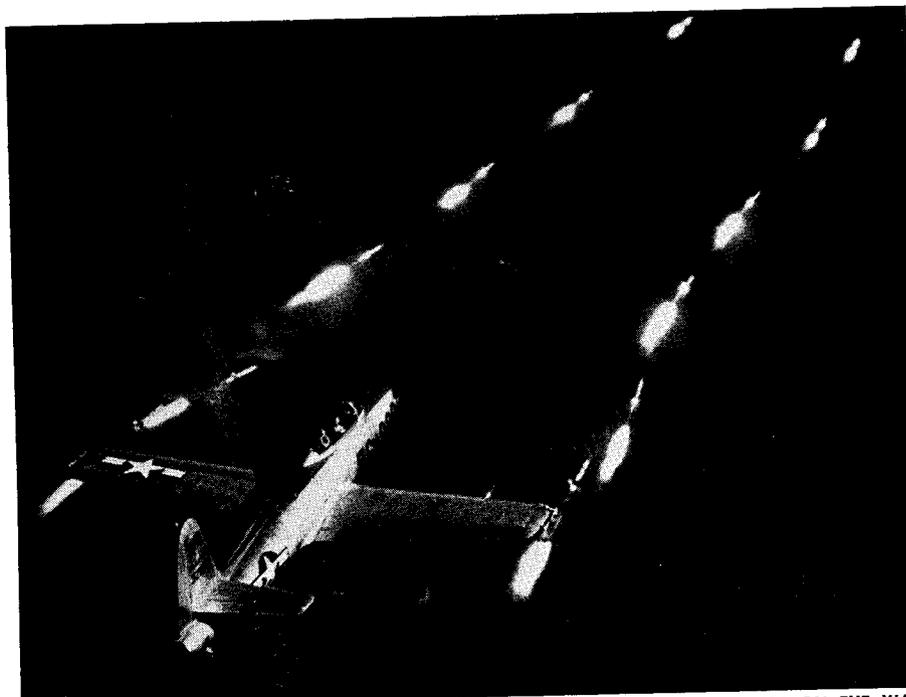


NAVY ROCKETS HIT REDS



AN EVEN DOZEN 5" HVAR'S STREAK TOWARD TARGET: NOTE DISPERSAL OF ROUNDS ON THE WAY

FOUR POTENT Navy-developed aircraft rockets are being used by Navy and Air Force planes to pulverize ground targets in the Korean war, including a new 6.5" anti-tank rocket.

This new rocket was designed and produced by the Navy in six weeks to smash North Korean tanks and is the first aircraft rocket to contain a hollow or shaped charge in the warhead. Shaped charges, which were used in both World Wars and date back to 1880, enable a rocket or bazooka charge to penetrate an armored tank like a hot needle through butter.

Other Navy rockets being used in the close air support work of *Corsairs*, *Panthers* and *Skyraiders* are the huge 11.75" *Tiny Tim*, the conventional 5" HVAR rocket and the 3.5" aircraft

rocket (see photo, top pg. 9). The only other Navy aircraft rocket, the newly-developed 2.75" *Mighty Mouse* has not seen action in the war zone, because it is primarily an air-to-air missile and BUAER is developing launchers for its use.

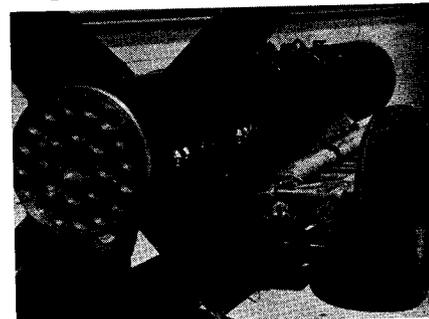
The new ATAR (anti-tank aircraft rocket) was produced as a crash project to meet the need for a tank-penetrating missile in Korea. Using the principle discovered in the 1880's by Prof. Charles E. Munroe while working at the Naval Torpedo Station at Newport, R. I., it is the first aircraft rocket to use shaped charges.

Essentially, it is a 6½" head filled with a shaped charge as illustrated at the bottom of the facing page. Powering it is the same 5" rocket motor used

on the HVAR *Holy Moses* projectile. It has far greater penetration power than the 3½" bazooka rocket which can penetrate 11" of armor plate.

First report on results from use of the *Ram* came from a Marine flying an F4U, although Navy, Air Force and Marines are all using it. The pilot knocked out the first enemy tank he hit, the missile boring into the tank and igniting the gasoline and oil inside. Unlike an explosive charge, the shaped charge squirts a stream of hot gasses and molten steel through steel plate. After it reaches the inside of a tank, it ignites inflammable materials, burns out the oxygen and scatters red-hot metal around the interior.

The Navy got urgent demands for a rocket which would stop the North Korean tanks, off which ordinary projectiles bounced. Chronology of its development reads like this:



TINY TIM ROCKET BLAST SHOOTS OUT 25 PORTS

6 July—CNO ordered BUORD to develop a 6.5" rocket for use against tanks.

7 July—BuOrd ordered NOTS INYOKERN to make a test of such a rocket.

14 July—NOTS INYOKERN informed BUORD it had completed the job.

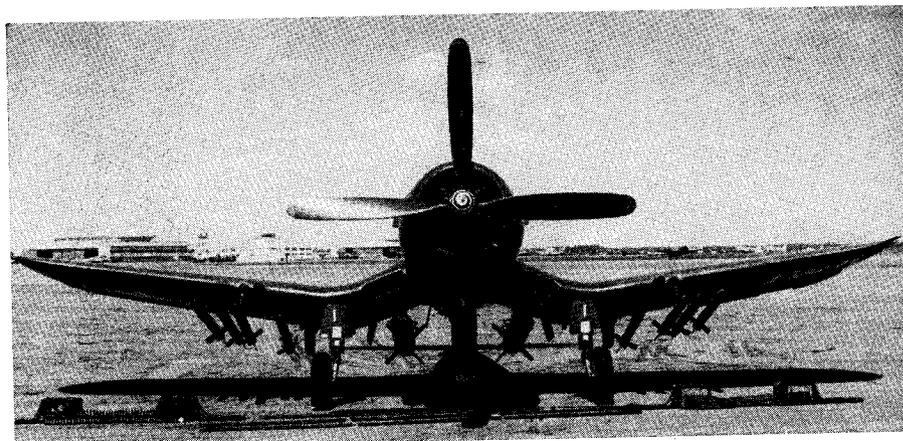
18 July—Inyokern was directed to make more rockets for immediate shipment to Korea.

29 July—First shipment was dispatched to the war zone by air.

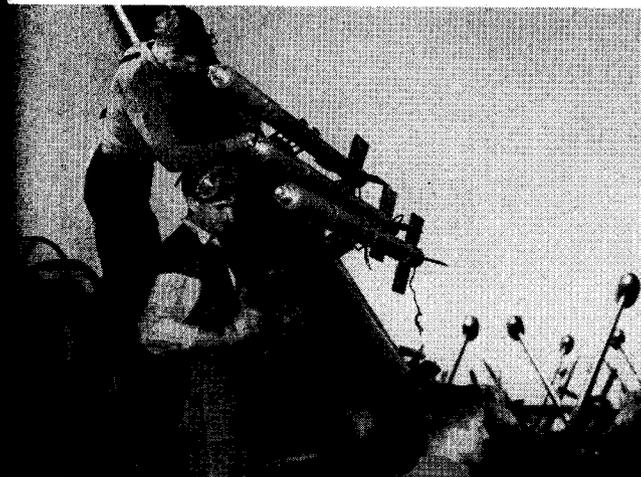
16 August—The Air Force used the new rocket for the first time in combat. The first ones were hand-made but the rocket since has been placed in production.

WHEN Navy *Corsairs* loaded with *Tiny Tim* 11.75" aircraft rockets plastered North Korean ammunition trains and bridges on 14 August, some authorities credited it with being the first combat use of the huge rocket.

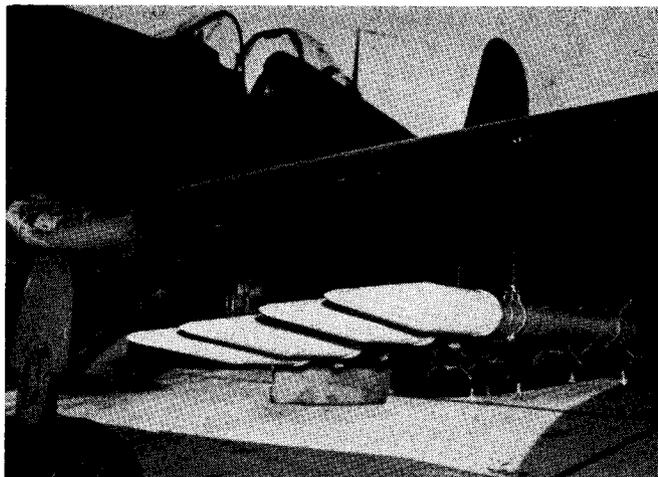
The carrier-based planes destroyed 13 locomotives, damaged 23, blew up eight ammunition cars, set afire two fuel oil trains, and strafed seven cars loaded with troops. The rockets destroyed the highly-important Han river bridge. This was the first published account of the use of *Tims* against the Reds.



CORSAIR FIGHTER CARRIES TWO TINY TIMS, 5" ROCKETS, MANY ROUNDS OF 20 MM CARTRIDGES



OFF KOREAN COAST, ORDNANCEMEN LOAD 3.5" SMOKE-HEADED ROCKETS



NEW NAVY 6.5" RAM HAS SHAPED CHARGE IN NOSE TO KILL OFF TANKS

Contrary to some accounts, however, it was not the *Tiny Tim's* bow in combat. Aviation records show the Navy used the big rocket on numerous raids in 1945 during World War II after having developed it at NOTS INYOKERN.

First record of firing of *Tims* against the Japs was on 19 March 1945. VBF-10 flying off the carrier *Intrepid* used them against Okinawa and western Japan targets. The same squadron fired them on raids on March 24, 26, 27, 29 and 30 and on March 31, VT-10 took its turn using them against the Japs.

On April 1, the same fighter-bomber outfit flew ground support missions against the Japs on Okinawa. Next use was aboard the *Lexington* when fighters worked over Marcus Island harbor installations with *Tiny Tims*. The *Wasp* sent VBF-85 against Wake Island on 18 July and against eastern Japanese airfields on August 13, carrying the 11.75" rockets.

Final use of the rockets in the war came on August 13-14 when PBJ- (B-25) Marine bombers from VMB-612 raided merchant vessels off western Japan using *Tims* as weapons. The next day the Japs surrendered. A squadron of *Corvairs* equipped with *Tiny Tims* was sent to England to hit v-2 rocket launching bases but no record could be found of their seeing action.

The *Tiny Tim* rocket is far larger than any other used by the U. S. forces. Its 11.75" diameter compares to the next in size, the 5" HVAR. It weighs 1173 pounds and is 114" long. Packed with 152 pounds of TNT in its warhead, the rocket's business end is essentially a 500-pound bomb with a rocket motor and fins attached to it for driving power.

Although shaped charges were used by the Germans and Japs, as well as the Allies during the last war, against pillboxes, tanks, fortifications and armor plate, many do not understand the principle on which they work. The "Mun-

roe Effect" was discovered by the George Washington University professor while he was experimenting with guncotton. He put dynamite sticks around a tin can, creating a cavity in the middle of a charge, and found this assembly would blow a hole in a heavy steel safe with less dynamite than was required if the explosive were placed flat against the safe.

The cavity in the nose of today's shaped charge is figured out scientifically so that it is not too shallow nor too steep. The inside is lined with a steel jacket which gives the explosive substance in the warhead something to throw forward upon ignition.

The fuse is at the rear of the powder charge and burning progresses forward after ignition. As the explosive burning progresses it creates force, which moves outward at right angles to the surfaces of the charge. In the hollow portion of the shaped charge, this force coming from the sides of the cavity is concentrated into a jet of superheated gasses. It melts the steel liner and projects this straight forward, along with the gas, at terrific speed. If it should be shot upward at night, it would look like a searchlight beam.

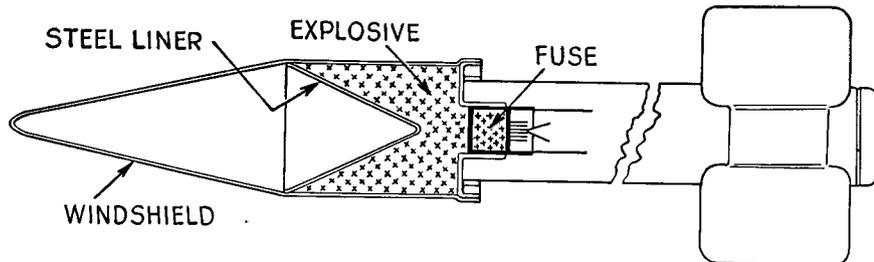
Linings were developed to go with the shaped charge to give the explosion something to project ahead, fragments leading the way for larger pellets of melted steel. To get the most good out of this white-hot arrow of steel and gas, the shape of the hollowed-out

charge and its distance from the side of the tank or fortification is carefully figured out.

A shaped charge with a shallow hollow would give a wider hole but less penetration, while the deep notch gives a narrow shaft of fire and steel. Rifle grenades, bazooka shells and demolition charges all use the Munroe effect to good advantage, as well as artillery shells. Armor-piercing shells have a heavy steel nose, while shaped charge ammunition has the hollow nose and thin windshield that serves mostly to make it fly straighter to the target. The cone behind the nose focuses the explosive force against the armor.

THE PROCESS of penetration of a tank by a shaped-charge jet is much like that of a high speed jet of water from a fire hose nozzle penetrating a bank of soft mud. Target material is splashed out at high velocities radially from the point of impact. The strength of the armor plate is of little consequence because the pressures produced at the point of impact are far above the yield point of most materials.

Besides their regular grenades and projectiles, the Germans put shaped charges out with magnets to hold them to the sides of tanks until a time fuse set it off. The Japs, with their usual Kamikaze thinking, put them on the end of a long pole and expected a soldier to hold it against the tank until it went off.



SHAPED CHARGE OF POWDER IN ROCKET NOSE GIVES IT POWER TO DRILL THROUGH HEAVY ARMOR