Having procured a tin tube CD, four inches in diameter, and two feet long with a circular plate soldered to one end, having a round hole in the centre, like the tube of a reflecting telescope, I got another smaller tube of the same length soldered into the larger, so as to be in the axis or centre of it ; the small tube was open at both ends, and on this construction water could be poured into the large vessel to fill it, while the central tube was exposed to its temperature. Into this central tube I could insert the upper half of a syphon barometer, and fix it by a cork, the top of the narrow tube, also, being corked—thus the effect of any temperature under 212° could be ascertained, the depression of the mercurial column being known by the ascent in the exterior leg of the syphon. The force of vapour from water between 80° and 212°, may also be determined by means of an air-pump, and the result exactly agrees with those determined as above.”

“ After repeated experiments by all those methods, and a careful comparison of the results, I was enabled to digest the following :—

Table of the Force of Steam from Water in the tempe­ratures from 32° to 212° (1802.)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Tem-  pera  ture. | Force of Vapour in inches of Mer­cury. | Tem­  pera­  ture. | Force of Vapour in inches of Mer­cury. | Tem­pera­ture. | Force of Vapour n inches of Mer­  cury. | Tem­  pera­  ture. | Force of  Vapour in inches of Mer­cury. |
| 32° | .200 | 78° | .940 | 123° | 3.59 | 168° | 11.54 |
| 33 | .207 | 79 | .971 | 124 | 3.69 | 169 | 11.83 |
| 34 | .214 | 80 | 1.00 | 125 | 3.79 | 170 | 12.13 |
| 35 | .221 | 81 | 1.04 | 126 | 3.89 | 171 | 12.43 |
| 36 | .229 | 82 | 1.07 | 127 | 4.00 | 172 | 12.73 |
| 37 | .237 | 83 | 1.10 | 128 | 4.11 | 173 | 13.02 |
| 38 | .245 | 84 | 1.14 | 129 | 4.22 | 174 | 13.32 |
| 30 | .254 | 85 | 1.17 | 130 | 4.34 | 175 | 13.62 |
| 40 | .263 | 86 | 1.21 | 131 | 4.47 | 176 | 13.92 |
| 41 | .273 | 87 | 1.24 | 132 | 4.60 | 177 | 14.22 |
| 42 | .283 | 88 | 1.28 | 133 | 4.73 | 178 | 14.52 |
| 43 | .294 | 89 | 1.32 | 134 | 4.86 | 179 | 14.83 |
| 44 | .305 | 90 | 1.36 | 1.35 | 5.00 | 180 | 15.15 |
| 45 | .316 | 91 | 1.40 | 136 | 5.14 | 181 | 15.50 |
| 46 | .328 | 92 | 1.44 | 137 | 5.29 | 182 | 15.86 |
| 47 | .339 | 93 | 1.48 | 138 | 5.44 | 183 | 16.23 |
| 48 | .351 | 94 | 1.53 | 139 | 5.59 | 184 | 16.61 |
| 49 | .363 | 95 | 1.58 | 140 | 5.74 | 186 | 17.00 |
| 50 | .375 | 96 | 1.63 | 141 | 5.90 | 186 | 17.40 |
| 51 | .388 | 97 | 1.68 | 142 | 6.05 | 187 | 17.80 |
| 62 | .401 | 98 | 1.74 | 143 | 6.21 | 188 | 18.20 |
| 53 | .415 | 99 | 1.80 | 144 | 6.37 | 189 | 18.60 |
| 54 | .429 | 100 | 1.86 | 145 | 6.53 | 100 | 19.00 |
| 55 | .443 | 101 | 1.92 | 146 | 6.70 | 191 | 19.42 |
| 50 | .458 | 102 | 1.98 | 147 | 6.87 | 192 | 19.80 |
| 57 | .474 | 103 | 2.04 | 148 | 7.05 | 193 | 20.32 |
| 68 | .490 | 104 | 2.11 | 149 | 7.23 | 194 | 20.77 |
| 59 | .507 | 105 | 2.18 | 150 | 7.42 | 195 | 21.22 |
| 60 | .524 | 106 | 2.25 | 151 | 7.01 | 196 | 21.68 |
| 61 | .542 | 107 | 2.32 | 152 | 7.81 | 197 | 22.13 |
| 62 | .560 | 108 | 2.39 | 153 | 8.01 | 198 | 22.09 |
| 63 | .578 | 109 | 2.46 | 154 | 8.20 | 199 | 23.16 |
| 54 | .597 | 110 | 2.53 | 155 | 8.40 | 200 | 23.64 |
| S5 | .616 | 111 | 2.00 | 150 | 8.60 | 201  202 | 24.12  24.51 |
| 66 | .635 | 112 | 2.68 | 157 | 8.81 |
| 37 | .655 | 113 | 2.76 | 158 | 9.02 | 203 | 25.10 |
| 88 | .676 | 114 | 2.84 | 159 | 9.24 | 204 | 2δ.61 |
| 69 | .698 | 115 | 2.92 | 160 | 9.46 | 205 | 26.13 |
| 70 | .721 | 116 | 3.00 | 161 | 9.68 | 206 | 26.66 |
| 71 | .745 | 117 | 3.08 | 162 | 9.91 | 207 | 27.20 |
| 72 | .770 | 118 | 3.10 | 163 | 10.15 | 208 | 27.74 |
| 73 | .796 | 119 | 3.25 | 164 | 10.41 | 209 | 28.29 |
| 74 | .823 | 120 | 3.33 | 165 | 10.68 | 210 | 28.84 |
| 75 | .851 | 121 | 3.42 | 166 | 10.96 | 211 | 29.41 |
| 76 77 | .880  .910 | 122 | 3.50 | 1G7 | 11.25 | 212 | 30.00 |

Dr Dalton afterwards resumed the experimental ex amination of this subject, and was induced to modify these numbers slightly, as will be seen from our final table.

30. Passing over the experiments of Schmidt, Goldner, and others, as presenting no important differences from some of these we have already noticed, we come to those of Dr Ure, published in the *Philosophical Transactions* of 1818, and made at Glasgow during 1817. The ad joining figures represent his apparatus.

Fig. 15. represents the construction used for temperatures under and a little above the boiling point. Figs. 16. and 17. are those used for higher temperatures, the last being the more convenient of the two ; each was suspended from a lofty window ceiling, and placed in a truly vertical position, by means of a plumb line. Dr Ure gives the following account of his mode of experimenting. “ One simple principle pervades the whole train of experiments —which is, that the progressive increase of elastic force developed by heat from the liquid, incumbent on the mercury at L *l',* is measured by the length of column which must be *added* over L, the primitive level below, in order to restore the quick silver to its primitive level above, at *l.*

These two stations or points of departure are nicely defined by a ring of fine platina wire, twisted firmly round the tube.

“ At the commencement of the experi ment, after the liquid, well freed from air, has been let up, the quicksilver is made a tangent to the edge of the upper ring, by cautiously pouring mercury, in a slender stream, into the open leg of the syphon B, the level ring below is then carefully adjusted.

“ From the mode of conducting my experiments, there remained always a quantity of liquid m contact with the vapour, a circumstance essential to accuracy in this research.

“ Suppose the temperature of the water or the oil in A to be 32° Fahrenheit, as denoted by a delicate thermo meter, or by the liquefaction of ice ; communicate heat to the cylinder A, by means of two argand flames, playing gently on its shoulder at each side. When the thermo meter indicates 42°, modify the flames, or remove them so as to maintain a uniform temperature for a few minutes. A film or line of light will now be perceived between the mercury and the ring at *l,* as is seen under the vernier of a mountain barometer, when it is raised a few feet off the ground ; were the tube at *l* and L, of equal area, or were the relation of the areas experiment ally determined, then the rise of the quicksilver above L would be one-half, or a known submultiple of the total depression, equivalent to the additional elasticity of the vapour at 42° above that at 32°. Since the depressions, however, for 30 or 40° in this part of the scale are exceedingly small, one-half of the quantity can scarcely be ascertained with suitable precision, even after taking the above precautions ; and besides, the other sources of error, or at least embarrassment, from the inequalities of the tube, and from the lengthening space occupied by the vapour, as the temperature ascends, render this method of reduction very ineligible.

“ By the other plan we avoid all these evils ; for what ever additional elasticity be communicated to the vapour above *l*, it will be faithfully represented and measured by the mercurial column, which we must add over L, in order to overcome it and restore the quicksilver under *I,* to its zero or initial level, when the platina ring becomes once more a tangent to the mercury. At E, a piece of