

The paper was illustrated by diagrams showing the most important products derived from coal, and the apparatus for coal-tar distillation and timber-preserving; also by tables, giving the properties of coal-tar products and other substances, of timber-preserving specifications, and of more than one hundred references to various authorities upon the topics alluded to in the paper.

## Miscellaneous Notes.

**PIPES MADE OF STEEL PLATES.**—Pipes made of steel plates are coming into use in England for the conveyance of water under high pressure. The plates are coated with lead on both sides by immersion or otherwise, then rolled to form, rivetted, soldered the whole length, and covered with pitch. Of this method the first cost, it is said, is not much greater than that of iron, and the steel pipes possess considerable advantages over those of iron.

**A [HIGHLY ELEVATED RAILROAD.**—The Pike's Peak Railway, which will be in operation next year, will be the most notable piece of track in the world. It will mount 2,000 feet higher than the Lima & Oroya Railway, in Peru. It is now in operation to a point over 12,000 feet above the sea level. The entire thirty miles of its length will be a succession of complicated curves and grades, with no piece of straight track longer than 300 feet. The maximum grade will be 316 feet to the mile, and the average grade 270 feet. The line will abound in curves from 500 to 1,000 feet long, in which the radius changes every chain.

**THE CORINTH CANAL.**—The Isthmus of Corinth has been disturbed from its sleep of centuries, and is now the scene of very active engineering operations, a new town, called Isthmia, of at least 200 houses and stores, having risen on the shore of the Gulf of Ægina. The dredging of the approaches of the canal has been commenced on each side at the rate of some 5,000 cubic metres of sand and soil every 24 hours, while great numbers of workmen are employed on the central portion, the conveyance of the material being provided for by a railway of 15 kilometres in length, four locomotives, and 150 tip-waggons. Two large dredging machines have also just arrived from Lyons, which will work to the amount of 13,000 cubic metres per day.

**TAMPING WITH PLASTER OF PARIS.**—Plaster of Paris makes a very efficient and safe tamping, the peculiar advantage being the abolition of the tamping bar and the consequent danger of explosions resulting from its use. The plaster is mixed to the proper consistency with a little clean, dry sand and poured into the hole. With proper attention the tamping will set in a few minutes, and little more time is required than for tamping in the usual way. It is also found that in many cases the placing of an elastic cushion of some compressible substance just above the cartridge produces good effects. All danger of cutting the fuse in tamping is also removed entirely by the use of plaster of Paris.

**THE REFRACTION OF WAVES.**—At the Birmingham meeting of the Physical Society, on May 10, Professor J. H. Poynting exhibited an experiment designed to illustrate by means of water waves the refraction of waves when they pass from one medium to another in which the velocity is different. The apparatus consisted of a tank 2 ft. 6 in. square with a plate glass bottom. Water is poured into the tank to a depth of, say, 5 or 6 millimetres. The lid of the tank consisted of a calico screen and was slightly tilted up. A naked lime-light placed under the tank threw on to the screen a picture of the waves in the water. Plate of glass 3 or 4 millimetres thick were placed in the tank, thus reducing the depth of the water. If waves were now sent across the tank they travelled more slowly across the shallower water over the plates and were seen to be refracted. When circular or lenticular plates were employed it was easy to show that the refracted waves converged to a focus.

**SANITATION IN NEW YORK.**—An interesting experiment is just now being made in New York with a view to the utilization of the street sweepings and house refuse of that city. A large machine has been erected by a stock company at the East River Wharf of the street cleaning department, which sifts and reduces to its elements all refuse of whatever descrip-

tion, which is brought to it. The average amount of stuff which is brought to this wharf is estimated at 40 loads per diem, but it is claimed that the machine could deal with more than three times that amount in a working day of 10 hours. By an ingenious arrangement all scraps of paper, rag, coal, cinder, glass, iron, &c., become separated, these are afterwards sold, with the exception of coal and cinder, which are used for firing the engine. The projectors estimate that every load of 1,800 pounds of refuse contains about 400 pounds of coal and cinder which is more than sufficient for their own purposes. The residuum refuse is cremated and the ashes are discharged into the sea. So far, it is said, the experiment has proved an entire success, and the promoters announce their intention of having machines at every city wharf to utilize all the refuse of the street cleaning department with profit to themselves and the city. Should these anticipations prove well founded a solution will be offered of a problem which has long perplexed New York. The system of the disposal of refuse which now prevails is most unsatisfactory, the whole of it being carried some way out to sea in scows and then discharged. Year after year the pilots raise warning cries respecting the enormous injury which is being to the harbour's mouth by the accumulation of ashes and street dirt there, and a radical change of method has long been sought.

## INVERTEBRATES OF THE TALISMAN EXPEDITION.

In a communication to the French Academy, Dr. Paul Fischer observes, that, during the voyage, attention was directed especially to determining whether the deep-sea fauna of the tropical seas is peculiar to the geographical region, or derived by emigration from arctic seas. By dredging in a north and south direction in the eastern Atlantic, and comparing the results from different latitudes with those obtained by others in northern seas, it was hoped to arrive at a satisfactory solution of the problem. The line upon which work was done extended from the mouth of the Charente, over thirty degrees of latitude, to Senegal.

It is known that the superficial and abyssal faunas of the seas of tropical Africa differ greatly. The genera are not the same: their respective assemblages have no parallel relations. If the remains of these two contemporaneous faunas were fossilized, it might be supposed that they belonged to two different epochs, or represented the population of two uncommunicating seas. The abyssal fauna of the coasts of the Sahara, Senegal, and islands of Cape de Verde, contains a number of mollusks common to the arctic seas which have an immensely wide distribution. Such are *Trochelia bernicieiensis*, *Chrysodomus islandicus*, *Scaphander puncto-striatus*, *Lima excavata*, *Malletia obtusa*, *Limopsis minuta*, *Syndosmya longicollis*, *Neaera arctica*, *N. cuspidata*, *Pecten vitreus*, and *P. septem-radiatus*. These range from Iceland and Fmarmark, or northern European seas, in comparatively shallow water, southward to various points on the line, terminating at Senegal. A blind *Fusus* was dredged in over twenty-five hundred fathoms. These instances are sufficient to show the extension of arctic forms into tropical regions, but with these are found a great number of mollusks yet unknown in the North Atlantic. The abyssal fauna of the African coasts is therefore not composed solely of arctic immigrants. Lovén has shown that the arctic species range at greater depths as they advance southward,—a fact confirmed by other naturalists, and by the researches of the Talisman party. It is probable, therefore, that the idea now generally entertained by malacologists is correct, that the range of these animals is determined by temperature rather than by the intensity of light or other factors. The investigations of the Talisman have considerably enlarged the number of Atlantic stations for mollusks reputed peculiar to the Mediterranean. Among these are *Cassidaria tyrrenna*, *Umbrella mediterranea*, *Xenophora mediterranea*, *Carinaria mediterranea*, *Pyramidella minuscula*, *Pecten pes-felis*, *Spondylus*, *Gussoni*, and a number of others. Dr. Fischer concludes that the Mediterranean has very few peculiar species, and appears to have been populated in great part by colonists from the Atlantic, after the geological period in which communication with the Indian Ocean was cut off.

Lastly, the expedition obtained some of the remarkable forms first signaled by the U. S. fish-commission from deep water in the North Atlantic, among which may be mentioned *Pholadomya arata*, *Mytilimeria flexuosa*, etc.—(*Science*.)

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