centre of gravity of the bottom of the ſhip from the aft side of the poſt.

The height of the centre of gravity of the bottom above the lower edge of the keel may be determined by the same principles. Thus,

To one ſixth of the lowermoſt horizontal ſection add the product of one ſixth of the uppermoſt section by three times the number of ſections minus four the se­cond ſection in aſcending, twice the third, three times the fourth, &c. ; and to half the ſum of the extreme planes add all the intermediate ones. Now the firſt of theſe ſums, multiplied by the diſtance between the planes or ſections, and divided by the second ſum, gives the altitude of the centre of gravity of the bottom of the ſhip above the lower edge of the keel as required.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hor∙ Planes. | 1st. Fact. | 1st Products. 2d | Fact. | 2d Products. |
| 208.00 | °⅛ | 34∙i>7 | O∣ | 104.00 |
| 3 74-2 7 | I | 374∙27 | I | 374∙27 |
| 2366.46 | 2 i | 4732.92 | I | 2366.46 |
| 3305∙42 | 3 | ÏCO96.26 | I | 3365∙42 |
| 4169.50 | 4 | 1667 8.co | I | 4169.50 |
| 4939,27 | 5 | 24696.35 | 1 | 4939∙27 |
| 5592∙27 ’ | 6 | 33553∙02 | I | 5592.27 |
| 5974∙l6((3× 8)-4y | | )×3- \*9913∙s7 | Or | 2987.c8 |
|  |  | ï 10079.96 |  | >  23898.27 |

110079.06 on % , ∙ ,

Now —— × 2.95 = 13.588, the height of

23θ9\*∙^7

the centre of gravity of the bottom of the ſhip above the lower edge of the keel.

We have now found the diſtance of the centre of gra­vity of the bottom of the ſhip from the aft side of the poſt, and its altitude above the lower edge of the keel. Hence the ſhip being ſuppoſed in an upright poſition, this centre of gravity will neceſſarily be in the vertical longitudinal ſection which divides the ſhip into two equal and ſimilar parts ; the poſition of this centre is therefore determined.

It now remains to find the height of the metacenter above the centre of gravity ; the expreſſion for this altitude, as found in Chap. III. is —— which we ſhall

now apply to determine the metacenter of the ſhip of of 74 guns, whoſe centre of gravity we have already found.

|  |  |  |
| --- | --- | --- |
| Ord. of the Plane of Floatation. | | Cub.of Ordinates. |
| Ft. Inch. | Ft. & dec. of Foot. |  |
| U 9 o | 14.7 | 3 209.04δ |
| 17 i 6 | 17.1 | ÇC00.2I I |
| 1890 | 18.7 | 059i∙797 |
| 19 10 0 | 19.8 | 7702.392 |
| 20 7 6 | 20.6 | 8741.816 |
| 2 1 19 | 21.2 | 9595-703 |
| 21 6 3 | 2I∙5 | 9938.375 |
| 21 7 9 | 21.7 | 10289.109 |
| 21 7 9 | 2 1.7 | 10289.109 |
| 21 76 | 21.7 | ιc289 ιc9 |
| 21 40 | 2∣∙3 | 9663∙597 |
| 20 10 6 | 20.9 | 9129.329 |
| 19 9 0 | 19.7 | 7703734 |
| H 4 6 | 17.4 | 5268.024 |
| 13 1 3 | 13∙1 | 2248.091 |
| 291 i 3 | 291a | 115719.443 |

|  |  |  |
| --- | --- | --- |
| Ordinate at 10.03 feet abaft the or­dinate 8y, — 4, of which the cube is 64, and 64 X ⅜ | | 32. |
| Ordinate at 10.03 feet afore the or­dinate G 0 ≈ 6, cube of which is  216, and 2i6×4∙ | | 108. |
| Sum |  | i ∏859∙442 |
| Diſtance between the ordinates |  | 10.03 |
| Product |  | 1162070.20326 |
| Half the cube or the aftermoſt ordinate | 32∙ |  |
|
| Half the cube of the thickneſs of the item | 0.14 |  |
|
| Sum | 32∙14 |  |
| Diſtance between the ordinates | 3∙° |  |
| Product | ββ | 96,42 |
| Half the cube of the foremoſt ordinate | 108. ∙ |
|  |
| Half the cube of the thickneſs of the item | .14 |  |
|
| Sum | Iθ8.14 |  |
| Diſtance between the ordinates | 5-5 |  |
| Product | - | 594-77 |
| ∕∕ x |  | 1162761.39326' |
| ay>,.\* |  | 2325522.7865s |
| τ∕j3\* | - | 775174.26217 |
| The ſoh’dityof the bottom is 2527⅛ tons = 7001 8.6,-r ,. r . 1 *y∕y3χ*  cubic feet: hence 2~γ \_ 700j8 67 = U.07 feet,  the altitude of the metacenter above the centre of gra­vity of the bottom of the ſhip. | | |
|
|
|

APPENDIX.

When a ſhip is built, ſhe must be fitted with maſts, yards, sails, ropes, and blocks, or, in other words, ſhe must be *tigged* before ſhe can go to ſea. To complete this article, it may therefore be thought neceſſary to treat of the art of rigging veſſels ; but we have elſewhere (see *MAST-Rigging,* Rope-Making, and Sail) ſhown how the ſeveral parts of a ſhip’s rigging are made ; and the art of putting them proper­ly together, ſo as to make the ſhip beſt anſwer the purpoſe for which ſhe is intended, depends upon a juſt knowledge of the impulſe and reſiſtance of fluids, and of the theory and practice of ſeamanſhip. (See *RESISTANCE of Fluids* and Seamanship). Nothing, therefore, of the ſubject is left to us here, except we were to ſtate in few words the progreſſive method of rigging ſhips ; but there is no one undeviating mode which is pursued, as the nature of the operation is such that all the parts of it may be advancing at the ſame time. We ſhall there­fore take our leave of ship*s* and sh*ip-building* with a few general obſervations on *ſail-making,* which were omitted under the article Sail, referring our readers for farther information to the very elegant work lately publiſhed, in.