present capable of exerting a power of 500 horses, should have been capable of exerting a power of 600 horses, and would in this case have consumed lees fuel, as well as have produced greater regularity and a higher velocity.

The following results are obtained :—

The vessel of less power burns thirty tons per day, per­forms the distance in fourteen days, consuming 420 tons of coals in fair weather.

The vessel of less power burns thirty tons per day, per­forms the distance in twenty-two days, consuming 660 tons of coals, in foul weather.

The vessel of greater power burns thirty-six tons per day, perforins the distance in twelve and one-half days, consuming 468 tons of coals, in fair weather.

The vessel of greater power burns thirty-six tons per day, performs the distance in seventeen days, con­suming 630 tons of coals, in foul weather ; being a con­sumption of sixty-four tons less fuel, and performing the voyage in four and a half days less than the other.

It is manifest that the store of fuel carried in the ves­sel with less power, must on all occasions be equal to the greatest consumption of fuel, that is, to at least 660 tons, whereas 630 tons will be sufficient for the vessel of greater power ; and as in all vessels for long voyages, coals carried are much more costly than the mere price of coals, or as the freight of the vessel is more costly than the fuel, coals carried are to be reckoned at least as ex­pensive as coals burned. Moreover, as the gain in time and in capital is four one-half out of twenty-two, being twenty-five per cent, it is plain that the vessel may be calculated to perform the distance offener in a year; be­cause as the times of starting must always be regulated, not by the shorter but by the longest period of a voyage, seventeen one-half days in the one case, stand in the place of twenty-two days in the other.

As another example, let us take the case of a vessel calculated to stem the monsoon in the Indian seas. A vessel of 600 tons and 200 horse power, steaming in fair weather at the rate of eleven miles an hour, has been found to have her speed diminished by the monsoon to five miles an hour. What would be the best proportion of power in such circumstances?

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Hence we see that the power being increased in the ratio of sixteen to ten, that is, engines of 320 horse­power being substituted for those of 200, the speed on the quick voyage would be twelve three-fourth miles an hour, instead of eleven, the speed against the monsoon increased from five to nine miles an hour, with a saving of coals amounting to forty tons out of 320; and when it is remembered that the voyage for which eighteen days would be required as continual allowance in the one case, might always be calculated on as performed in ten days in the other, the advantage is placed beyond all doubt. It appears, therefore, that for long voyages es­pecially, great advantages in point of economy, certainty, and speed, are to be obtained by the use of vessels of a higher power than usual ; and that, in a given case, the best proportion of power to tonnage may readily be de­termined from the rules already given.

In regard to absolute or definite proportion, it may be stated as the result of the best vessels, that the propor­tion of power to tonnage should not be greater than one horse power to two tons; the greater proportion holding in the smaller, and the less proportion of power in the greater vessel.

*The Proportions, Form, and Mechanical Structure of Steam-Ships—*In the article Shipbuilding, the reader will find the elements of construction of ships developed and applied in a satisfactory and lucid manner. There he will also learn, that naval architecture is scarcely recognised as a science in England. The reader will therefore bo prepared for the announcement that the proportions and structure of steam-vessels is an enquiry which has hardly as yet systematically commenced ; and it is with much hesitation that we set the example of en­deavouring to eliminate from the rude mass of practical truth and practical error, some general results worthy of confidence. We may premise, that the drawing and finding the displacement, centres of gravity, and buoy­ancy, and the calculations of stability, &c., may be per­formed for steam-ships by the methods, and on the prin­ciples developed in the article to which the reader has already been referred.

The proportions of steam-vessels were originally taken from sailing vessels ; the length being three or four times the breadth. Six breadths to the length is now a common proportion. The proportion of depth varies with dimen­sion, being about one-half the breadth in vessels of 100 tons, two-thirds of the breadth in vessels of about 600 tons, and three-fourths of the breadth in vessels of 1500 tons. The qualities of a vessel depending much on its form, it is not possible to deduce a very precise rule for proportion abstracted from shape ; but the following list of dimensions is deduced from a comparison of the di­mensions of the best vessels, and will serve as a standard of reference for the existing state of practice. The fol­lowing are dimensions of flush-decked vessels without poops or forecastle. Where these exist, the depth must bo diminished so as to leave the mean depth the same. Thus, in the table, a vessel of 180 feet long by thirty feet beam, has twenty feet depth ; but with a half-poop she would require to be only about eighteen one-half feet deep.

*Table of Dimensions of Sea-going Steam- Vessels of the best proportions, in conformity with the best practice in. Britain.*

|  |  |  |  |
| --- | --- | --- | --- |
| Length between the per­pendiculars. | Breadth between the paddles. | Depth, hold, and midships. | Tonnage. Old law. |
| 90 feet, | 16 feet, | 7 feet, | 110 tons. |
| 96 | 161/2 | 71/2 | 118 |
| 102 | 17 | 8 | 140 |
| 108 | 18 | 9 | 168 |
| 114 | 19 | 10 | 197 |
| 120 | 20 | 11 | 230 |
| 126 | 21 | 12 | 266 |
| 132 | 22 | 13 | 306 |
| 138 | 23 | 14 | 350 |
| 144 | 24 | 15 | 397 |
| 150 | 25 | 16 | 450 |
| 156 | 26 | 17 | 505 |
| 162 | 27 | 18 | 565 |
| 168 | 28 | 19 | 630 |
| 174 | 29 | 20 | 700 |
| 180 | 30 | 21 | 776 |
| 186 | 31 | 22 | 856 |
| 192 | 32 | 23 | 941 |
| 200 | 33 | 24 | 1044 |
| 205 | 34 | 25 | 1136 |
| 210 | 35 | 26 | 1231 |
| 216 | 36 | 27 | 1240 |
| 222 | 37 | 28 | 1455 |
| 228 | 38 | 29 | 1576 |
| 235 | 39 | 30 | 1712 |
| 240 | 40 | 30 | 1838 |
| 250 | 40 | 30 | 1923 |
| 300 | 50 | 40 | 3590 |