SAND TRAVEL IN HARBORS.

At the Birmingham meeting of the British Association a paper by Ernest R. Matthews, entitled "Harbor Projections and Their Effect Upon the Travel of Sand and Silt" was read to the Engineering Section. The author pointed out that any seaweed projection on a coast has the effect of arresting or more or less checking the travel of the sand, whether the projection is a groyne extending to low-water line, a breakwater, a harbor pier or arm of 1,000 ft. in length, or a natural promontory extending some miles from the coast line. In the case of harbor arms extending at right angles to the coast, this obstruction (especially on a sandy shore) impounds the travelling material on one side and often causes serious erosion on the other side. The sea-front at Yarmouth, Shoreham, Lowestoft and other places has extended seaward during the past half-century, the first mentioned, at an average of 300 ft., due almost entirely to the construction of the harbor.

At Madras (India) 650,000,000 cu. ft. of sand have accreted on the south side of the harbor within a distance of three miles of the harbor, and 450,000,000 cu. ft. of land has been eroded in the north side within a similar distance. The Madras authorities are now contemplating an extension of the harbor seaward at an estimated cost of about $15,000,000 in order to reduce the extent of the silting of the harbor.

The only method of escaping from the impounded material seems to have been to periodically extend the arm of the harbor further seaward, as proposed for Madras. This means a tremendous cost, and the results are often not satisfactory, for as the pier is advanced the shore also advances. It has been suggested that openings should be left through the shore ends of the harbor arms, for the sand to pass through. This is not practicable, for immediately the travelling material passes through the opening the wave behind it does not possess sufficient force to move the material through, especially where the width of the harbor is considerable.

The author suggested that in order to modify this trapping of the sand the piers should not run out at right angles to the coast, or approximately so, but on the side facing the direction of the travelling material should project from the coast at an angle of 45 degrees. The additional area thereby enclosed by the harbor piers could be utilized, among other purposes, for that of wharfage. The travelling material would, he stated, pass around the harbor projection if the plan of the harbor was on these lines, and would supply the coast on the lee side of the harbor with a natural protection of sand and shingle.

In another paper, entitled "The Transport and Settlement of Sand in Water and a Method of Exploring Sand-Bars," and illustrated by experiments, Dr. John S. Owens dealt with certain phenomena accompanying the movement of sand in water.

Sand ripples were shown travelling under the influence of a current; the grains being swept by the current from the back of the ripple and deposited on its face, the ripple-form moved forward with the current by a process of erosion of its back and accretion of its face. This was demonstrated by means of a trough with semi-circular ends and a longitudinal partition in the middle, thus forming two channels. The water was made to circulate up one channel and down the other, and the movements of the ripples were seen on the sand forming the bottom. The formation of quicksands was illustrated by means of a tank containing ordinary sea-sand, and it was shown that when water was caused to flow upwards through the sand the latter acquired all the properties of a quicksand and swallowed heavy bodies placed thereon. The effect of obstacles lying on a sandy bed in the path of a current was demonstrated by means of a model. Stones, models of piles, and improperly made groynes were placed on sand in the path of a current in a small glass tank, and localized erosion around the obstacles resulted in each case owing to the deflection and increased local velocity of the current. The curious effect of suspended matter on the specific gravity of water was illustrated by means of a glass cylinder containing water in which sand was shaken up; it was shown that while the sand was suspended the specific gravity, measured by a floating hydrometer, was raised above that of water. The influence of such a rise in specific gravity in increasing the intensity of impact of the water, and consequently its erosive power, was indicated.

A tall glass tube filled with water was exhibited, and in this bodies of different shape were allowed to sink; in every case, whether discs, rectangular plates or rods, the bodies settled in the position offering the greatest resistance to movement. It was shown that this property might result in more rapid settlement in running than in still water, and also in a cleavage in sedimentary rocks.

A model of an instrument for exploring sand-bars and river-beds, which was also shown, consisted of two tubes arranged concentrically, connected at the top, but separate at the bottom. A cock-and-hose attachment was fixed on the upper end of the inner tube, and a second cock, with a spout, communicated with the top of an annular space between the two tubes. At the bottom the inner tube ended a short distance above the end of the outer tube. Water, if forced down the inner tube, must pass out at the bottom when the cock to the annular space was closed; in this case the instrument sank if placed on a sandy bottom. When at any desired depth the cock to the annular space was opened the water returned up the outer tube, carrying a sample of the sand with it, and delivering the sample from the spout. By means of this instrument the depth and nature of bars and shoals might be easily ascertained.

HAMMERED PISTON RINGS.

If the rings on a piston are not accurately turned and ground, so as to make a steam or gas-tight joint between it and the cylinder walls, the efficiency of the engine will be impaired, power will be lost, and consequently fuel will be wasted. If the tension of the ring is not approximately the same at every part it will exert greater pressure in one direction than in another; the cylinder will be worn out of shape and soon require re-grinding or re-boring. Further, an unevenly-tensioned ring produces friction, and so causes loss of power.

A special form of piston ring which is claimed to possess many advantages is being made by a patented process, by which the rings are of the same thickness throughout their periphery; and as they are machined concentric, they are seated uniformly in the grooves provided in the piston. Special plant is, of course, necessary for the manufacture of the rings, and a patented system of hammering is used whereby, it is stated, the spring action of the concentric rings can be reduced to a minimum without affecting their efficiency. The result of the hammering is to ensure a perfectly even and constant pressure on the walls of the cylinder. The rings, which are of cast iron, are accurately ground after hammering and are supplied ready for use.