

# H-Net Reviews

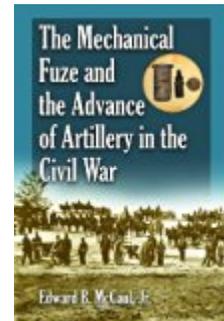
in the Humanities & Social Sciences

Edward B. McCaul Jr. *The Mechanical Fuze and the Advance of Artillery in the Civil War*. Jefferson: McFarland, 2010. 227 pp. \$35.00 (paper), ISBN 978-0-7864-4613-1.

Reviewed by Justin S. Solonick (Texas Christian University)

Published on H-CivWar (April, 2011)

Commissioned by Martin P. Johnson



## Advances in Artillery during the Civil War

Historians debate various aspects of the nature of the American Civil War. Although veterans reflecting on the struggle in the late nineteenth century recognized the transitional character of the war, more recent historians disagree over its place on the spectrum of modern warfare. Some, such as Edward Hagerman (*The American Civil War and the Origins of Modern Warfare* [1988]), suggest that the fighting signaled the beginning of modern conflict. Meanwhile, British historian Paddy Griffith, in his book, *Battle Tactics of the Civil War* (1987), argues that the Civil War was in fact the last of the Napoleonic Wars.

Unfortunately, this debate rests on a limited number of dated professional histories that examine military technology. With academics disregarding the material aspects of military history, the pillars of these larger disagreements rest on a shaky and incomplete foundation. Yet, over the years, some scholars have successfully taken the history of Civil War military technology to new levels of sophistication, writing histories that broader audiences can appreciate. For example, Robert Bruce's 1989 study, *Lincoln and the Tools of War*, describes Abraham Lincoln's fascination with technology and the endless number of inventors who passed through the White House attempting to gain fame via their martial contraptions. While artillery briefly figures into Bruce's book, it remains a smaller component of a larger study about the wartime president and his acceptance of technological innovation during the war. As a result, complicated micro issues, such as variations in artillery ordinance, remain neglected, leaving unanswered the question of the

impact of Civil War weapons systems on both the battlefield and the home front.

It is this gap in historical knowledge that Edward B. McCaul Jr.'s book, *The Mechanical Fuze and the Advance of Artillery in the Civil War*, fills. McCaul accurately describes the Civil War as a transitional war and sets forth a multifaceted thesis centered on the impact of the mechanical fuze on warfare. Advances in metallurgy and the widespread use of rifled artillery during the war placed heavy demands on the projectile technology of the era and signaled the transition to a more modern war. According to McCaul, "the lethality of modern ordinance is, in large part, dependent upon the effectiveness of its fuzes. It was during the American Civil War that modern fuzes were extensively used for the first time in combat.... By the end of the war, fuzes had evolved to become more dependable even though they were not as reliable as the military desired. Still, the fuzes created during the war were the basic design of all artillery fuzes until the advent of the variable time fuze during World War II" (p. 4). This aspect of Civil War history, though neglected for many years, yields volumes about various facets of the war. The Union, with its larger manufacturing base and ability to machine intricate parts, was able to surpass the Confederacy in making fuze technology a functioning reality. Ultimately, while the North produced superior mechanical fuzes that added to the deadly nature of Civil War combat, "the new fuzes were a victim of their own success in that they raised expectations beyond what could be achieved.... The combination of ri-

fled artillery and new fuzes made the Civil War a much deadlier war, one in which there was no safe place on the battlefield” (p. 9)

McCaul successfully guides the reader through the cluttered technical ground of Civil War mechanical fuze technology. The author begins by describing the composition and grain-size variations of different types of gunpowder propellants. According to McCaul, on the eve of the Civil War, gunpowder technology was relatively advanced and powder manufacture remained strictly controlled throughout the war. This quality control, in turn, made mechanical fuzes during the Civil War superior to those used during the Napoleonic era. After establishing the state of wartime gunpowder, the author discusses the benefits and drawbacks of smoothbore versus rifled artillery, arguing that advances in the latter made the Civil War battlefield a deadlier arena than previous wars. “Ultimately, the effectiveness of deadly long-range fire was dependent upon a new generation of artillery fuzes” (p. 45). Thus, rifled artillery demanded the mechanical fuze, which, in turn, contributed to the Civil War’s high rate of casualties.

Subsequently, McCaul emphasizes late nineteenth-century manufacturing and artillery’s combat performance during the Civil War. By the time war broke out in 1861, Americans had honed the craft of interchangeable parts that came to characterize the “American System.” As a result, technical ideas became a battlefield reality. But, while this new martial technology proved revolutionary in effect, it was the result of an evolutionary process. Often the battlefield provided an onsite proving ground prompting inventors and manufacturers alike to tweak their ideas in order to meet military necessities. Ultimately, the Union, controlling the majority of the nation’s industry located in the Northeast, outproduced the Confederacy in many areas, including in the manufacture of mechanical fuzes. “The states remaining under Union control throughout the war,” McCaul argues, “were well-prepared for the difficult task of manufacturing military equipment that required high-precision machining, to include fuzes.... The Civil War was as much a manufacturing war as a physical war, and the Union’s superior industrial capability allowed it to produce fuzes and other items needed to make artillery a truly effective weapon” (p. 56). After discussing the infrastructure necessary to build fuzes, McCaul assesses their battlefield performance, writing that “the mechanical fuze made it possible for rifled artillery to fire a projectile that would dependably explode at a longer range.... [It] was the key to making rifled artillery a truly effective weapon.... When combined with rifled artillery, fuzes changed warfare and

increased the effective killing zone” (p. 83). But, as with many inventions, fuze technology reached a plateau during the war. Although concussion and combination fuzes solved the timing problems of their prewar paper counterparts, inventive genius surpassed the mechanical realities of the era. In short, inventors solved many of the problems that battlefield tests yielded on a theoretical level, but they could not translate their ideas into tangible reality; for, “in the end ... fuzes were part of a larger system and were dependent upon the proper functioning of the larger system.... The development of [Civil War] fuzes was dependent on the relationship between military need, technical availability, and industrial capability” (p. 120).

Overall, McCaul provides a thoughtful monograph about an often overlooked subject. He successfully guides the reader through a technically complex topic and clearly describes fuze development during the Civil War. In addition, the author successfully navigates the pitfalls inherent in relating the history of an inanimate object. He holds the reader’s interest and does not lose sight of the human element of his history. Readers will come to appreciate the problems that inventors, such as Benjamin B. Hotchkiss, John P. Schenkl, and Robert P. Parrott, faced as they attempted to answer military necessity while at the same time creating their own fortunes.

Yet this history contains several small problems easily solved with further editing and consulting the latest secondary sources. For example, McCaul confuses John Bell Hood’s Army of Tennessee with The Army of the Tennessee; a rival Union army in the western theater of the war (p. 76). In other segments the author draws dated conclusions. For instance, McCaul writes that “the arming of infantry with rifled muskets ... increased the effective killing range from 400 yards for a smooth-bore musket to 1,000 yards for a rifled musket when used by marksmen. Although a Soldier firing a rifled musket could not reasonably expect to hit a man at 1,000 yards, he had a very good chance of placing accurate fire onto the relatively large target of an artillery battery at 600 yards” (pp. 39-40). Although the author supports this claim with evidence from a period artillery manual, he might have considered consulting Earl Hess’s book, *The Rifle Musket in Civil War Combat: Reality and Myth* (2008). Hess, after laborious research, provides numerous primary source examples that question the accuracy of McCaul’s source. Yet these small quibbles do not detract significantly from the overall value of the book. Civil War and military historians alike will appreciate its details and larger connection to the history of technology.

If there is additional discussion of this review, you may access it through the network, at:

<https://networks.h-net.org/h-civwar>

**Citation:** Justin S. Solonick. Review of McCaul Jr, Edward B., *The Mechanical Fuze and the Advance of Artillery in the Civil War*. H-CivWar, H-Net Reviews. April, 2011.

**URL:** <http://www.h-net.org/reviews/showrev.php?id=32430>



This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License.