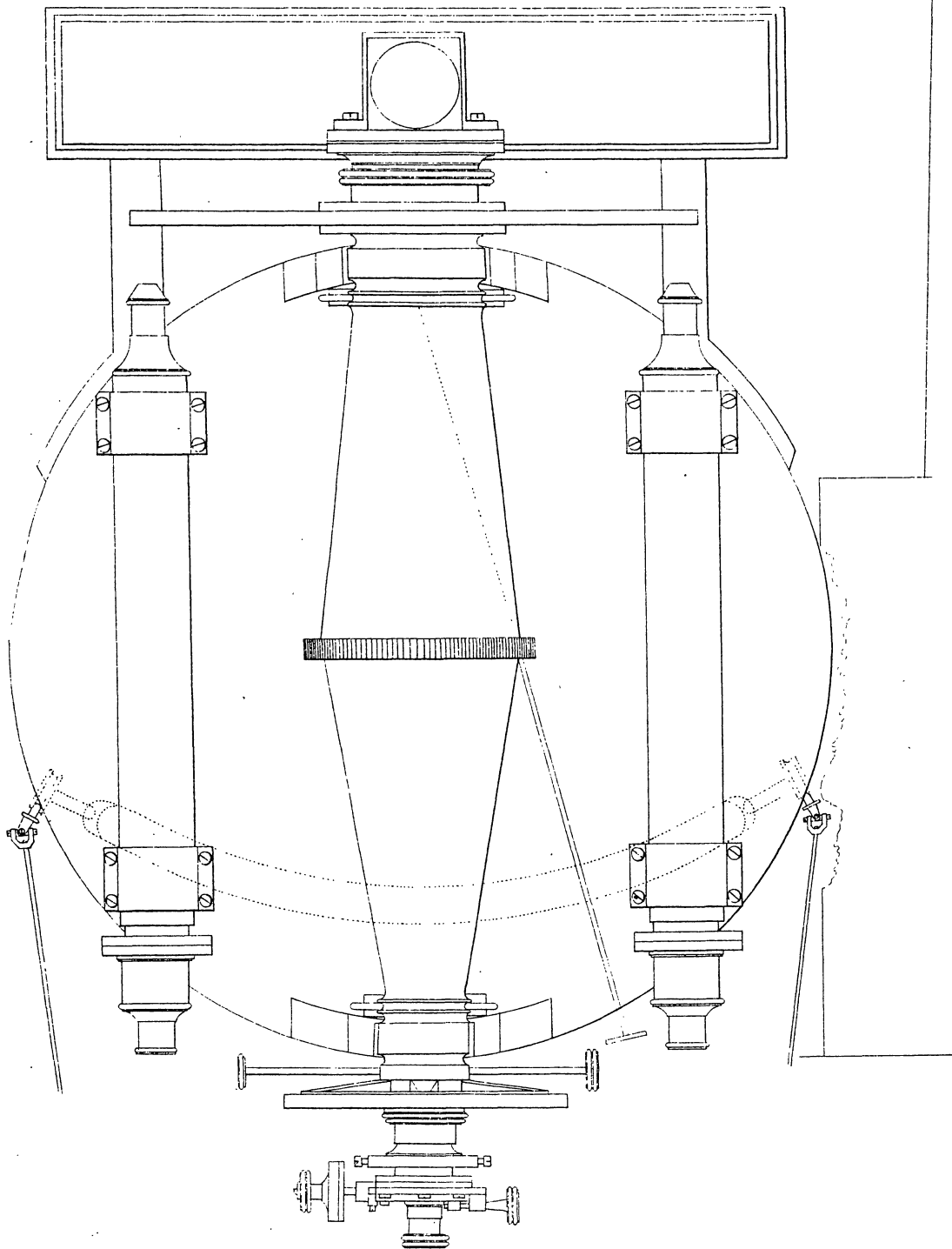


Fig. 304. Drawing (plan view) of STEINHEIL meridian circle.

## STEINER -

STEINHEIL Carl August - eminent Bavarian optician and instrument maker, *München*, 1801- 70. The firm probably began in 1847,<sup>34</sup> and certainly designed a fine meridian circle in 1849.<sup>35</sup> In 1856 STEINHEIL succeeded in making the first silver-on-glass mirror (although FOUCAULT, independently, achieved the same in 1857). By 1862 this highly successful firm was C.A. STEINHEIL Sohne. The address, *31 Landwehrstr. Works: 7 Theresienhohe* is recorded in 1894, and a branch at *13 rue Ste Cecile, Paris* (c.1900), and tradecards stated established 1855.<sup>36</sup> For his many excellent telescopes STEINHEIL, himself, designed a new triplet objective, and also a new monocentric ocular consisting of a crown bi-convex and two flint meniscuses, all spherical surfaces. There was frequently competition but also collaboration with firms such as REPSOLD and MERZ, and the latter may well have provided an overwhelming competition in optical components. KONKOLY ordered STEINHEIL instruments, amongst others, for his observatory.<sup>37</sup>

STEINHEIL Edward - son of Carl, instrument maker, 1830-78. The firm was STEINHEIL Sohne from 1862. The originator of this famous firm died in 1870.

STEINHEIL Adolf - son of Carl, instrument maker, 1832-92.

STEINHEIL Rudolph - grandson of Carl, instrument maker, taking over the family business in 1892.

STERR Joann - *Freysing*, c.1719. A telescope inscribed with this name is in the Deutsches Museum.<sup>38</sup>

STERROP Ralph - optical instrument maker, freed 1685, *St Paul's Churchyard, London* (1695), and *Archimedes and Golden Prospects, Ludgate Street, London*.<sup>39</sup>

STEWART James Henry - telescope maker, watch and barometer maker and jeweller, *406 Strand, London* (1856 -1900), *54 Cornhill* (1866-92), *63 St Paul's Churchyard* (1867-88), and 67, 66, 456 Strand (1867, 1868-88, 1879-88, respectively), and 457, 406 West Strand (1885-1900, until early 20C, respect.).<sup>40</sup> Also, *7 Gracechurch St. E.C.* (1895).

STORER William - professor of optics, associated with instrument maker, Charles LINCOLN c.1800.<sup>41</sup>

STRUTHERS William - *London*, late 18C.<sup>42</sup>

STRUVE (von) Frederick George Wilhelm - 1793-1864, eminent astronomer associated with the DORPAT telescope. Di-

rector of Pulkova Observatory.

STRYPE W.G - Irish engineers, *Jame's Gate Brewery and Custom House Mill, Dublin*, fl.1872-76.<sup>43</sup>

SWASEY - see WARNER.

SWIFT James - microscope maker, *15 Kingsland Road, E London* (1867-70), *43 University Street, WC London* (1872-79). James SWIFT and Son is recorded at *81 Tottenham Court Road, London* (1882-90), *43 University Street, WC London* (1880-81).<sup>44</sup>

SWAROVSKI - Bavarian instrument maker, *Tyrol* (WW2 binocular code cag).

SYKES H - English scientific instrument agent, working in *Paris*, late 18C. He operated from *Place du Palais Royal, maison du Caffé de la Régence au premier*. SYKES was associated with CASSINI (IV) at *Paris Observatory*, and with DOLLOND.<sup>45</sup>

(to be continued)

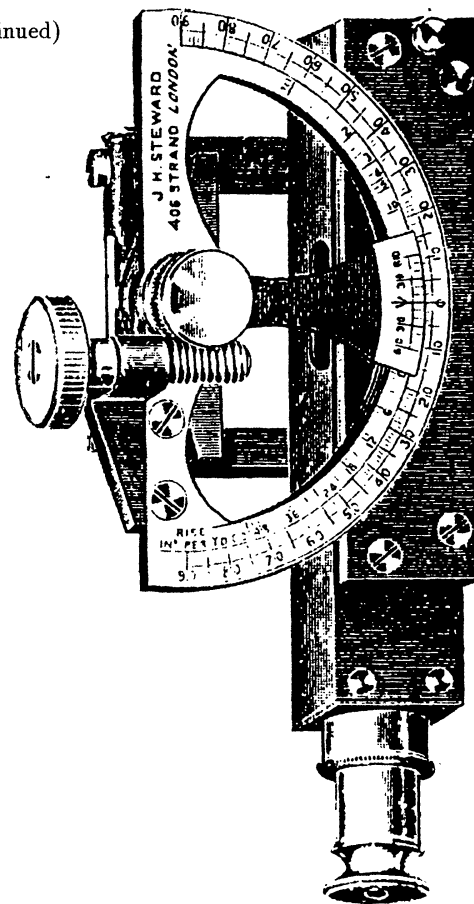


Fig. 305. Abney reflecting level and clinometer by J.H. STEWART (engraving c.1890). This was a surveying instrument consisting of a spirit level and a sighting telescope to measure inclination.

<sup>34</sup>See Handlist.

<sup>35</sup>See *Astr. Nachr.* 684, p.176.

<sup>36</sup>See Handlist.

<sup>37</sup>See *Cyclopaedia*, Part 3, Fig.126b.

<sup>38</sup>See Daumas p.334.

<sup>39</sup>See SIMON. We record also Jane STERROP c.1709 (*Turner Mic* p.107) and George STERROP, instrument maker (microscopes), c.1740-50, (Daumas).

<sup>40</sup>See SIMON and Herschel Collection, as listed by W.S. Steavenson. See also *Trans. Opt. Soc.* vol.26, 1924/25, and CHrApr88.

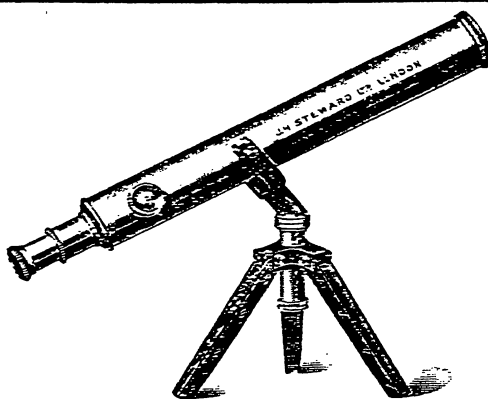
<sup>41</sup>See CHrNov93, lot 160.

<sup>42</sup>See CHrJun92, lot 96.

<sup>43</sup>See J.A. Bennett and M.Hoskin, *Journ. Hist. Astron.*, vol.12, p.216, 1981.

<sup>44</sup>See SIMON.

<sup>45</sup>See Daumas p.317, and A Turner ESI p.223.



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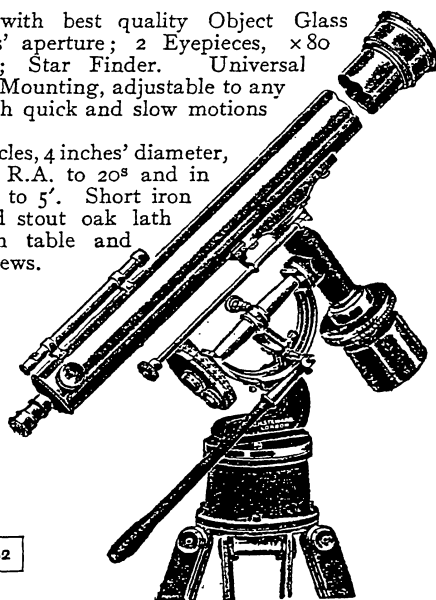
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Fig. 306. Advertisements from J.H. STEWART.



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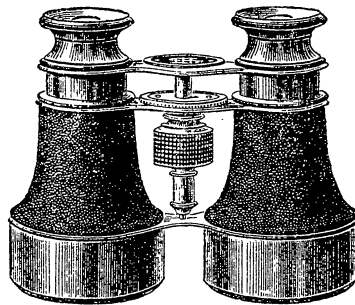
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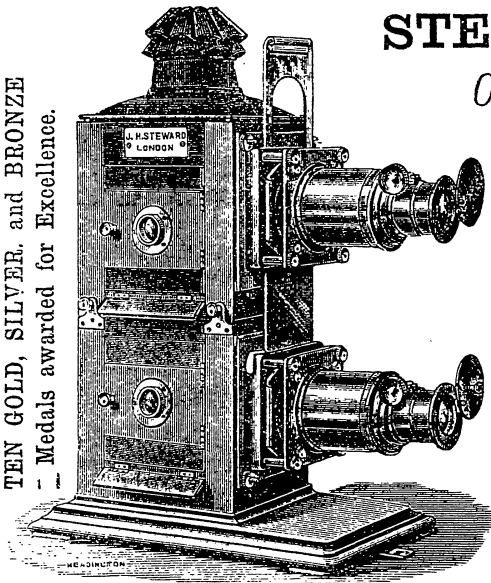
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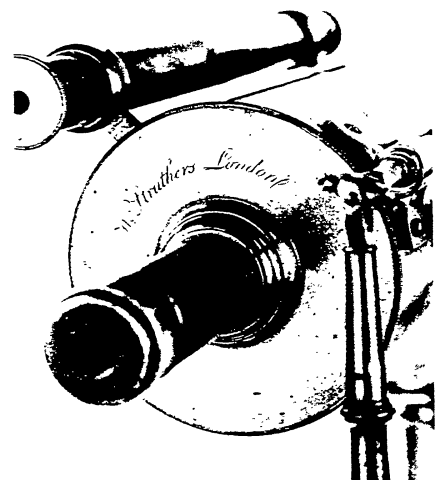
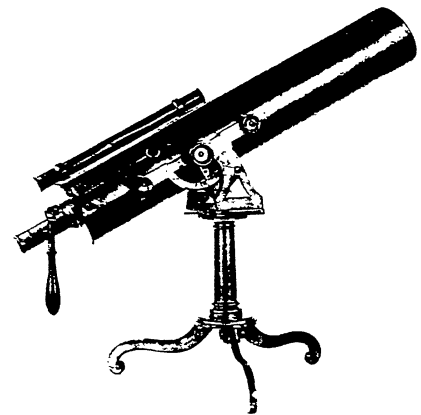
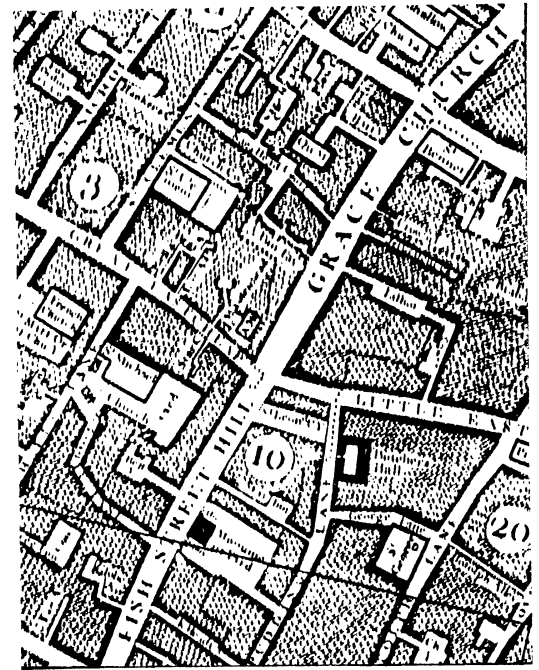
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7, GRACECHURCH STREET, E.C.**

Fig. 307. Optical instruments from J.H. STEWARD (top). A 4-inch reflector by Wm. STRUTHERS is shown, late 18C, courtesy of Christies S.Kensington (lower).



**Fig. 308.** A small achromatic refractor from the Optical Institute of UTZSCHNEIDER and FRAUNHOFER in Munich, similar to the great Dorpat 9.6-inch FRAUNHOFER refractor (see *Cyclopaedia Part 1*, IAJ 20 (3), 181 (1993)) used by STRUVE to measure double stars. Two portraits of the eminent astronomer, F.G.W. STRUVE (1793-1864).

## BOOK REVIEWS

edited by

A. D. ANDREWS

### FLUID DYNAMICS FOR PHYSICISTS

T. E. Faber

Cambridge University Press 1995

H/b xxvi + 440pp. ISBN 0 521 42969 2 £50.00 (US\$ 34.95)

S/b ISBN 0 521 42969 2 £22.95 (US\$ 34.95)

Whether one is interested in the physical behaviour of rockets, windmills, tornados, smoke rings or any type of turbulence and shock front, one requires a sound knowledge of fluid dynamics. It is 350 years since Evangelista Toricelli's work on the simple fountain which has plagued thousands of school children studying physics ever since. The behaviour of waves on the sea, the turbulence of a waterfall, a lake ruffled by the wind, an aircraft's contrail, all these can fascinate the imagination. A glance at an advanced textbook on hydrodynamics soon changes all that. The author of *Fluid Dynamics for Physicists* has recognized the fact that Landau and Lifshitz's standard textbook is too advanced to serve the needs of, say, university undergraduates. Faber's textbook fulfills a double need: to inform the student at a suitable level, and to allow the fascination of the visual phenomena of windmills and wind ruffled lakes to remain.

After the necessary introductory words of advice, and the mathematical groundwork on Mach, Reynolds, Bernoulli, Poiseuille and Euler, the author allows the reader some glorious photographs of waves, helical chains of bubbles and the River Severn's bore. After carrying the reader further mathematically downstream with the development and decay of shock fronts, Kelvin's circulation theorem, magnetostatic analogies, vorticity etc., he is appeased with a tornado photograph. Further downstream with surface waves, viscosity, stress and rate of deformation, percolation, hydrodynamic lubrication, the reader encounters the beauties of vorticity, the horrors of eddies, the Kármán vortex street, streamline flow past rotating cylinders. Perhaps at this point many readers would step off (or jump on the power boat of Landau and Lifshitz) but instabilities must be faced at some stage. Messieurs Bénard, Taylor, Couette, Tollmien, Schlichting, Benjamin and Feir must be confronted. Instability appears to extend to madness when the reader reaches Non-Newtonian Fluids in Chapter 10, and comes across his/her childhood *silly putty*. With mathematicians of the calibre of Horace Lamb and A.S. Ramsey (1920s and 1930s), textbook heroes of yesteryear, it is no wonder that Cambridge always wins the OC boat race! This textbook by T.E. Faber (also Cambridge) is highly recommended to advanced university students of physics and engineering.

### FORCE OF SYMMETRY

V. Icke

Cambridge University Press 1995

H/b 338pp. ISBN 0 521 40495 9 £35.00 (US\$ 54.95)

S/b ISBN 0 521 45591 X £13.95 (US\$ 24.95)

*Symmetry is that which imposes order on the quantum chaos*, Icke tells us. *It governs the structure and interactions of particles of which atoms are made*. The author explores many fascinating aspects of modern physics, from quantum mechanics, special relativity and the important role of symmetry. Simple language and metaphors bring these difficult subjects in reach of everyone. He says that Feynman's *QED* appeared at the time he was writing this book and that he would not have written *The Force of Symmetry* if he had known previously. Fortunately for us Icke did finish the book. The fun style carries the reader through what in many other books is hard going. If according to Icke *there are whole walls in libraries covered by countless shelves which are bending under books on electronics and electrodynamics*, none of which tell us what an electron 'is', then how does one explain to young students why this is so? If one does not know the answer then this is an essential book! *Colour me red, green and blue*, *Through a glass slowly* and *Excelsior! The ascent of  $SU(\infty)$* , and *Strawberry fields forever*, these are typical titles of sections in the book. There is a 33-page glossary to help the reader along when the jargon gets tougher. This is a highly recommended book for all those embarking on a study of physics, and also for those who changed their minds and became *the general reader*.

### CHAOTIC DYNAMICS

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Alfredo Medio (collab. Giampaolo Gallo)

Cambridge University Press 1992 (Reprinted 1993)

H/b 344pp. ISBN 0 521 39488 0 £37.50 (US\$ 64.95)

S/b ISBN 0 521 48461 8 £15.95 (US\$ 19.95)

The author of *Chaotic Dynamics* is a member of the research group on economic dynamics and chaos theory at the University of Venice. Gliding along the canals of this very difficult subject the author relates in an elegant but thoroughly sound manner the fundamental concepts and methods of chaos theory. Written for both the theoretician and numerical investigator of non-linear dynamical systems, the book includes a useful integrated software programme together with a 43-page