

CONTENTS

Foreword, by the President	Page iii
Preface	v

SECTION 1. Laboratory and Workshop Tools, Processes and Devices

1. Some Mechanics' Own Tools. <i>R. S. Clay</i>	1
2. A Few More Mechanics' Tools. <i>R. S. Clay</i>	9
3. Some more Mechanics' Own Tools. <i>S. Munday</i>	18
4. The Use of Ball-Bearing Balls as a Convenient Series of Equal Weights. <i>E. C. Wadlow</i>	21
5. Steel Balls as Pivots. <i>E. A. Baker</i>	23
6. A Precision Test for Squareness. <i>J. W. Drinkwater</i>	23
7. A Marking Tool for Tubes. <i>E. A. Baker</i>	24
8. Cutting Holes in the Side of a Tube. <i>R. Harries</i>	25
9. A Tool for Cutting Circular Washers or Bobbin Cheeks. <i>G. W. Drury</i>	26
10. A Simple Saw for Hard Materials. <i>W. A. Wooster</i>	27
11. Making Small Drills. <i>Taylor-Hobson Research Laboratory</i>	28
12. The Drilling of Deep Holes. <i>Taylor-Hobson Research Laboratory</i>	28
13. Riveting into a Blind Hole. <i>Taylor-Hobson Research Laboratory</i>	30
14. The Punching of Holes. <i>A. F. Dufton</i>	30
15. Riveting Thin Wire through Aluminium Plate. <i>S. Munday</i>	31
16. A Light Tool for Pulley or Gear Removing. <i>A. H. Cox</i>	32
17. Stop-Clock Key Retainer. <i>S. Munday</i>	32
18. Locking Screwed Members. <i>Taylor-Hobson Research Laboratory</i>	33
19. V-Pulleys. <i>G. R. Myers</i>	34
20. A Flexible and Non-Extensible Driving Band. <i>J. M. Waldram</i>	35
21. The Mounting and Preparation of Fine Wire Specimens for Photo-Micrography. <i>H. Gollop</i>	35
22. A Simple "Trip" Mechanism. <i>O. W. Gill</i>	36
23. The "Chain" and "Screw-Cord" Movements as Substitutes for the Rack and Pinion. <i>E. A. Baker</i>	37
24. Self-Locking Winding Gear. <i>O. Kantorowicz</i>	39
25. A Silent Worm Drive. <i>M. C. Marsh</i>	41
26. A Simple Reduction Gear and Clutch. <i>J. M. Waldram and J. M. Sandford</i>	42
27. A Simple Variable-Speed Gear. <i>J. de Graaff Hunter</i>	44
28. Calculation of Gear Wheels to Obtain the Best Approximation to a Given Ratio. <i>R. S. Clay</i>	45

	<i>Page</i>
29. The Simple Construction of Accurate Division Plates. <i>D. C. Gall</i>	47
30. A Simple Method of Dividing Instrument Scales. <i>W. E. Williams</i>	49
31. Ruling Verniers and Scales on a Lathe. <i>P. Kirkpatrick</i>	51
32. A Laboratory Ruling Device. <i>V. H. L. Searle</i>	52
33. A Drawing Instrument for Large-Radius Arcs. <i>E. Simeon</i>	53
34. An Adjustable Curve. <i>H. H. Macey</i>	54
35. The Mounting of Quartz Suspension Fibres. <i>D. R. Barber</i>	55
36. The Construction of Molecular Models. <i>W. A. Wooster</i>	57
37. A Spherical Template for Drilling Balls for Crystal Structure Models. <i>W. A. Wooster and R. Cole</i>	58
38. The Lubrication of Fine Mechanisms. <i>Editor, J. Sci. Instrum.</i>	60
39. "3 in 1" Oil (for Delicate Mechanisms). <i>Sir Charles Boys</i>	61
40. Laboratory Cements and Waxes. <i>L. Walden</i>	61

SECTION 2. Clamps, Supports and Agitators

41. Rigid Stands for Laboratory Apparatus. <i>L. J. Wheeler</i>	72
42. A Simple Anti-Vibration Galvanometer Support. <i>G. E. Coates and J. F. Coates</i>	73
43. An Anti-Vibration Support. <i>J. W. French</i>	76
44. Improving the Fixation of Instrument Parts. <i>O. Kantorowicz</i>	77
45. Easily Made Geometric Bosses. <i>R. Harries</i>	78
46. Concrete Bases for Retort Stands. <i>O. H. F. Pieris</i>	79
47. A Method of Clamping Glass Tubing. <i>J. A. V. Fairbrother</i>	79
48. A Shaking Gear for Use with Water-Baths. <i>S. J. Folley</i>	80
49. An Adjustable Agitator for Laboratory Use. <i>N. G. Heatley</i>	82

SECTION 3. Soldering, Brazing and Welding

50. Soldering and Brazing. <i>A. S. Newman and R. S. Clay</i>	84
51. Soldering Aluminium. <i>A. G. C. Gwyer</i>	92
52. Soldering, Brazing and Autogenous Soldering. <i>Sir Charles Boys</i>	92
53. An Aid in Soldering Small Parts. <i>W. Clarkson</i>	100
54. An Electrical Method of Soft-Soldering. <i>R. A. Fereday</i>	101
55. Cold "Soldering". <i>M. C. Marsh</i>	101
56. Soft-Soldering on to Stainless or Case-Hardened Steel. <i>O. Kantorowicz</i>	102
57. Soldering or Brazing of Alloy Steels. <i>J. P. Reed</i>	103
58. Soldering Aluminium Brass Joints. <i>F. H. Sims</i>	103
59. An "Iron" for Silver-Soldering. <i>T. F. Harle</i>	104
60. Flux for Soldering Phosphor-Bronze Hair-Springs. <i>C. E. Homer and H. A. Watkins</i>	105
61. Lead Jointing of Metal. <i>H. G. Jones, G. E. Rowland and A. Williams</i>	105

	<i>Page</i>
62. Welding Small Platinum Heaters and Electrodes. <i>A. R. Morris</i>	106
63. An Improved Method of Spot Welding. <i>L. J. Bayford</i>	107
64. Welding Fine Thermocouple Wires. <i>E. D. Hart and W. H. Elkin</i>	108

SECTION 4. Technique of Glass Manipulation and Silvering

65. Drilling Holes in Glass. <i>B. Brown</i>	110
66. Manipulating Glass. <i>Sir Charles Boys</i>	110
67. On Drilling Small Holes in Glass. <i>N. G. Heatley</i>	116
68. A Simple Glass-Blowing Machine. <i>C. E. S. Phillips</i>	118
69. A Chuck for Glass Tubing. <i>J. M. Somerville</i>	121
70. Hints on Silvering Glass. <i>F. E. J. Ockenden</i>	123
71. The Silvering of Small Mirrors. <i>E. A. Baker</i>	125
72. A Glass Cell for Colour Filters. <i>B. H. Crawford</i>	126
73. Plate Glass Cells. <i>W. Pinfold</i>	127
74. A Capillary Mercurial Barometer. <i>Sir Charles Boys</i>	128
75. Flasks made from Burnt-Out Electric Lamp Bulbs. <i>G. T. P. Tarrant</i>	130

SECTION 5. Vacuum and Pressure Technique and Devices

76. The Design of Vacuum Joints in Metal Apparatus. <i>R. M. Archer</i>	131
77. A High-Vacuum Connexion. <i>M. J. Moore</i>	136
78. A Receiver Changer for Small-Scale Vacuum Distillations. <i>W. V. Thorpe and R. T. Williams</i>	138
79. A Double Liquid Air Trap. <i>R. W. Conway</i>	140
80. A Modified Mercury Trap. <i>J. E. Crackston</i>	141
81. A Combined Vapour Trap and Cut-Out. <i>E. L. Mays</i>	142
82. A Seal for Electrodes. <i>S. Munday</i>	142
83. A Flexible Seal for Electrodes. <i>M. C. Marsh</i>	143
84. Sealing Electrode Leads into Experimental Apparatus. <i>A. J. Maddock</i>	144
85. Two Methods of Sealing Off Large Exhausting Tubes. <i>B. George</i>	145
86. Sealing Electrodes into a Steam Chamber. <i>S. Munday</i>	146
87. A Vacuum "Lead-In". <i>H. Herne</i>	148
88. Insulating Joints in Vacuum Tubes. <i>W. Ehrenberg</i>	149
89. A Method of Controlling the Pressure inside an Apparatus which is being Evacuated. <i>S. Rama Swamy</i>	150
90. An Improved Form of High Vacuum Leak. <i>W. Bogg</i>	151
91. Leaking and Controlling Small Quantities of Gas. <i>A. S. Husbands</i>	153
92. A Simple Variable and Greaseless Leak. <i>G. C. Ellenton</i>	156
93. An Electrolytic Hydrogen Leak. <i>P. C. Thoneman</i>	156
94. An Improved Cut-Off for High Vacuum Work. <i>R. W. Ditchburn</i>	157
95. A High-Vacuum Valve. <i>M. J. Moore</i>	159

	<i>Page</i>
96. A Multiple High-Vacuum Valve. <i>R. I. Garrod</i>	160
97. A Simple High-Vacuum Release Valve. <i>R. Jackson and A. G. Quarrell</i>	162
98. A High-Pressure Valve. <i>M. J. Moore</i>	163
99. A Self-Seating Valve. <i>J. H. Marvell</i>	164
100. A Glass and Brass Valve. <i>Taylor-Hobson Research Laboratory</i>	164
101. A Simple Micrometer Gas Inlet Tap. <i>L. Saggars</i>	165
102. A Three-Dimensional Adjustment of an Electrode <i>in Vacuo</i> . <i>J. L. Miller and J. E. L. Robinson</i>	166
103. A Quick Method of Checking Pumping Speeds. <i>G. C. Ettenton</i>	167
104. An Apparatus for Stirring under Vacuum. <i>B. R. Atkins</i>	168
105. A Convenient Apparatus for Distilling Metals. <i>R. V. Jones</i>	170
106. The Formation of Metallic Blacks on Thin Foils by Evaporation. <i>R. V. Jones and B. V. Rollin</i>	172
107. A Vacuum Tank for Use with a Single Crystal X-Ray Goniometer <i>M. F. Perutz and G. L. Rogers</i>	173
108. A Vacuum Furnace. <i>W. Ehrenberg and F. Ansbacher</i>	174
109. Making Very Thin Vacuum-Tight Glass Windows. <i>S. Rosenblum and R. Walen</i>	177
110. Danger of Explosion of Liquid Air Cooled Charcoal Tubes, and its Prevention. <i>J. Taylor</i>	179

SECTION 6. Electrical and Magnetic Devices and Techniques

111. An Adjustable Resistance. <i>Sir Alfred Egerton and M. Milford</i>	180
112. A Variable Low Resistance. <i>W. H. Walton</i>	181
113. A Simple Heavy-Current Resistance. <i>F. A. Cunnold and M. Milford</i>	182
114. Measuring the Length of Resistance Wires. <i>S. Munday</i>	183
115. A Simple Electrical Time-Cycle Process Controller. <i>K. Hoselitz</i>	183
116. A Simple Power Control Circuit. <i>J. G. Holmes</i>	186
117. A Wide Range Motor Speed Control. <i>O. H. Schmitt</i>	187
118. A Simple Method of Making Contacts with Thin Metal Foil. <i>R. V. Jones</i>	188
119. The Use of Wollaston Strip for Suspensions. <i>D. W. Dye</i>	189
120. The Manipulation of Wollaston Wire. <i>H. E. Bennett</i>	191
121. Cleaning Fine Copper Wire. <i>D. A. Bell</i>	192
122. Testing Repaired Coil Galvanometers. <i>S. Munday</i>	193
123. A Simple Clamp for Fine Wires. <i>L. Bainbridge-Bell</i>	193
124. A Connector for Wires—Particularly for the Cold Junctions of Thermocouple Wires. <i>R. J. M. Payne</i>	194
125. The Assembly of a Sensitive Thermopile. <i>H. E. Beckett</i>	195
126. Low Tension Supply. <i>A. F. Dufton</i>	196
127. A Device for Maintaining a Steady Direct Current. <i>H. H. Potter</i>	197
128. A Constant E.M.F. Device. <i>Sir Alfred Egerton and J. M. Mullaly</i>	199

	<i>Page</i>
129. Change-Over Switch with Automatic Release. <i>O. Kantorowicz</i>	201
130. A Pedal-Operated Switch. <i>W. Burns</i>	203
131. Electro-Plating Copper on Manganin. <i>C. R. Cosens</i>	204
132. Cleaning Small Magnet Gaps. <i>J. G. Beard</i>	207
133. Aluminium Panels for Electrical Instruments. <i>L. B. Turner</i>	208
134. A Method of Simultaneously Projecting Two Periodic Curves on a Cathode-Ray Oscillograph. <i>F. E. Kennard</i>	208
135. A Device for Winding Small Toroidal Inductances. <i>C. A. A. Wass</i>	209
136. A Simple Device for Securing Rigidity of Electrodes in Conductometric Work. <i>B. N. Sastri and M. Sreenivasaya</i>	212

SECTION 7. Optical Devices and Techniques

137. Optical Levers. <i>B. H. C. Mathews</i>	213
138. An Optical Multiplier. <i>W. I. Place</i>	215
139. Magnesium Oxychloride for Photometer Screens and Test Plates. <i>J. S. Preston</i>	216
140. A Fluorescent Medium for Use on Surface Plates. <i>H. D. Griffith and A. M. Fraser</i>	218
141. An Improved Method of Illuminating Resolution Charts. <i>H. K. Bourne</i>	218
142. A Counting Lamp for Colonies of Bacteria. <i>A. E. Crisp</i>	220
143. A Simple Bacterial Colony Counting Device. <i>A. L. Sims and R. C. Jordan</i>	221
144. Fitting Spider-Threads in Eyepieces of Optical Instruments. <i>F. H. Rolt</i>	222
145. A Simple Method of Fitting Fine Cross-Wires in an Optical Instrument. <i>D. G. Drummond</i>	222
146. A Simple Method of Fitting Fine Cross-Wires in an Optical Instrument. <i>R. W. Lawson</i>	224
147. Treatment of Discoloured Quartz Windows. <i>A. G. Gaydon</i>	224
148. Unscrewing Lens Mounts. <i>D. A. Cameron</i>	225
149. Transparent Scales on Glass Supports. <i>E. A. Baker</i>	226
150. Making Thermometer Graduation Marks Permanent. <i>D. Northall-Laurie</i>	226
151. Stick-Slip Phenomena in a Lens-Centring Device. <i>L. B. Banks</i>	227
152. A Device for Centring a Microprojector Lamp. <i>R. Harries</i>	228
153. A Continuous Record for Recording Drums. <i>R. E. Clark</i>	229
154. A Simple Spark Recording Apparatus. <i>E. H. Dock</i>	230
155. The Recording of Stationary Patterns on the Cathode-Ray Oscillograph. <i>E. T. S. Walton</i>	231
156. Corrector Bar Mechanism Applied to a Densitometer. <i>G. F. G. Knipe</i>	231
157. A Gravity-Controlled Sight to Assist in Height Measurements. <i>S. L. Anderson</i>	233
158. Adjustable Telescope Holders. <i>S. Munday</i>	234

	<i>Page</i>
159. A Method of Constructing Slits of Fixed Width. <i>W. L. Buxton</i>	235
160. Reproduction of Graphs by Industrial Photo-Print Methods. <i>O. Kantorowicz</i>	237
161. A Device for Visual Observations at Low Temperatures. <i>A. Schallamach</i>	238
162. The Observation of Reflecting Galvanometer Deflexions. <i>R. V. Jones</i>	239
163. Oscillograph Film Camera for Brief Records. <i>A. J. Small</i>	239

SECTION 8. Devices for Liquids and Gases

164. A Siphon Head for Dewar Flasks. <i>G. C. Ellenton</i>	241
165. A Simple Safety Siphon. <i>R. Readman</i>	242
166. An Automatic Siphon. <i>H. Tompa</i>	242
167. Modified Construction of an Automatic Siphon. <i>V. A. Yardley</i>	243
168. A Buoyancy Manometer for Use with Corrosive Gases. <i>R. S. Bradley</i>	245
169. A Safety Device for a Differential Oil Manometer. <i>W. W. Barkas</i>	246
170. The Determination of Volumes by the Use of Carbon Dioxide. <i>W. W. Barkas and J. M. Paton</i>	246
171. Two Constant Pressure Devices. <i>A. Clow and G. Shand</i>	249
172. A Device for Producing a Slow Constant Flow of Liquid. <i>R. J. Davies</i>	252
173. A Motorless Circulator for Liquids. <i>C. Record</i>	253
174. Rapid Filtration of Viscous Liquids. <i>E. B. Moss</i>	255
175. A Device for Bottling Viscous Liquids from Bulk. <i>E. Simeon</i>	255
176. A Variable-Slit Filter for Liquids. <i>E. Simeon</i>	256
177. A Sensitive Relay Operated by Fluid Flow. <i>J. H. J. Poole and J. C. Gilmour</i>	257
178. A Water-Tight "Lead-In" to an Enclosed Chamber suitable for Ordinary Temperatures. <i>W. F. Cope</i>	258
179. Glass Spirals for Use in Sensitive Pressure Gauges. <i>S. G. Yorke</i>	259
180. Improved Method of Winding and Mounting Glass Spirals for Sensitive Pressure Gauges. <i>S. G. Yorke</i>	262
181. Prevention of Capillary Disturbances in Electrolytic Field Plotting Troughs and in McLeod Gauges. <i>O. Klemperer</i>	264
INDEX	266