

The fourth is a kind of accident occurring through a variety of causes. Machinery can often be repaired at sea, as duplicates of many parts are carried; but in many cases it cannot. Cylinders crack; air pumps, piston rods, or condensers break, and the engine is rendered useless. The *Aurania*, of the Cunard Line, broke a connecting rod, which smashed the cylinder, and she drifted about until picked up by tugs. A paddle boat usually has two engines, and unless the main shaft breaks she can go

of *Paris*, a twin screw, is opposed to this theory, but that I will discuss later on.)

Collisions have recently become a source of terrible disasters to all iron ships, and here the utility of the twin screw, is seen. In a single screw, protection is sought by means of cross bulkheads and double bottoms. The former often fail for want of strength to resist the pressure of a large body of water, and they are pierced by doors which there is no time to close in a panic or in a great emergency.



FORWARD CORNER IN GRAND SALOON, EMPRESS OF INDIA.

ahead slowly with one engine, or even with one paddle; but in a single screw, if one cylinder is disabled the others are useless, because the steam passes from the high pressure cylinder through the intermediate into the lower and thence into the condenser. But in a twin screw the total breakdown of the engine only involves a diminution of speed; the chances of both breaking down at the same time are, of course, infinitesimal (It may be said that the accident to the *City*

Double bottoms are a great protection when a ship strikes on a sandy, or level bottom, but they are no protection against sharp rocks. In collisions between two iron ships, one usually escapes, if she has a strong collision bulkhead near her bows, but the other sinks in a few minutes, as has been illustrated in the case of H. M. ships *Victoria* and *Camperdown*. The *Polynesian* and *Cynthia*, met end on near Longue Point below Montreal. The collision bulkhead saved the