

monuments of the great skill of the Egyptians in transporting material and in masonry construction. The largest of these puzzling structures contains about 82,000,000 cubic feet of masonry and weighs over 6,000,000 tons.

In Egypt we also find a fine example of municipal engineering belonging, however, to a much later date than the works just mentioned. Alexander the Great employed Dinocrates as engineer to lay out the city of Alexandria. This city, with its population of 600,000, had all the advantages of its splendid situation, and Dinocrates also constructed important harbour works. The streets of the city were laid out at right angles to each other and there was an admirable water supply. Each dwelling had a reservoir supplied with Nile water, and these reservoirs and their supply pipes being lined with cement may be seen in many places at the present day.

China, that country of which we know so little, can show many engineering works of great antiquity. We have all heard of the Great Wall, begun by Che-Hwang te in 214 B.C., and the Grand Canal in the north-east over 700 miles long. In China also is the Sangan bridge, the longest in the world, $5\frac{1}{4}$ miles long and having 300 piers. This bridge may certainly be called a permanent structure, as it has been in existence over 800 years. In the mechanical branches of engineering also China was early at work. Printing was invented in 593, and was thus known 900 years before the time of Caxton.

But ancient engineering was at its zenith during the Roman Empire. Begun in the earlier years of the Republic the public works were ever increasing in magnitude; and, if they had only been required to withstand the effects of time only, we should have many more examples of beautiful masonry construction. As it is, however, we can see how thoroughly skilled the Roman engineers were in

bridge building and masonry of all kinds, hydraulic engineering, road-making, sanitary engineering, and surveying. The permanency of their work is shown by the proposal to utilize some of the piers of Trajan's Bridge over the Danube in a new bridge to be built at the same place. This bridge was built 120 A.D. and consisted of 20 semi-circular arches, the span of each being 180 feet. The dome of the Pantheon, 142 feet in diameter, now nearly 2,000 years old, is often cited as an instance of the suitability of concrete for such structures. The Colliseum, covering an area of over 6 acres and capable of seating 70,000 persons, shows the greatest skill in the design of every detail with elaborate water supply and sanitary arrangements. It would take too much time to describe the numerous magnificent bridges constructed by the Roman engineers. Their waterworks with aqueducts, settling-ponds, filter beds, flow-off chambers, and leaden service pipes, and their splendid public roads are examples worthy of careful study even now by all who have similar works to carry out. The great sewers and their connections are amongst the earliest sanitary works still in existence. But the most remarkable works are the two tunnels which drain the Alban Lake and Lake Fucino respectively, and one of which belongs to the earlier period. As all readers of Roman history will remember when, about 398 B.C., the Romans were besieging Veia, the waters of the Alban Lake rose so high as to be a source of danger to Rome. After consulting Apollo through his Delphian Oracle the Romans learned that Veia would be taken if the waters of the lake were drawn off to the sea. Accordingly they set to work and within a year a tunnel was driven. This tunnel, 6,000 feet long, penetrated a mountain composed of the hardest lava. To expedite the work