

THE WHEEL-LOCK GUN

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Government efforts to suppress the spread of advances in firearms technology are not unique to the twentieth century. In this article, Yale history professor Thomas F. Arnold details the social and military impact of the invention of the wheel-lock pistol. This article was originally published in the Autumn 1995 issue of MHQ (formerly known as Military History Quarterly), and is reprinted by permission.

The assassin, waiting on horseback in a wooded grove, marked his approaching target: François, duc de Guise, nicknamed “Scarface,” who was the leader of the ultra-Catholic faction in the Wars of Religion just starting to tear France apart. The year was 1563. The lurking killer’s weapon, a wheel-lock pistol, had been a novelty in France just twenty years before. As Guise and three companions, all mounted, passed between two large walnut trees, the assassin, a French Calvinist, rode up close behind, swiftly presented his pistol, and fired into the duke’s back at point-blank range, fatally wounding him.

It was the first notable assassination by pistol in history and the most outrageous manifestation yet of a threat to law and order recognized since the pistol’s invention early in the century. Standard military firearms—the long-barreled matchlock harquebus and musket—were heavy and bulky, requiring two hands at all times to carry, load, and fire them. They were poor weapons for criminals. But the short-barreled wheel-lock pistol could be loaded in advance, easily hidden under a cloak or in a deep pocket, and then aimed and fired with one hand.

These characteristics inspired some of the first attempts at gun control. In 1517 the Holy Roman Emperor Maximilian I prohibited the manufacture or possession of “self-striking hand-guns that ignite themselves”—language that could only be describing devices with wheel locks. King Henry VIII of

England, an enthusiastic collector of pistols himself, attempted in 1537 to severely restrict the ownership of guns less than two and a half feet in length, stock included. His heirs repeated the effort. Queen Elizabeth issued four proclamations against overly handy firearms between 1575 and 1600, each progressively stronger in wording. Elsewhere in Europe, other rulers and regimes similarly tried, but failed, to control the pistol. Crime had entered the gunpowder age.

But the same qualities (compact size, one-handed use) that made the pistol the perfect weapon for cutpurses and highwaymen—not to mention assassins—also made it ideal for the mounted soldier, and in the course of the sixteenth century the wheel-lock pistol revolutionized cavalry warfare. As early as 1496, enterprising captains had raised special units of mounted harquebusiers (analogous to existing companies on horseback armed with crossbows), and these units became more numerous from the mid-sixteenth century. Troopers could even fire the cumbersome weapons from horseback, and one illustration shows an expert rider giving a Parthian shot with a long-barreled gun, shooting to his rear on a swiftly moving horse. But this equestrian demonstration must have required the horsemanship of a Turk—if not a centaur—and such skills were never in wide supply. In general, harquebus-armed horsemen and their descendants, eventually known as dragoons, were really mounted infantry, habitually dismounting to shoot it out with the enemy. As such they were valuable troops, especially for cavalades and ambushes, but in most battlefield situations they could hardly be counted as cavalry.

What the mounted man needed was a firearm operable with only one hand, leaving his other free to maintain control of his mount. The technical breakthrough came with the marriage of the wheel-lock firing mechanism to an exceptionally short barrel and stock, resulting in the pistol (a contemporary coinage, probably Czech in origin). The exact time and place of the wheel lock's invention are unknown, but the best evidence points to sometime around 1510 in the workshops of southern Germany, famous for their expertise in manufacture of arms and armor and

in clock making—this last a critical skill, because the wheel lock was essentially a clockwork mechanism. (At least one noted wheel-lock gunsmith was also a clockmaker.) Many of the earliest wheel locks, rare and curious pieces in their time, were artfully incorporated into traditional weapons, fitted inside the shaft of an armor-cracking poleax or the stock of a crossbow—or even hidden within the handle of a dagger. Such applications, besides hinting at unreliability, reveal the extraordinary nature of the first wheel-lock devices: these were exotic weapons for bodyguards and the best-accounted men-at-arms. But soon the wheel-lock pistol was a developed weapon in itself, with a griplike stock clearly designed for one-handed use.

How did the wheel lock work? The key element was a palm-sized, serrated wheel that was attached, via a short chain of three links, to a powerful leaf spring made of steel. Using a wrenchlike tool called a spanner, the wielder cranked this wheel counterclockwise, bending the spring until the wheel engaged a catch linked to the trigger. Pulling the trigger then released this catch and allowed the spring to spin the wheel, which protruded through the bottom of a priming pan filled with fine gunpowder. The mechanism also automatically retracted a lid covering this pan, allowing the spinning wheel to scratch against a lump of the mineral iron pyrites, producing a shower of sparks and setting the piece off. The loading of a wheel lock remained unimproved over other firearms of the day: powder, ball (or balls—three were used in Guise's assassination), and wadding were pushed down the weapon's bore with a short ramrod; then the loader filled the priming pan and depressed the cock. But unlike other firearms, once loaded the wheel-lock pistol could be tucked away and held until drawn and fired. Until its widespread replacement by the flintlock (which required no wheel, relying instead on a flint to spark the charge) after the mid-seventeenth century, the wheel lock remained the only practical pistol mechanism.

However, the ingenious wheel lock was not without disadvantages. If left spanned too long, the mainspring could conform to its bent position and refuse to drive the wheel. In

1645, during the English Civil War, the Parliamentarian general Edmund Ludlow left a wound-up pair of pistols overnight, and found them unusable in helping him fend off a dawn attack. In addition, early gunpowder was an inefficient, dirty explosive, and a wheel lock soon clogged with corrosive, gritty residue. Besides necessitating constant maintenance, this could be very dangerous—a stray spark might explode a dirty lock packed with incompletely burned powder. And period gunpowder, often of uncertain potency, was hazardous in other ways. Determining a given pistol's correct charge with a given powder could be tricky, encouraging undercharging for safety's sake. In 1582 an overcharged pistol used in an assassination attempt on William I, prince of Orange, burst in its Catholic wielder's hand, maiming the firer (it blew his thumb clean off, so that the assassin was unable to use a dagger, his second weapon) and doubtless affecting the force of the bullet—which was fired at such close range that the discharge set William's beard and hair on fire, ironically cauterizing a head wound that his doctors believed would otherwise have killed him. (Two years later, a better or luckier assassin gunned William down with a triple-shotted pistol fired to the belly.) Finally, the clockwork wheel lock was much more expensive, both to purchase and to repair, than the far more common and mechanically simple matchlock, and for that reason the wheel lock's military application remained largely limited to cavalry pistols.

Despite its deficiencies, the wheel-lock pistol became the mounted man's standard weapon in the second half of the sixteenth century. Cavalry progressively abandoned the lance, and even the sword became secondary. The new-style trooper—the pistoleer or cuirassier (armored from head to knee)—relied on a brace of massive pistols carried in saddle holsters on either side of his mount's shoulders, with a third gun often tucked in the top of his right boot (some riders managed to pack four or even five pistols). Though still one-handed weapons, these guns were not for weaklings: a typical cavalry-style wheel-lock pistol, made in Dresden in 1584, weighed just under five pounds, and it fired a .65-inch lead ball. Besides being murderous at close

range, such pistols were easier to aim than a lance, and were certainly far handier in a close-pressed action.

For defensive purposes, the better-equipped pistoleer retained a nearly full set of armor, including a visored helmet, only exchanging the lower leg pieces for stout boots. This change in equipment accompanied a social change as well. In the late seventeenth century, a grumpy Englishman—echoing the sentiments of Don Quixote, tilter at windmills—noted that “the ancient distinction between the Cavalry and Infantry, as to their birth and breeding, is wholly taken away,” leaving horsemen, like foot soldiers, nothing more than “the Scum of the Commons.”

The abandonment of the knightly lance for the newfangled pistol naturally entailed a transformation in tactics. The first uniformly armed and armored units of pistoleers appeared in Germany around 1545. Known, as “black riders” for their fashionably blackened armor, these horsemen were as famous for their indiscipline off the field—plunder, mutiny, rapine—as for their discipline in battle. They and their imitators popularized a new style of cavalry warfare that depended on regular formations, a practiced cohesion in movement, and the particular attack drill known as the caracole. On the battlefield, pistoleers marshaled themselves in deep formations, typically fifteen or sixteen ranks. To execute the caracole, the entire formation halted, and then each rank in turn trotted forward to within pistol range of the enemy, whereupon each trooper fired his piece and immediately wheeled left (the pistol being held and fired with the right hand), the rank as a whole swiftly returning to the rear of the unit to re-form and reload. When properly conducted, the caracole must have been terrible to behold, as much a piece of clockwork as the pistols each rider carried. It could also be directed against pike-armed infantry—ending a long-standing near-invulnerability to cavalry.

Such maneuvers, however, required long practice and practically perfect discipline. Contemporaries considered the many things that could go wrong: riders naturally tended to fire and wheel prematurely; many pistols failed to fire at all; and

most troopers—as many as 80 or 90 in a company of 100, according to one expert—neglected to load their pistols with a full charge, since a fully charged pistol was both potentially dangerous and difficult to control when fired (there were said to be cases of troopers blowing the ears off their mounts).

Seizing upon such criticism, historians have gone so far as to characterize the pistoleers as “degenerate cavalry.” But that goes too far: there were real advantages to the new troopers and their tactics. For example, pistoleers did not depend on the speed of their horses to give impetus to their attack, as did lancers. Therefore, pistoleers—mounted on much cheaper horses, not an inconsiderable benefit—could be packed more closely together (giving an advantage in manpower against an equal frontage of a dispersed opponent), and they could maneuver and fight at the trot or even at a standstill. It also meant that their formations did not naturally fly apart in the attack, as galloping cavalry almost always did. Though their trademark tactics were undoubtedly exacting, by introducing disciplined drills and maneuvers the pistoleers ensured cavalry’s place on the gunpowder battlefield.