

stilling an area of disturbance in the open sea or other exposed waters. Similarly it is efficient in the protection of shores liable to erosion. This system has been adopted with success in America, notably by the Standard Oil Company at El Segundo, California. Its resultant effect is to produce an area of still water by means of the ejection of air from perforated pipes laid on the sea bed. At El Segundo the pier, as built, was 4000 feet long, and in the winter of 1914-5 a length of nearly 2000 feet of it was washed away. In this instance the submerged perforated pipes subsequently laid for its protection were served by existing compressors, and a shield or wall of air, rising from the bed of the sea to the surface, was created. This air reef neutralized the sea disturbance, producing sufficient tranquillity to permit vessels to load or discharge at the pier in stormy weather.

From installations already carried out the cost of the application of the system appears to be about £2 to £4 per lineal foot.

It is obviously only necessary to put the apparatus in operation in rough weather. When the sea or other exposed area of water is naturally tranquil, craft can lie alongside a jetty or quay to discharge or load, without let or hindrance. On the approach of doubtful or stormy weather, the compressed air is switched on and still water results. A ship at the jetty thus lies surrounded by broken water, but in a lagoon of safety.

The applications of the air method are varied. Not only is it available for protecting shipping made fast to a pier in the open sea or otherwise, but it can be used during the construction of sea-walls, piers, lighthouses, &c., to produce artificial tranquillity, and thus enable operations to be carried on undisturbed. Stranded vessels can also be protected from the pounding action of the waves, and round lighthouses or lightships a tranquillized area of water, as occasion demands, can be created.

The cost of operating the apparatus is small. At El Segundo, during a heavy winter storm, the plant was in operation for twenty-three hours at a cost of £12.

One important application of the system is that of protecting