

THURSDAY, NOVEMBER 21, 1872

## MR. BESSEMER'S SALOON STEAMER FOR THE CHANNEL PASSAGE

THE prevention of sea-sickness by means of a swinging cabin has nothing novel about it, but the originality and inventive merit in the suspended saloon devised by Mr. Bessemer, and now about to be actually constructed in a ship specially designed for it by Mr. Reed, the late Chief Constructor of the Navy, are of the highest order. The association of those names is in itself a sufficient guarantee that the idea will be carried into execution with complete security as respects the safety of the passengers and the seaworthiness of the ship, and a full knowledge of the scientific principles involved.

Persons suffering from sea-sickness complain not only of giddiness arising from themselves and everything about them being continually in motion, but also in particular of a qualm which comes over them every time the ship, or the part of it on which they are standing, is descending, sinking, as it were, from under their feet. An approach to this qualm is commonly felt in a garden swing during the descent, and also in jumping from considerable heights. There can be very little doubt that this is due to the fact that the intestines are then wholly or partially relieved from their own weight, and therefore exercise an unusual pressure against the stomach, liver, and diaphragm. This pressure produces the qualm, and its rapid and frequent alternations cause sufficient irritation to produce in most people sea-sickness, and in some persons more serious effects. Physiologists are by no means agreed as to how much of sea-sickness is due to this cause, and how much to the reaction upon the stomach of the brain-disturbance, due in part, perhaps, to the actual motion of the head, but largely to the optical effect of the motion. It is pretty certain that all these causes contribute to produce the effect of sea-sickness. It is beyond doubt that they all aggravate it.

Mere swinging cots or small cabins go but a very little way to remedy any of these evils. Even if suspended in two directions, like a compass or barometer upon jimbals, the translatory motion, whether up or down, or to and fro, remains wholly unaltered, and even the oscillatory motion is not got rid of, but only altered in character, being reduced to a minimum at a point near the middle of the ship. The distressing effect upon the eye of the relative motion of surrounding objects also remains. These effects will not be wholly eliminated by Mr. Bessemer's invention; but some of them will be very much reduced, and it remains to be seen whether the reduction is sufficient to get rid of the sickness.

The design, as settled by Mr. Bessemer and Mr. Reed, includes the construction of large steam vessels of light draught, 350 feet long, 40 feet beam, drawing 7 feet of water, and worked by two pairs of paddle-wheels. In the middle of each of these is provided a well, or hole, for the reception of a saloon 70 feet long, 20 feet wide, and 20 feet high, constructed so as to form a box girder in itself, and suspended at its extremities upon a pair of trunnions, on which it can turn, so that it may be kept steady as the vessel rolls from side to side. The saloon is not allowed to swing quite freely, but its motion is controlled by hy-

draulic machinery, acting either upon a rocking arm or a tangent bar (it does not appear as yet which has been selected), which enables a man to regulate its position at his discretion. This man sits opposite a spirit level, and, by merely turning a handle which opens certain valves, can keep the bubble of the spirit level at zero, so as to keep the saloon virtually upright at all times. The chief novelty of the invention consists in two points—the great size of the swinging cabin or saloon, and the controlling of its motion by hand, instead of trusting to self-adjustment. Both these are very important improvements on the simple swinging cabin.

This attempt to neutralise the motion of the vessel addresses itself to one phase of motion only, namely the rolling. Mr. Bessemer makes no attempt at correcting either the translatory part of a ship's oscillation, or the pitching. He considers that in large vessels such as he proposes to use, both these motions will be small, and not sufficient to cause sickness when once the rolling motion is got rid of. We think there is very much to bear out his view of the case; but we also think that, considering the difference which always exists between experimental and actual circumstances, and especially when we bear in mind that the plan does not correct the whole of the motion, its absolute and entire success is not by any means to be looked upon as a certainty.

The experiment recently made at Denmark Hill must be regarded rather as showing the efficiency of the hydraulic apparatus for regulating the motion, than the effect of its being so regulated.

In the regular heaving of the sea, after the wind has blown sufficiently long to cause regular waves or swell, each particle of water describes a circle in a vertical plane. At the surface, the diameter of these circles is the whole height of the wave from valley to crest. These circles rapidly diminish in size as their depth below the surface increases. Taking into account this diminution, as well as the effect of a ship's breadth, it is certain that the ship will not follow this circular motion at all to the same extent as a cork floating on the surface. In moderately heavy weather, it is probable that in such a ship as is proposed by Mr. Bessemer, any fixed point could describe a circle of five or six feet in diameter, quite independently of any rotatory (or rocking) motion. It is much to be regretted that the model at Denmark Hill was not mounted on a crank or eccentric, so as to combine this motion with the simple rocking, and to ascertain how far it remained as a cause of real uneasiness, when the rocking had been eliminated.

It is to be observed that a level does not give a fixed direction when a ship is moving upon waves. Apart from any rolling of the ship's own, it gives, when its centre is describing a circle uniformly, not the direction of actual gravity, but the resultant of gravity and of the centrifugal force. In fact, instead of being horizontal with reference to the earth, it is horizontal with reference to the effective wave surface. But as this is also the direction with reference to which a man has to balance himself in sitting or standing, it tells us what is practically, though not actually, the upright, and therefore is probably a better guide than a truly vertical or horizontal line.

It must not be supposed that the feeling of the deck sinking under one, or the motion which produces this

effect, is an actual translatory motion shared by the whole vessel. By far the greater part of it is due to rocking about some centre (whether fixed or instantaneous), at some distance from the passenger, just as a boy moves really up and down on a see-saw, while the plank simply rocks about a fixed centre. A very large portion of the apparent motion of translation will therefore be cured by neutralising the rocking; and so far as rolling is concerned, we have no doubt that all rocking will be effectually cured. Even as regards pitching, we are disposed to think that in large vessels this is seldom very troublesome when there is pitching and nothing else. It is the combination of pitching with rolling which is so difficult to bear; and we have reason to know that a vessel's pitching is almost invariably accompanied with a roll of very considerably greater amount than the fore and aft motion. Apart from the much more confused and distressing character of the combined motion, we think that the pitching would be found to be a much smaller effect than is commonly believed, if the rolling were wholly got rid of.

On the whole, while we are unwilling to commit ourselves to any prophecy, either of complete success or of partial failure, we think very favourably of the proposal. As a mere scientific experiment it is one of the very highest interest. As a practical design it offers a sure prospect of realising a large part of its intention, and a fair prospect of attaining a high degree of success. We feel confident that it will save a great many who would otherwise suffer, from being sea-sick at all, but we can hardly hope that there will not be sufficient residual motion in very heavy weather to cause some degree of uneasiness to very sensitive persons; nor would we venture to predict what will be the numerical reduction in the proportion of persons relieved from sickness, or the amount of alleviation to those not wholly saved from it.

It remains to say a few words on the question of safety. The inquiry of the timid will be, What if anything goes wrong? How will you control this great moving mass of 150 or 200 tons if a valve should give way or a pipe burst? The answer is immediate. In case of accident, the saloon would simply be disabled from moving independently of the ship, and the worst that could happen would be that the passengers would not get the relief desired, but would simply be as in the saloon of an ordinary vessel, and with much better ventilation. Even if the machinery broke down badly, it would be the work of a moment for those in charge to jam the saloon most effectually, so as to make it a fixed part of the ship. The hydraulic machinery is similar to that which has been for a long time used by Mr. Bessemer in controlling large masses of molten iron, and has, therefore, been fully tested and shown to be efficient.

#### SCIENCE IN CEYLON

A SUPPLEMENT to a recent number of the *Ceylon Observer* contains the first address of the new Governor of Ceylon, his Excellency the Right Hon. W. H. Gregory. On the opening of the session of the Legislative Council, his Excellency proposes to take a vote of 50,000 rupees for the commencement of a Museum of Natural History and Antiquities. The cost of the building when

completed in the rough is to be 80,000 rupees. He says, "the want of a museum in which may be represented the natural history, antiquities, and industrial products of the island has been forcibly urged on me by persons of all classes. For a comparatively small sum, considering the object in view, a museum may be constructed, which shall not be a mere random collection of miscellaneous objects, but a scientific teaching exhibition. To carry out thoroughly our purpose, it will be necessary that the head of the institution should be a person competent from knowledge and scientific training to arrange in proper sequence the various specimens as they come in, to give information to the student, and probably to give lectures occasionally on the different branches of the collections, such as on the principles of classification, the habits, instincts, and economical uses of each class." The salary of the Director to be appointed is to be a liberal one, in order that a man of high acquirements may be induced to undertake the task. The archæology of the island is to be well represented in the museum, and to contain reproductions of the many ancient inscriptions therein existing in the form of photographs, casts, and hand copies. The collection generally is to be strictly confined to the products of Ceylon. New regulations are to be made for the management of the forests and to prevent the present waste of timber, for the carrying out of which foresters are to be appointed. A hope is expressed that the cultivation of cinchona will be extended. The soil and climate of Ceylon are peculiarly adapted to the growth of this plant, Ceylon samples of bark fetching a higher market price than similar ones from Ootacamund. It is also hoped that the production of tea may be taken up by the planters. Silk may, perhaps, also be added to the productions of the island. The mulberry tree grows quickly and vigorously in Ceylon, the worms are reported hardy and to thrive well; but difficulties arise from the want of patient and skilled hands in the winding of the silk. The dried cocoons would probably have to be sent to Europe to be spun, as they are at present in largely increasing quantities from various parts of the East. Regulations are to be made for the preservation of game, *i.e.*, deer, elk, buffaloes, and pea-fowls, not for the benefit of the sportsmen, but for that of the native population.

The natives complain that bodies of strangers enter a district, drive into a narrow compass and shoot down and wound large quantities of deer, the flesh of which is dried, carried away, and sold; that this wholesale destruction goes on at all seasons; and that the breed of buffaloes is deteriorating by the slaughter of the wild males. The tame buffaloes are, in Ceylon, turned out loose into the jungle when not employed in the paddy fields or elsewhere, and interbreed with the wild ones. During the whole of the Governor's journeys in the northern and eastern provinces he saw only two deer and heard one pea-fowl, although riding over ground where, a few years previously, all kind of game abounded. We think the Governor was unlucky in his experiences. There are still plenty of peacocks to be seen about Trincomalee, at least where we lately came across upwards of thirty in one afternoon. It is still extremely desirable that the wanton destruction of game should be put a stop to. A close time is to be enforced, and driving prohibited except by the inhabitants of a dis-