



chapter three

The Maintenance of Empire

Keeping the Road Open



▲ 16th Century Mughal manuscript illustration showing the Red Fort in Agra, India being built.



▲ Detail from the Emperor Trajan's Column in Rome. It shows a bridge built over the Danube by the Roman armies during the period when Trajan (53-117 CE) extended the Roman Empire into the regions north of that river.



With the rise and expansion of empires there was a need to administer and police them efficiently. Fast lanes of communication were essential in order to control these huge territories. The formidable empire of Cyrus the Great of Persia (559-530 BCE) had the earliest network of highways. The so-called Royal Road ran 2,700 kilometres from Susa near the north of the Persian Gulf westwards to the Tigris and then across Syria to Ephesus on the Aegean coast. All along the way it was serviced with inns and relay stations. These roads were not really designed for merchants and travellers but were mainly military and administrative highways. However, their existence inevitably helped the growth of trade.

The Chinese built an elaborate system of highways and canals which, as well as transporting goods, were important for the administration of the empire. Later, the Mongols used these and the Silk Route generally to administer their empire, with an efficient messenger service running between the cities and caravanserais (roadside inns) along its paths. The highway system constructed by the Romans across their vast empire was so well made that many stretches still exist today and formed the basis of Europe's and the Middle East's modern highway system. Their network of splendid roads extended over some 80,000 kilometres.

In other areas of civil and mechanical engineering, Roman skills lay in the construction of huge public buildings such as amphitheatres, baths, basilicas, bridges and aqueducts. They built complex fortifications and ports, vital for protecting their communications and trade. Their use of concrete from the Second Century BCE enabled them to build stronger and bigger buildings than before. They developed the use of the arch, the vault and the dome, which enabled them to span ever greater areas.



Via the Byzantine Empire (the name given to the Eastern Roman Empire from 610), the Arabs inherited many of the Roman methods of construction in their Islamic empire, combining them with knowledge gained from their Iranian territories. In later centuries as their military architecture developed, especially during the Crusades from the Eleventh to Thirteenth Centuries, there was much cross-fertilization between Islam, Byzantium and the West. Ideas passed from one region to another as improvements in siege techniques called for matching improvement in defences. Paradoxically, technological exchanges took place in the very areas where Islam and Christianity confronted each other. For example, the Islamic development of a 'machicolation' gallery projecting over the gateway, with holes in its floor through which boiling oil could be poured onto the heads of attackers, was used much later in castles as far west as Ireland.

▲ *Illustration from a Chinese scroll dating to the early Qing dynasty (1644-1912). It shows the building of a dyke. The Chinese undertook many huge engineering works, including the Great Wall and an extensive network of canals.*



◀ *View of the crusader castle of Krak des Chevaliers in Syria, built during the 12th and 13th Centuries. The Crusaders adopted many of the Arabic ideas for fortified buildings.*



Arms and Warfare

Military architecture needed to become ever more sophisticated to withstand the use of more powerful weapons. People have always been remarkably inventive when it comes to developing new weapons. There has always been a need for an advantage over enemy forces, to kill more people at greater distances.



▲ Bronze sculpture of a Parthian bowman using a composite bow. He has just fired one arrow and is pulling out another from his quiver.

► Illustration from a 16th Century manuscript showing cannon being used by the Ottoman army during their siege of a Hungarian fort.



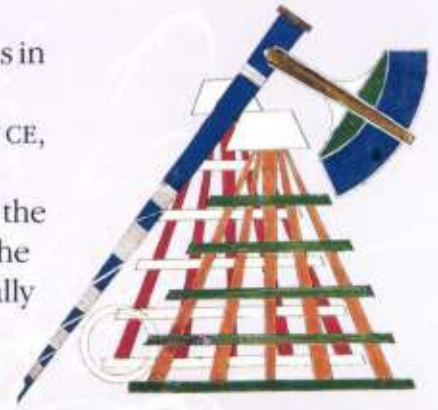
The history of gunpowder clearly illustrates the exchange of ideas in arms and warfare that took place by means of the trade routes. Gunpowder was first invented by the Chinese in the Ninth Century CE, not as a weapon but as an elixir of immortality. The first use of gunpowder in warfare occurs in 919 when it was used as a fuse for the ignition of a Chinese flame-thrower. Gunpowder made possible the later invention of guns and cannons. The gun proper was eventually developed in China sometime during the Thirteenth Century – a bronze hand gun dating from 1288 has been excavated in north-eastern China.

The spread of knowledge and use of gunpowder westwards took place in a number of stages. In 1265 an English scientist and Franciscan monk named Roger Bacon (c. 1214-c. 1294) first described gunpowder being used in a type of firecracker. This information may have reached him through his friend and fellow Franciscan William of Rubrouck who returned from a mission to the Mongol capital of Karakorum in 1256.

Many foreigners were welcomed and employed at the courts of the Mongol emperors. Knowledge of devices such as cannons, bombs, grenades and rockets may have reached Europe through merchants like Marco Polo, while Muslim military experts took service under the Mongols specifically to learn eastern methods of warfare. In 1340 cannons were used by the Muslims at the battle of Tarif in Spain. The first battle in northern Europe in which cannons are reported to have been used was Crécy in northern France in 1346.

There were great advances in gunpowder technology in Europe during the Fifteenth Century and a number of European adaptations of Chinese weapons were exported back to China. For example, the Portuguese *culverin*, a development of the Chinese breech-loader, reached China by about 1510. In a similar way, the *serpentine* may originally have been a Chinese invention. It was developed into the matchlock musket or arquebus either by the Turks or the Europeans. The Chinese probably saw it again in its new form in about 1520, introduced by the people of Central Asia.

The design of many other weapons throughout history have followed this same pattern of give and take. For example, a powerful missile-thrower called a trebuchet entered the Islamic armoury from China by way of Central Asia towards the end of the Seventh Century. Similarly, the extremely powerful composite bow, invented by the nomads of Central Asia, became part of the armoury of both the Chinese and Persian armies. They also adopted later innovations made to the bow by the nomads.



▲ Illustration of a 14th Century Turkish trebuchet. This was a device for hurling heavy missiles, like a giant catapult. Its use was adopted throughout Europe.



▲ Illustration of a collection of arquebuses, one at the bottom being demonstrated. It comes from a 16th Century work called *The Book of Arms*.