fixed in the same way as the flint of modern guns. The wheel lock was invented in Italy early in the sixteenth century; it was moved by a chain, and wound up like a watch to prepare it for use. Sometimes the single lock had two cocks, each of which was placed at the same time against the wheel, which was not fixed in the gun, but was fitted in a groove when ready for firing, and was generally carried in a velvet bag.

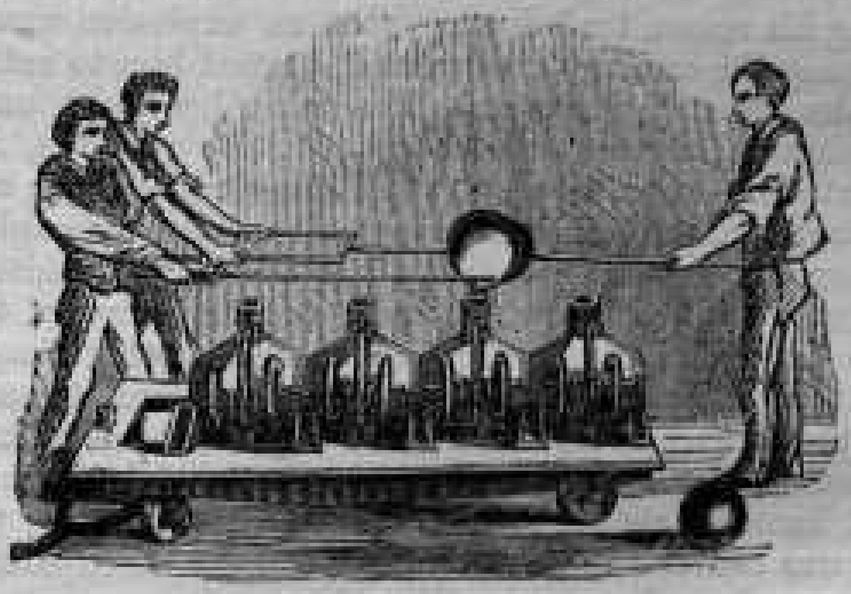
In an age of mechanical invention and improvements many changes have been introduced into the manufacture of fire-arms; but the essential parts—the metal tube from which the shot or shell is to be expelled—still remains, and Roger Bacon's projectile force, gunpowder, still remains also. The old-fashioned musket has yielded precedence to the rifle—a lighter, more convenient, and more certain weapon of destruction. Rifle barrels are grooved within from the muzzle to the breech in a spiral line, so that as the bullet is expelled, it receives a rotary motion. The rifle-bore is employed in the manufacture of some of our largest guns—the Lancaster for example—and in other pieces of ordnance. When the rifle-bore is employed, a conical ball is generally used, as it is found to follow a truer course, every atom being carefully balanced in the air with far greater certainty then is the case with a spherical ball.

Pieces of heavy ordnance are made of cast iron, or of gun metal, a mixture of tin and copper. They are cast solid, and subsequently bored by machinery. They are chiefly used to throw solid round shot of cast iron: the weight of these determine the character of the gun as a sixteen or thirty-two pounder. There is a smaller species of gun called a carronade, also used for throwing round shot. "Howitzers" and "mortars" are used for throwing shells.

The whole, or nearly the whole, of our modern warfare—rifles, cannons, long ranges, and the like—depend on the use of gunpowder. Take away this terrible compound, and all the ordnance ever cast, all the rifles ever bored, would be less useful than the club of the savage.

The military and civil branches of the Office of Ordnance

have been established at Woolwich since the accession of George I., when a singular train of circumstances led to the fixing on this spot for the naval and military depôt, formerly called the Warren, but now the Royal Arsenal. The original foundry possessed by the Government for casting brass guns and howitzers was established in Upper Moorfields, London, near the site of the Tabernacle where John Wesley preached; and which, from the circumstance of his having before preached beneath a shed in the foundry itself, was formerly called by that name. The operation of casting the guns was then, as it still is,



CASTING SHELLS AT WOOLWICH.

an object of curiosity; and many persons even of the higher ranks occasionally attended to see the process of running the fluid metal into the moulds.

About the year 1716, when Colonel Armstrong was Surveyor-General of the Ordnance, it was determined to re-cast the unserviceable cannon which had been taken from the French in the successful campaigns of the great Duke of Marlborough, and which had hitherto been placed in front of the foundry and in the adjacent artillery ground. Upon the appointed day, a great concourse of persons assembled to witness the operation, among whom were many of the nobility, general officers, &c., for whose reception galleries had been prepared near the furnace.

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