

Capt. E.G. Uhl fires the first Rocket Grenade Launcher, T.I. May 1942. (*Army Ordnance Magazine* Sept-Oct. 1944)

## The Man Who Didn't Invent the Bazooka And the Men of Inspiration Who Did

by George Kontis PE

Unauthorized to build long range artillery as a result of the Treaty of Versailles, Germany began studying a technology that had not been used by Armies for many years: military rockets. Project leader Captain Dornberger spent the first two years studying the work of amateur rocket enthusiasts, before developing his plan. In 1932 he hired his first engineer, a bright young man named Werner von Braun. The launching of the first V2 was scheduled in just a few months - December 1934.

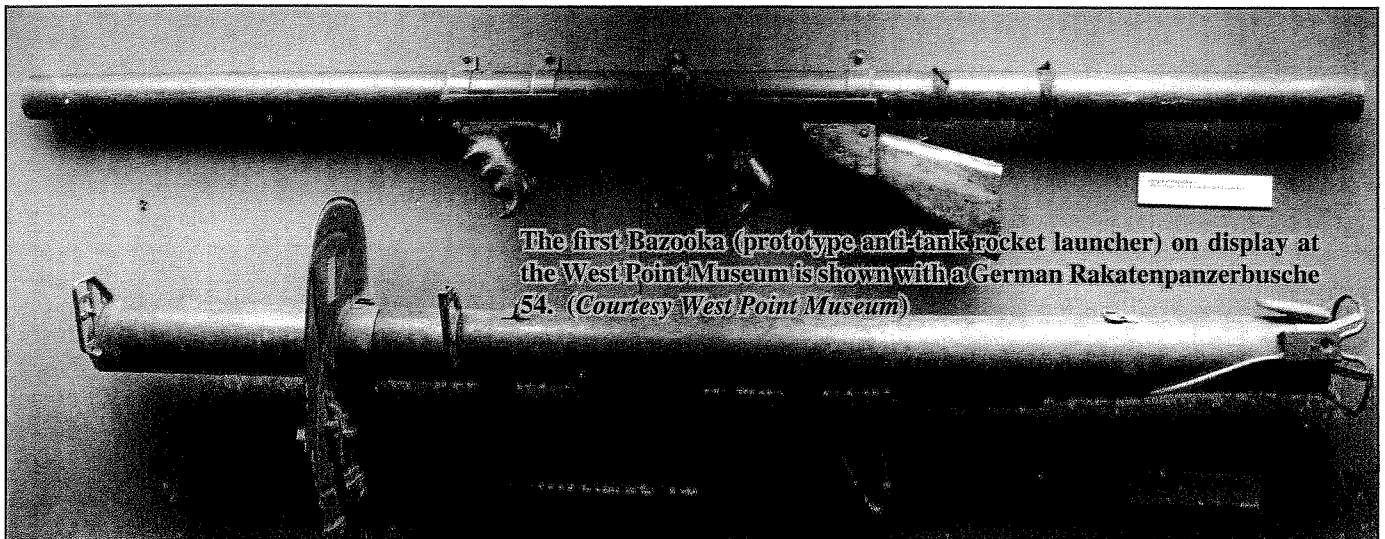
"Ah, there he is" the German Officer muttered to himself, spotting a man who was working around a group of boxes and other curious devices that lay scattered about the ground. The young man was bent over as if trying to record something from one of

*He walked in the direction he thought the sound had come from. Drawing closer to the source, he realized the strange noise had come from one of the firing ranges on Aberdeen Proving Grounds. He hoped that his German Army Officer's uniform wouldn't create any unwanted attention. It was a Saturday, he was there on official business and everybody, including Americans, knew that Germans took long walks on weekends. He played the sound back in his head. He had heard it before but it was back in Germany - from a top secret project that had been initiated by the German high command.*

the boxes. "That sounded like a rocket" he said to the man. "How do you know what a rocket sounds like?" the American fired back. The German Officer responded, "Oh, we've been working on rockets for a long

time." The American, Lieutenant Leslie A. Skinner, didn't respond, but picked up his launch rail and instruments and walked silently away.

The U.S. Army had a rocket program



The first Bazooka (prototype anti-tank rocket launcher) on display at the West Point Museum is shown with a German Rakatenpanzerbusche 54. (Courtesy West Point Museum)

too, and had that German Officer come a bit earlier he would have witnessed its latest development. Thirty-four year old Lt. Skinner had been experimenting with rockets since he was 13 years old, continually refining his designs and test monitoring equipment practically every year since. Lt. Skinner's experiments were known to Aberdeen's base commander, who supported Skinner's hobby by teaching him about the burning characteristics of powders and authorizing weekend use of the firing ranges. It may have been a hobby and unrecognized by the military, but at the time of the encounter with the German, Lt. Skinner had launched more than 900 rockets at Aberdeen, many of which achieved stabilized flight at ranges near 2,800 meters.

Lt. Skinner left Aberdeen in 1933 to pursue a Masters Degree at MIT where his thesis was on rocket nozzle erosion. The moment his thesis was published, Skinner officially joined the ranks of the "nut cases" who thought there was a future in rockets. There were others like him. Rocket technology pioneer, Dr. Robert Goddard, was ridiculed

by the media who called him "Mooney" for the absurd notion that men might travel to the moon on a rocket. Goddard's Clark University co-worker Dr. Clarence Hickman was also criticized, in spite of his brilliant work in exterior ballistics. When Lt. Skinner tried to write about his rocket studies in Army Ordnance magazine, it was refused for publication, ostensibly for reasons of security, but in reality from fear that politicians would focus on this "hare-brained" scheme of the Army's.

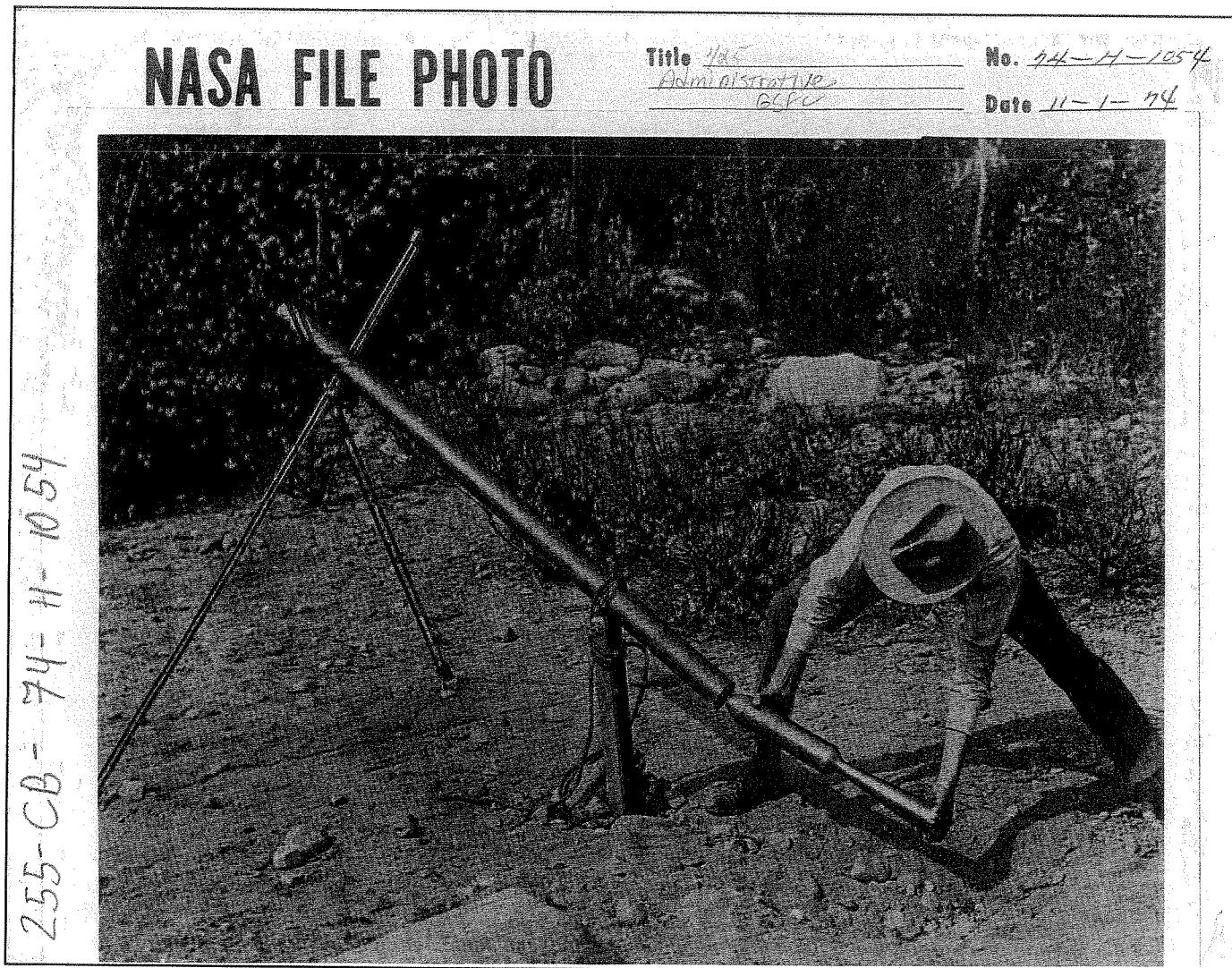
Forgotten by many, was the impressive demonstration that Dr. Goddard and Dr. Hickman conducted for the Army. On 10, November 1918, the pair demonstrated rocket guns that were capable of launching projectiles weighing between 1.4 pounds and 16.5 pounds. These guns were set up on flimsy music stands to demonstrate they could be fired without recoil. Observers agreed at the time that the accuracy and lack of recoil might make this an ideal concept to develop into an anti-tank weapon. Their report did not escape Lt. Skinner who found a copy in Aberdeen's library. He was so

impressed by the work that he contacted Dr. Hickman and opened a dialogue with him that continued right up to the time the two found themselves working together, just a few years later.

Skinner was reassigned to Hawaii in 1938, leaving behind all of his experiments, equipment, successes, and failures in rocket science. It was a good time to reassess where the rocket technology fit in as a military technology. The rocket could be made to fire accurately and could even be man-fired using the rocket gun technology developed by Goddard and Hickman. The major drawback was the rocket's velocity. A sizeable amount of explosive could be launched, but the velocity achieved was not enough to do much damage to the target. At this point, it was a feasible weapon platform that lacked practicality.

When war broke out in 1939, the military set up a National Defense Research Committee (NDRC) to investigate new technologies. Committee member, Dr. Clarence Hickman, insisted that a rocket research group be formed with the addition

**Below: In 1918, Robert Goddard loads a Bazooka predecessor with a 3-inch rocket. (NASA File Photo)**

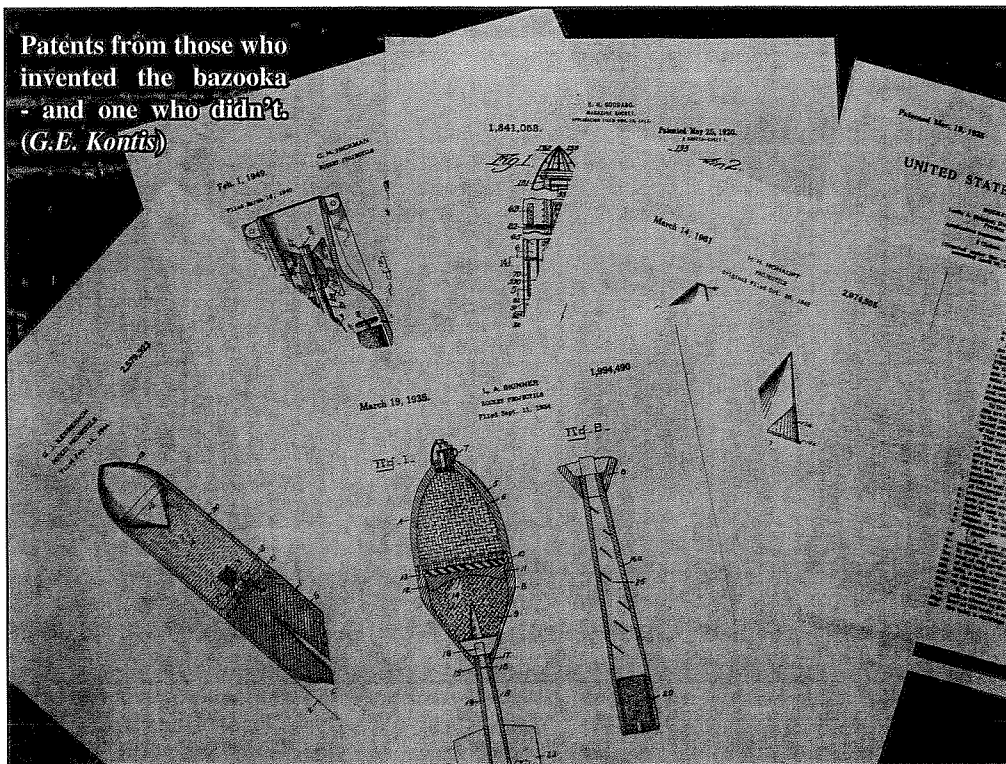


of Lt. Skinner to head up a 3-man "Special Projects Unit." Reluctantly, the Army agreed, but gave Skinner, now a Major, very little support. Every NRDC project had a higher priority so there were no facilities, no funds and worst of all; nobody could tell them what kind of weapons they should be working on.

Major Skinner was undaunted by this lack of interest by his superiors. Three projects made sense to him and he launched out on his own to develop: an artillery rocket, an aircraft launched rocket, and a shoulder fired anti-tank rocket. The Navy expressed some interest in the aircraft rocket, hoping to improve armor penetration by speeding up the bomb with a rocket assist. Consequently, of the three projects, Skinner gave this one top priority, but he was still plagued by a lack of funds and project priority that would allow forgings, castings, and other necessary material to be procured on a timely basis. The major problem, how to obtain rocket motor casings, was solved when Dr. Hickman had the Navy buy them some steel fire extinguishers for that purpose. In early 1941, Dr. Hickman and Maj. Skinner developed a solid propellant rocket that weighed 30 pounds. By May they had test fired rockets that performed far beyond anyone's expectation. As a reward for his success, Maj. Skinner was authorized an additional person for his team. Lt. Edward G. Uhl (pronounced "yule") was a self-starter with solid credentials; a graduate of Lehigh University with a degree in Engineering Physics.

The Skinner/Hickman developmental effort soon resulted in type classification of the M8 Folding Fin Aerial Rocket. Carrying an explosive charge of four pounds to a maximum range of 5,000 meters, the rocket had a four and one half inch diameter - a dimension based on the size of a fire extinguisher. The Army found someone else to develop the rocket launcher, a young Army private, Edwin (Win) Barr. The talented Barr designed an effective launcher that went into production immediately. Barr completed

**Patents from those who invented the bazooka - and one who didn't. (G.E. Kontis)**



his tour of duty and this "Renaissance Man of Small Arms" went on to establish himself in the field of small arms by founding AAI, a company dedicated to research in small arms and other weapons.

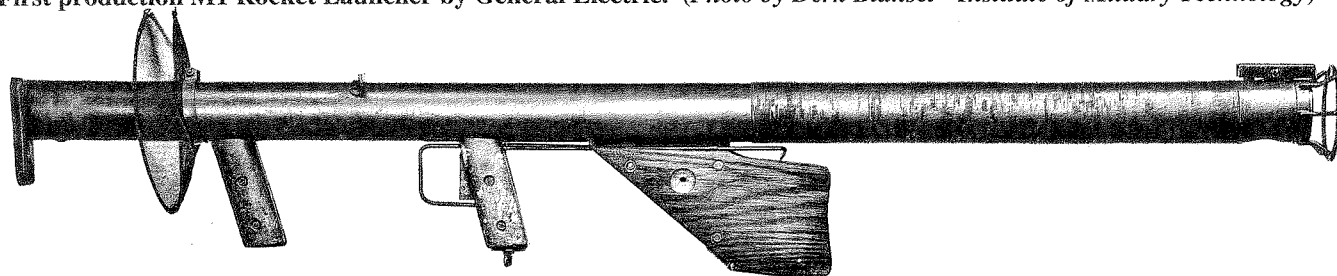
While Private Barr carried the aircraft launched rocket program forward with great success, Maj. Skinner was free to spend more time on the man-launched rocket. He bought some machine tools for his basement shop so he could continue work on this project at home. Lt. Uhl did most of the detail design work on the launcher and rocket while Maj. Skinner concentrated on the bigger problem; how to increase the terminal effect at the target.

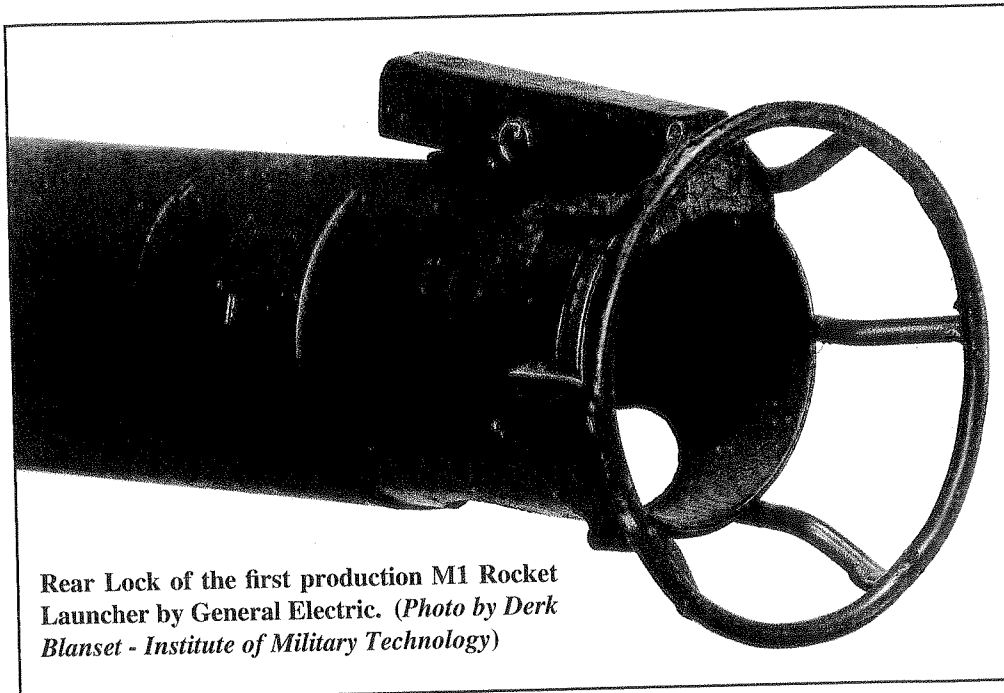
Ordnance Patent Section of the Ordnance Department was a good place to discuss such problems, and Skinner found a willing listener, the civilian patent attorney, Mr. Gregory Kessenich. Due to his position, Mr. Kessenich was well aware of the many armament projects under development, including a top secret project initiated by a young Swiss engineer named Henry H. Mohaupt. Private Mohaupt enlisted in the U.S. Army and worked in the Ordnance Department.

Private Mohaupt had prior experience in putting to practical use, a principle called "The Munroe Effect." While employed at the Naval Torpedo Station at Newport, Rhode Island, American physicist, Dr. Charles E. Munroe, discovered that a hollow cone or cavity in the front end of an explosive charge tended to focus the explosive waves at a single point. Mohaupt knew that "shaped charges," as they are known today, have the ability to penetrate armor far more effectively than a pure kinetic energy projectile. Mohaupt continued this development in the Ordnance Department after informing the Americans that he had already disclosed it to the British and French and had heard the Germans were working on it as well.

Kessenich knew that Mohaupt's design had been successfully demonstrated and that a project was underway to develop an anti-tank grenade. As best he could, considering the top secret classification of the project, he steered Maj. Skinner to this technology. The Army's crash program resulted in the M10 Anti-Tank Grenade. Much time and effort was spent on the design of the grenade, but very little thought was put in to the way to

**First production M1 Rocket Launcher by General Electric. (Photo by Derk Blanset - Institute of Military Technology)**





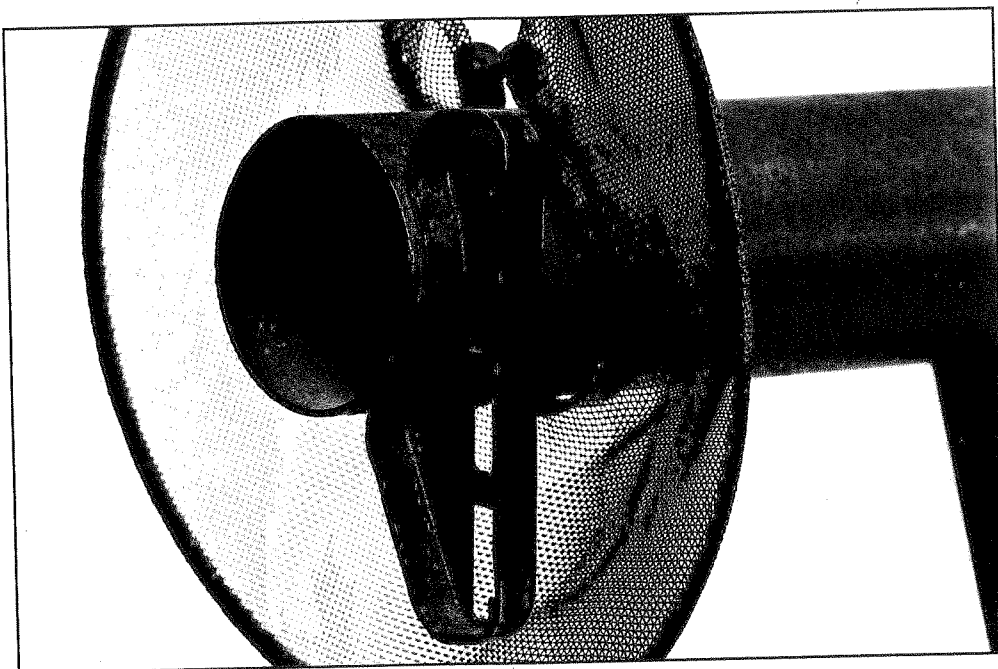
**Rear Lock of the first production M1 Rocket Launcher by General Electric. (Photo by Derk Blanset - Institute of Military Technology)**

launch it. The three pound grenade was too heavy to be fired from a rifle and no other method was found to be practical. In spite of this, the Army ordered the grenades anyhow. Thousands of M10 grenades would soon be coming off the production line with no way to launch them, offering no military value whatever. After realizing their mistake, they rushed to build experimental launchers and even proposed a rocket motor that would launch the M10 from a rail on a rifle. All of these ended in failure.

While Skinner worked on the warhead, Lt. Uhl tried to figure out how the soldier was going to aim and fire the launcher, at the same time keeping the burning power from scorching his face. The problem was solved, as Lt. Uhl later described: One day I was walking by this scrap pile, and there was a tube that was five feet long and 60 millimeters in diameter, which happened to be the same size as the grenade that we were turning into a rocket. I said, "That's the answer! Put the tube on a soldier's shoulder with the rocket inside and away it goes."

Finally in 1942, one of their superiors, Lt. Col. W.T. Moore, saw merit in the shoulder fired launcher being worked on by Skinner and his team and got them some production priority. The first prototype was built by Frankford Arsenal; 54 inches long with an internal diameter of

**Right: Sight and blast shield of the first production M1 Rocket launcher by General Electric. (Photo by Derk Blanset - Institute of Military Technology)**



As luck would have it, that day Aberdeen already had an anti-tank test underway. It was an experiment to test various launch techniques for the M10 grenade. The devices were all being tested against a moving tank target under the watchful eye of a group of generals including Major General G.M. Barnes of Ground Forces Development. Unnoticed by the group, Skinner and Uhl slipped over to the end of the firing line and took up a position at the spot where the tank target made its turn to go back. There had been no time to make a sight for their launcher, so Uhl found some wire and a nail on the range and quickly fashioned one. They loaded the launcher and waited. As soon as the tank came to the turning spot, Uhl fired. The rocket left the launcher with a mighty "whoosh," followed by the resounding thud of

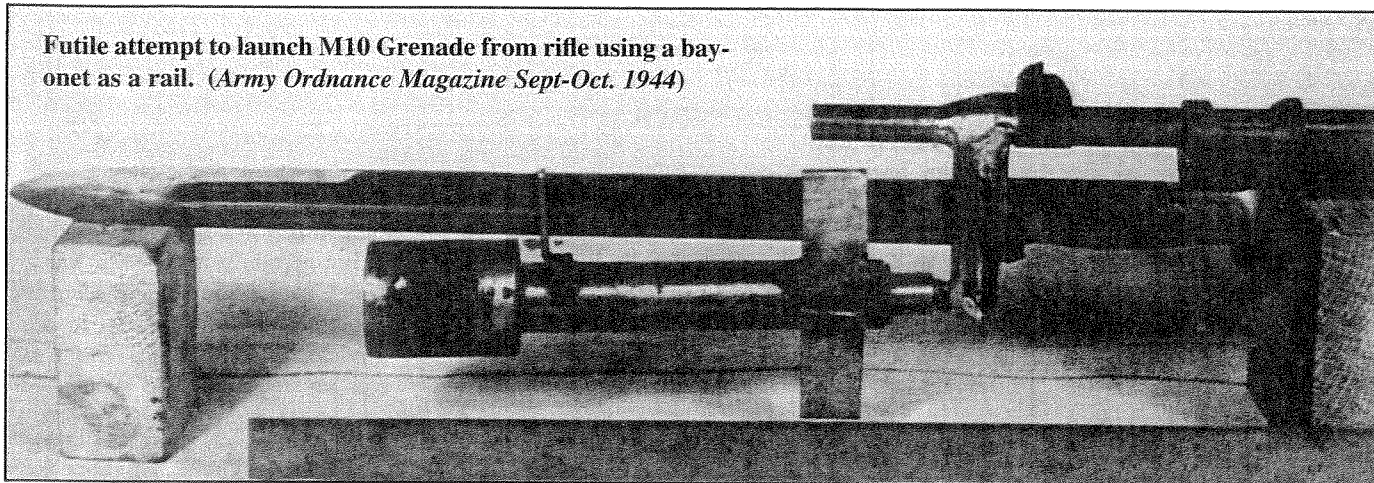
the huge projectile slamming into the tank. Surprised by this intrusion on their test range and the sound of their obvious success, the Generals and the test crew looked in their direction, only to see Maj. Skinner take the launcher from Uhl and score another direct hit before the tank could complete its turn. The M10 grenade demo was forgotten as the entire entourage of military brass raced to see what Skinner and Uhl had developed.

The next person to fire the launcher was Major General Barnes, who made a direct hit as well. One by one all of the others fired it until all nine rounds had been expended. MG Barnes advised the group he was ordering production to begin immediately as a result of what he had personally experienced. On the way home Skinner and Uhl were

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**Futile attempt to launch M10 Grenade from rifle using a bayonet as a rail. (Army Ordnance Magazine Sept-Oct. 1944)**



elated at their success, already imagining how their new system would save American lives in the war years that remained.

Reflecting back on this day many years later, Maj. Skinner noted that his usefulness to the Army's rocket program continually diminished from that day forward. The beginning of the end began when his commanding officer learned of the Aberdeen trip. Maj. Skinner had no authority to demonstrate the launcher at Aberdeen. His superiors in the Ordnance Corps were not aware of his unauthorized trip and were not pleased when they received urgent calls from the Army Ground Forces calling for the immediate production of an item that few were aware of. Maj. Skinner was called on the carpet to receive the second worst chewing out he had ever gotten. The first one was from his father when he was 15. One of Skinner's rockets started a fire on the roof of the Ft. Strong Army Hospital after going off course.

Now a high priority project, more demonstrations were organized with more success stories relating to the accuracy and effectiveness of the system. Allied nations were also in attendance including the Soviet Union, who ordered them on the spot. On 19 May 1942, an urgent, high-priority contract was awarded to the General Electric Company to make 5,000 launchers in 30 days. Incredibly, the order was completed with 89 minutes to spare. The device captured the imagination of many, and somehow picked up the name "Bazooka" which was a name for a home-made trombone made famous by a radio comedian named Bob Burns. The name stuck, either because Burns' trombone resembled the shoulder fired grenade launcher or because they both made "bad music."

The Bazooka went into combat with amazing results. Receiving some of the first of the 5,000 GE launchers, the Soviets put them to use immediately against German tanks with great success. The Bazooka was so quickly put into production that many of the American servicemen were forced to train themselves and fired their first shot in combat. Enemy tanks were no match for it,

and it was credited as being one of the major developments of World War II.

The design and development of the Bazooka was the work of many inspired men, and today most are recognized for their contribution in one way or another. The shaped charge concept of Dr. Munroe continues to be used to maximize armor penetration. Dr. Clarence Hickman is recognized today as an early pioneer in Bazooka technology and was awarded the Medal for Merit by President Harry Truman. Dr. Hickman was credited with more than 35 military patents and another 30 for advancements in telephone, tape recording technology, and piano development. Dr. Robert Goddard is remembered for his 1918 experiments with recoilless launchers that spawned the Bazooka. He is also recognized as the "father of modern rocketry" following his development of liquid fueled rockets and gyroscopic controls.

Henry Mohaupt was an alien; he was thereafter excluded from direct contact with the program, forcing him to assume only a distant advisory role. He filed for patents on shaped charges in 1941, assigning them to his employer. After his military service, he finished out his career working for the Navy.

Captain Edward Uhl left the Army to enter the aerospace industry where he used his ample talents to become president and chief executive of Fairchild Industries in 1961. Through his efforts Fairchild expanded its design and manufacturing base to include missiles and satellites. It was during his tenure at Fairchild that he oversaw the development of the highly-successful A-10 Thunderbolt II close combat aircraft. He died in the spring of 2010, and is remembered in his obituary for development work on the Bazooka.

Arguably deserving the most, but receiving the least acclaim for the development of the Bazooka, was Col. Leslie A. Skinner. In the spring of 1943, he got into a heated dispute with his higher-ups about the future of rocketry in the Army. He was relieved of his position in the Ordnance Corps and re-

assigned. He finally retired as a Colonel in 1948 after being honored with the Legion of Merit for his work in rocketry. The American Rocket Society honored him with the Hickman Award, but neither of the awards mentioned the Bazooka. Col. Skinner holds more than 20 patents for inventions of in various fuze and armaments. None of these patents cover the technology of the Bazooka.

None of the Bazooka's real inventors sought personal gain from its development, content in knowing that its development would save many American and Allied lives on the battlefield. There was one notable exception. In 1944, Gregory Kessenich, previously a civilian patent attorney and by this time had become a Colonel in the U.S. Army, filed a patent on a rocket projectile using a shaped charge warhead. Rather than assign patent rights to his employer, the U.S. Government, Colonel Kessenich managed to assign ownership to 6 members of his own family. Patent 2,579,323 was awarded in 1951 and Mr. Kessenich, lost no time in suing the U.S. Government for royalties, claiming he had confidentially disclosed his invention to officials of the Ordnance Department in 1941. The Army investigation that ensued found his claims to be totally without merit. Twelve years later, the 87th Congress under Kennedy, passed Private Law 87-578, earmarking \$100,000 to satisfy "all claims against the United States arising out of the invention of the Bazooka rocket." Funds were distributed to the assignees as by this time Kessenich had passed away.

*(Author's Note: Factual information for this article relied heavily on two articles, "The Genesis of a Powerful Portable Anti-tank Weapon," by Col. Leslie A. Skinner, and "Bad Music," a manuscript prepared by Army Information Officer, Mr. David Harris. Mr. Harris' article was fact checked and reviewed by Col. Skinner.)*

