But both of these, and especially the former, although well suited for fast steamers, have a great tendency to oscillate continually, and roll with great latitude at sea.

It appears from experience, that there is great difficulty in determining that section of vessel best suited to a steam-vessel. The rectangular figure first given is, as we have said, at once weak, and crank, and uneasy. The sharp­ening of the bottom, as in the figures which follow it, removes the engines up from the floor, and effectively diminishes the height of the engine-room, as well as ren­ders the vessel crank, by raising the centre of weight, and of the engines, &c., too high ; and if, to counteract this evil, the beam at the surface of the water be increased as in the third section, the vessel is rendered laborious, un­easy, and ineffective at sea by the excessive beam. Again, in the round bilges the vessel swings like a pendulum, and it seems as if her oscillating would never stop. From the multitude of practical experiments which have come under our notice, we are led to the following con­clusions.

1. That the existence of a fixed mass in the shape of engine and boilers, renders the usual mode of deter­mining the midship section of a ship inapplicable to steam-ships; and that the form must be determined with immediate reference to these. 2. That the engines of a vessel of 300 horse power occupy a space of about 2/3 of the beam of a ship, which necessarily is perfectly flat ; and that the engine can only be firmly connected with this floor of the ship by being placed as directly in contact with it as possible ; and further, that the weight of the said engine must be placed as low as possible, on account of the place of the paddle-wheel; all of which desiderata can only be obtained by making the floor of the vessel parallel to the bottom of the engine. Hence the bottom of the ship should be nearly flat across about 2/3 of her beam, thus:—B to B, fig. 31, nearly flat, E E the engines. 3. That no displacement is desirable on each side of the engines beyond what is required to give an easy turn to the bilge ; for it is found, as indeed it should be expected, that all displacement on each side of the engines, at the lower part of the bilge, being vacant space, or very inefficient stowage-room, is not only wasted, but tends to impair the stabi­lity and sea-worthiness of the vessel : and, further, the engines being placed low, a species of stability of the most valuable nature is ob­tained. 4. That there are two ways of obtaining sta­bility ; one by having the weight of engines and boilers as low as possible, which is obtained by the means already described, and by depth in the water ; the other by considerable beam. Now, beam in excess is one of the worst features of a steam-vessel. It produces a rolling oscillation, when the wind is in any degree on the beam, which impairs exceedingly the action of the paddles ; it gives a species of roll, which is at the same time most distressing to passengers, and most injurious to the ship. All these bad effects are diminished, and can alone be corrected, by obtaining stability as far as possible from depth of the centre of weight rather than beam, according to the midship section already given.

*The Water Lines.—* Opinions on the subject of water lines, or on the degree and manner of fulness or fineness which the ends of a vessel should possess in reference to the middle, are as various as the deviatione which one may conceive possible from any given shape. When with these we combine the differences of opinion concerning midship sections, which differences must also affect very materially the form of water line, we get into a labyrinth of difficulties, in the intricacies of which the good qualities of a steam-ship are so often lost.

Full round ends, convex outwardly at the bow, full above at the stern, and fine enough below to steer well, so rendering the form as like as possible to an American cotton ship, with a long straight narrow body in the middle; such a form has been introduced for steam-ves­sels, in the hope that the vessels, by having a small midship section and great buoyancy, might be easily propelled through the water. Even when they are made seven times as long as broad, we have seen vessels of this class turn out failures. They have, in the first place, been crank, in the second place wet, in the third place slow, and in the fourth place weak; for, by having too much bearing at the ends, and too little where the chief weight is to be supported, viz. in the middle, they have invariably bent down in the middle, and risen up at the ends.

Full round ends, combined with a full round midship section, are a modification from which much has been expected, as forming a ship of large capacity. This has been one of the worst and most extensive errors perpetrated in the construction of large steam-ships. The great breadth along the whole water line, arising from the full lines, gives an excess of superficial sta­bility, which, with a cross sea, causes the vessel to roll violently, with an extent and abruptness of motion which the round form of the section has no tendency to prevent or retard. Then the full ends of the vessel pre­vent her speed through the water, and increase her mo­tion in a heavy sea, by increasing to excess her longitu­dinal stability. In the next place, if the ends of the ship be used for stowage, it is plain that the great mass of matter at the two ends must render the ship labour- some, or the reverse of lively, according to the nautical phrase; and the ship will less readily obey the helm. Such are some of the evils which, in many instances, and those especially in steam-ships of the largest class, have been seen to result, and which necessarily must result, from the full and round-bodied vessel used in steam navigation.

These are not all the evils of the full form. The stowage of such vessels is by no means effective in pro­portion to the weight, capacity, and displacement of the ship. In the first place, by giving much space on both sides of the engine-room, a very inferior species of stow­age is obtained to that which results from additional length of hold. Next, the stowage-room in the end of the ship, for which so much speed is sacrificed, cannot be made effective without rendering the ship unseaworthy and unmanageable ; for it is notorious, that in order to rectify the erroneous fulness for which so much is sacri­ficed, the ends of the ship are bulkheaded off to obtain the valuable quality of liveliness. First, then, fulness is obtained at a sacrifice of speed and seaworthiness for some supposed advantage in capacity, &c.; then, that very capacity is rendered ineffectual by the injudicious mode of its application.

An opposite school from this recommends the long straight centre body of a ship, with rectangular sections and sharp, fine, wedgelike ends. This form possesses the advantage of email transverse sections, and gives great stowage ; it is an easy sea boat, and is lively from its fine ends. The principal fault in this form of vessel is its liability to crankness—its weakness at the bilge. Many of the finest steam-ships belong to this class.

The last class to which it is necessary to make a par­ticular reference, are the steam-ships recently constructed on the wave-lines, or the hollow entrance line—on the principle which the writer of this article, by experi­ment and by example, has laboured to introduce. The