The form of the ship, of Course, affects very materi­ally its qualities, and the choice of proportions to produce those qualities. The dimensions in this table apply to vessels of fine proportions, having a fine entrance and run, and a side nearly upright. If however the area of the load-water line be very large, the vessel will be un­easy even with these extreme dimensions; and in such a case the beam in the table is rather excessive, while the height might probably he augmented without incon­venience. Again, if the midship section of the vessel be very square, or merely rectangular, these dimensions will suffice. If however the bilges be round, and the sides slope outwards, more breadth may be usefully em­ployed, so as to leave the breadth at. the load-water line nearly equal tc, or rather greater than, the beam given in the table.

River steam-vessels are, in this country, and especi­ally on the Thames, made of great length in proportion to beam. Some of the swiftest river boats have their length equal to seven, eight, nine, and even ten times their beam, with advantage. In America they often have twelve times more length than breadth.

*The Form of Steam-Vessels.—*To determine the best form of a steam-ship may appear to be a much simpler case of the great problem of naval construction, than the formation of a sailing vessel. The principal desideratum in a steam-ship being the power of going fast through the water in the single direction of the propelling power, this case of the problem appears to approach much more closely to the construction of a solid that shall receive the least resistance in passing through the water, than to the case of the sailing vessel, which has to work with a propelling power which is generally in some other direction than that in which the vessel is designed to make way. In this point of view, the problem of the steam-ship is really a simpler case of the general pro­blem than that of the sailing vessel. If, however, the steam-ship is also to be a good sea boat, and to work on some occasions under canvass alone, as well as under steam alone at other times, the problem at once assumes an aspect more complex than that of either problem taken by itself.

There is, however, a single fact which is important, as it very much simplifies the subject. Vessels built expressly for the purpose of steaming, and adapted for that purpose in the best possible way, have been found, when under canvass, to equal the fastest ships in sailing qualities. Their great length and fine ends prevent them from falling to leeward ; their fast for­mation adapts them for going through the water; their boilers and machinery form a well placed and well distributed ballast: their fine ends and flaring bows render them lively as sea boats ; and the small amount of their midship section, and small resistance, give them great speed under comparatively little can­vass. This practical fact, that a vessel formed exclu­sively for steaming, and adapted for that alone, in the best possible manner, is found to be a good and fast ship under canvass, greatly facilitates the enquiry con­cerning the best form of a steam-ship. To this we now add another confirmatory fact, that the fastest schoon­ers, cutters, smugglers, yachts, and slavers, approach more nearly to the form of the best steamers than any other class of sailing vessels. The problem of the best form of a steam-ship becomes thus not only simpler, but doubly interesting, from the reflex influence it may be expected to produce on sailing ships.

It is difficult, without going into minute technical details, to explain the peculiarities in the shape of the best steam-ships. The present state of practice shows that systems perfectly opposite are adopted by different builders. It is at all times difficult to convert into ver­bal statistics forms so delicate and complex as the sur­faces of double curvature formed by the bottom of a . ship ; but the following considerations of a general na­ture may probably he intelligible.

In the formation of steam-ships, it has been stated that there arc opposite schools. One adopts and advocates a sharp bottom, a great rise of floor, great beam, exten­sive bearings on the surface, round sides, round water­lines, adopting altogether the formation of a full, espa­cions, stable, sea-going ship, only employing such dimen­sions and proportions as me given in the table of di­mensions already produced. Another school adopts a flat bottom, long floor, more angular bilge, upright sides, straight entrance, clean run, sharp ends, comparatively small moment of stability, formed with the idea of going directly through the water in all weathers with the least proportion of resistance, and the smallest change of po­sition. A third school, of recent origin, adopts the hollow­wave lines and new formation, of which the principles have been established by the writer of this article. The fastest steam-vessels of the present day are built on this principle.

The question of form may be taken up under several heads.

*The Transverse Section, or Midships* The simplest

and one of the earliest sections of a steam-vessel is the rectangle, fig. 26. the bottom being flat, the sides vertical, and the bilges almost angular. This form is rendered necessary when the breadth of the vessel over the paddles is to be rendered as small as possible. But this form, although it gives the greatest capacity when the breadth and depth of water are limited, is at once weak at the bilges, liable to crankness, and uneasy nt sea. To re­medy these evils, the bilges have been rounded, and the floor sharpened, in order to give more easy lines on the bottom, and an easier bilge, as in fig. 27.

And again, this method has been carried to an extreme, or with the intention of producing the best possible sea boat, by making the floor very sharp, and the sides extremely round, thus :

But such boats are both unstable at sea, and pitch most violently. The next modes of construc­tion have had for their object to pro­duce the greatest capacity with the least material, and least surface of adhesion to the water. For this purpose semicircular and elliptical bottoms have been tried, thus: