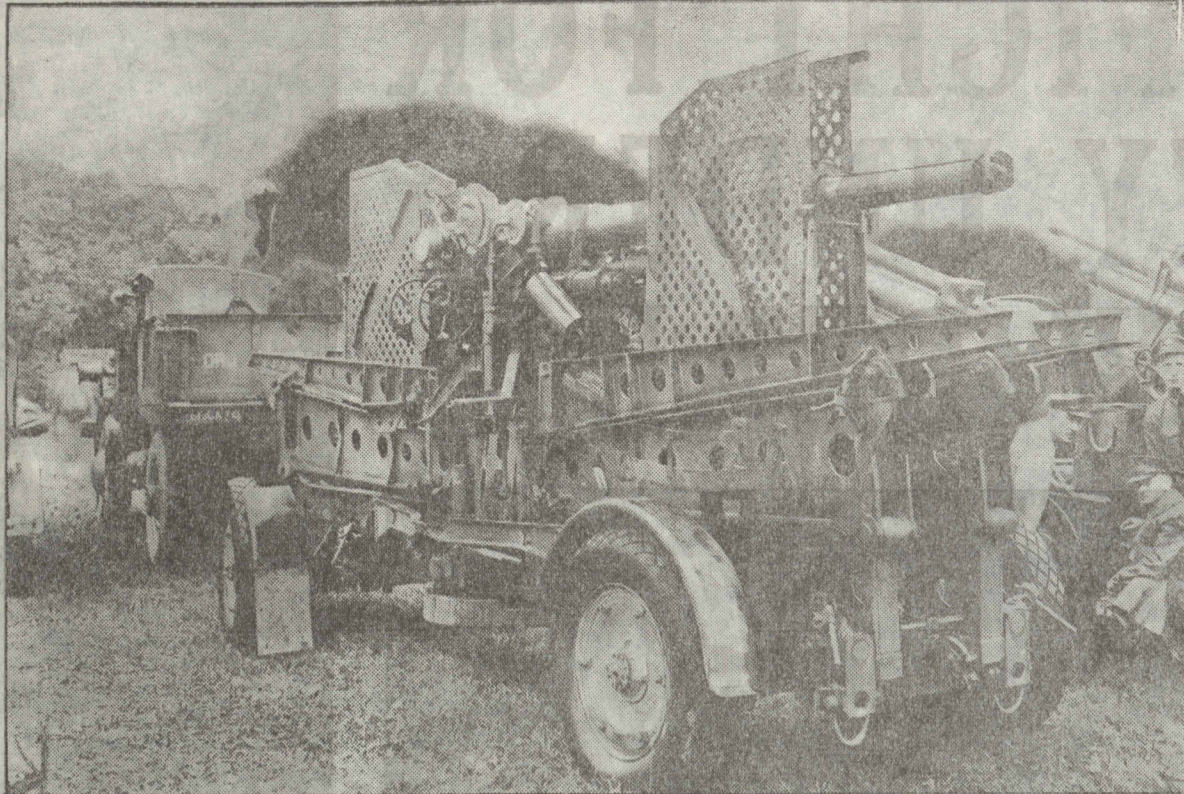
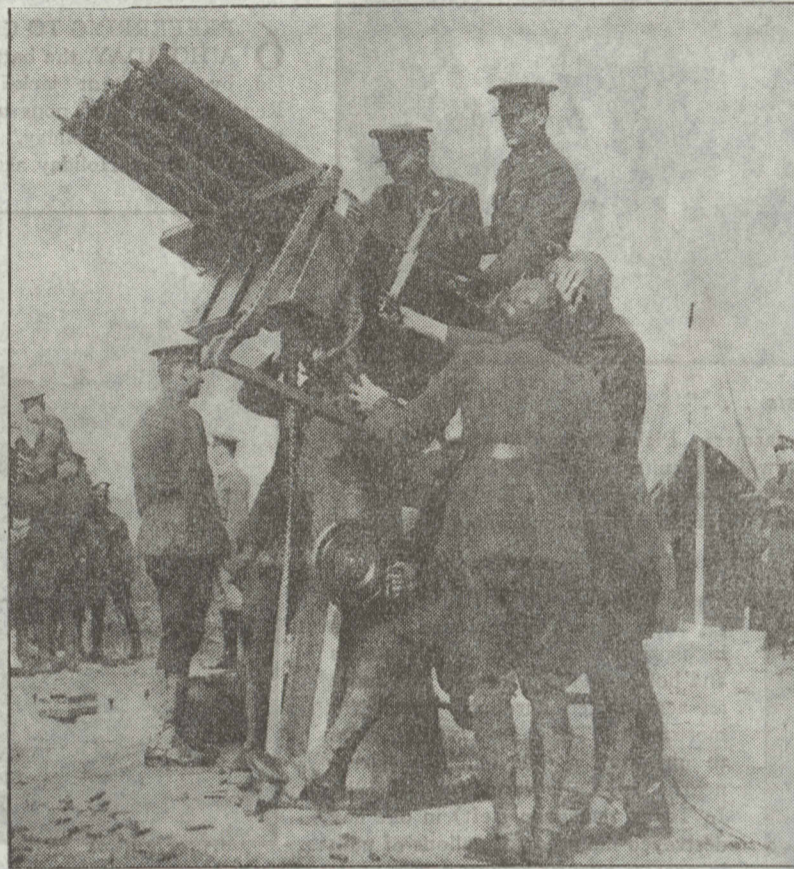


Slender fixed ammunition, from left to right: .30 caliber bullet; .50 caliber bullet; 37 mm. shell; 75 mm. shell; 3-inch anti-aircraft shell; 105 mm. howitzer shell; and 105 mm. anti-aircraft shell.



One of the newest type 3-inch anti-aircraft guns on a motor truck trailer carriage. The carriage may be quickly removed and the ground mounting, shown folded in the picture, as quickly set up. In accordance with its purpose, this gun usually is fired at extreme elevation. (Photographs from U. S. Ordnance Department.)



Anti-aircraft machine guns, four in a row, on a single mount. They fire the .50 caliber bullets for a maximum range of 7,500 yards.

WILL PLANE AND GAS ABOLISH ARTILLERY? EXPERTS SAY "NO!"

Formidable Array of Projectiles Used by United States Military Forces Remains a Vital Factor in Armament

By Joseph U. Dugan

FEAR that another war in Europe is imminent has given impetus in recent weeks to terror-inspiring stories which picture the next war as one in which civilian populations will be annihilated by clouds of poison gas, sprayed over wide areas by armadas of enemy airplanes. Such stories have been widely circulated in the United States, but, according to military experts, they are based more upon imagination than fact. Men qualified by training and experience to know assert that, although airplanes and poison gas may be used more effectively in a future war, the ultimate decision will be won, as always, by artillery fire and infantry advance.

The use of artillery in warfare began with the discovery of gunpowder. Since that time the missiles and later the projectiles fired from big guns and field pieces have been the most destructive forces known to military science. Crude artillery, which replaced the ancient catapult and ballista, was employed in battle as early as the thirteenth century. In every succeeding war to date the vital importance of artillery has been demonstrated. Not until the World war, however, was it so conclusively proved that an army cannot advance without a preceding barrage of artillery fire.

Crude as were the first artillery weapons, they represented an advance which revolutionized warfare. The first missiles were round stones, some of them weighing as much as a quarter of a ton. The devices from which the stones were hurled were built of wooden or iron staves, held together by iron hoops, shrunk on. Next came the development of smooth-bore cannon, made of iron or brass, from which spherical round shot was fired. The gunpowder charge and round shot were rammed in at the muzzle. Detonation was effected by applying fire to a small opening at the base of the cannon called the "touch-hole." Often, because of an overload of powder or defective metal in the cannon, the resulting explosion shattered the gun, killing the gunners. Then came the advance in the science of ballistics which developed the rifling of gun bores, elongated explosive projectiles, breech-loading mechanisms, and the scientific application to artillery fire of that factor which makes it the deadliest, most destructive weapon known to man. That factor is control.

Projectiles are fired and exploded today with mathematical exactness. It is seldom, if ever, necessary for a target to be visible. There is a weapon and a complementary projectile for every purpose. Pictured on this page are the projectiles for most of the weapons used by the United States army. Projectiles for guns of the navy differ ballistically only slightly.

As important in achieving control of artillery fire as any other element is the explosive used to propel the projectile from the gun and to explode the shell at or near the target. The exact formulas for the explosive compounds now in use are closely guarded military secrets, but it was a well known fact during the World war that most of the belligerents were using compounds of nitroglycerin, nitro-cellulose, picric acid, and gunpowder. The explosive composition, first developed before 1914 by the Germans, trinitrotoluene, or troyl, became popularly known as "T.N.T."

The amount and the power of the explosive charge placed within the projectile depend entirely upon the purpose of the shell. In all cases the detonation is accomplished by a fuse, placed either in the nose or the base of the shell. Generally there are four types of projectiles: 1—armor piercing, 2—shrapnel, 3—gas and smoke, and 4—high explosive.

Armor piercing shells have extremely hard and sharply pointed noses. The fuse is placed in the base and the explosion must occur after the nose has penetrated the target. Shrapnel shells, designed to kill or wound as many of the enemy as possible, contain metal balls which, with the fragments of the shattered shell, are hurled over



Projectiles for medium artillery, designed to silence hostile artillery, destroy trenches, and interrupt enemy operations behind the lines, are shown above. They are (from left to right) the 155-mm. shell, 8-inch shell, and 240-mm. howitzer shell.

explosive. They are fired from a brass cartridge and have a muzzle velocity of 2,650 feet per second and a maximum range of 5,500 yards. The next larger size projectile is the .50-caliber anti-aircraft machine gun bullet. It has a longer range and may be incendiary.

Brass cartridges, called case or fixed ammunition, are used to contain the propellant charges of five of the larger sized shells. The chief advantage of fixed ammunition is that it permits quick firing. Guns in which this type of ammunition is used are provided with extractors which automatically throw out the empty ammunition case after firing. The breech is then ready for a new cartridge, as no swabbing out of the gun is necessary. Such ammunition is comparatively heavy and more expensive, and for these reasons its use in the heavy guns is impractical.

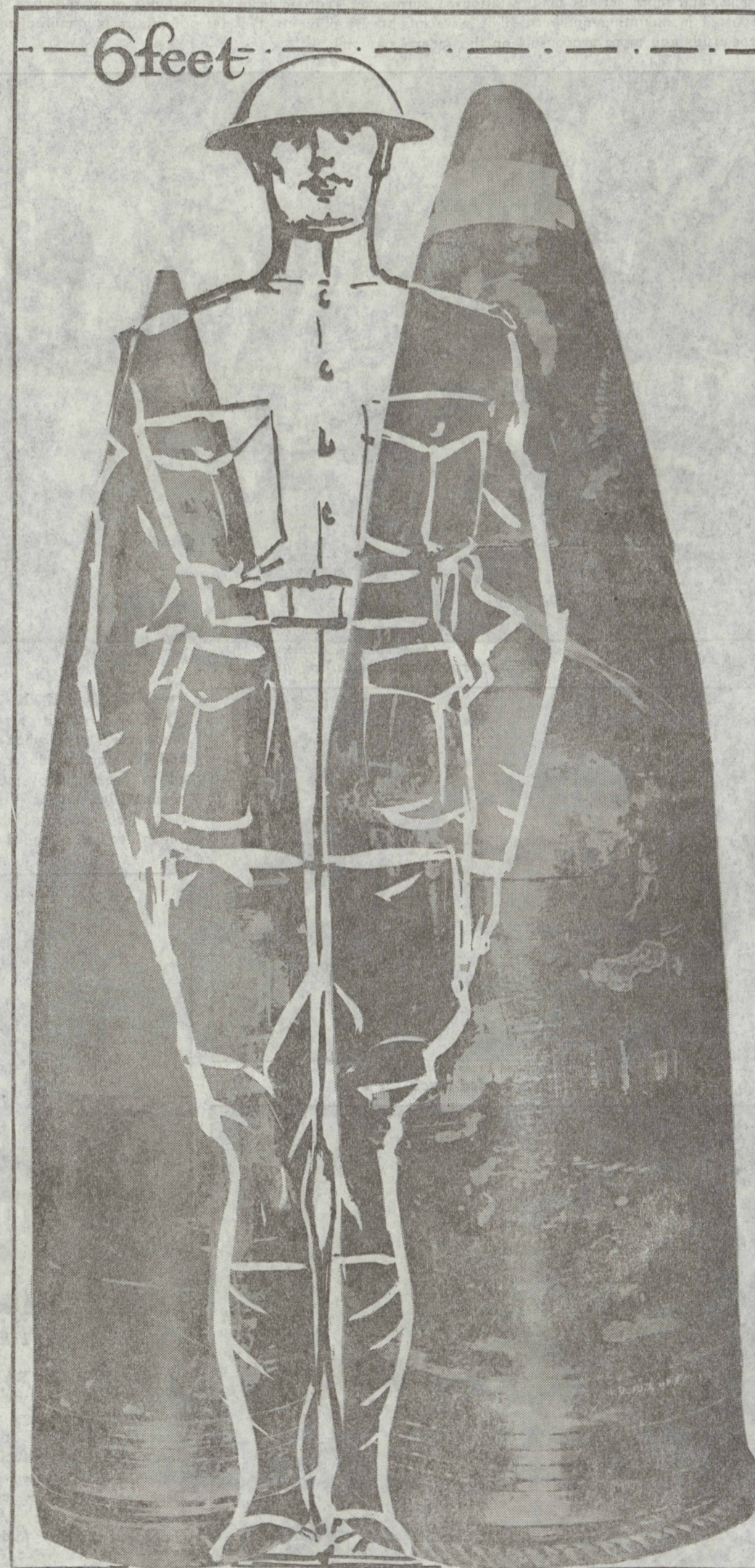
The largest shell used by the U. S. army is the 16-inch projectile, fired from huge cannons mounted on extremely heavy fixed emplacements. The shell is propelled by the explosion of charges contained in bags, usually made of raw silk. Bag ammunition is necessary for the larger projectiles because the huge amount of explosive required may be handled more easily in these light containers. The 16-inch shell weighs more than a ton and can be hurled a distance of about 28 miles in less than sixty seconds.

Best known of our artillery weapons, perhaps, is the 75-millimeter field artillery gun. Adopted from the French for our field artillery during the war, the 75-millimeter gun has since been improved by our ordnance designers. These guns are classified as light artillery. Operating in close proximity to the battle lines, they provide the preponderant fire which permits the advance of the infantry. The projectile for the 75-millimeter gun weighs 15 pounds, is fired from a brass cartridge, and has a muzzle velocity of 2,175 feet per second and a maximum range of 15,000 yards. A smaller light cannon is the 37-millimeter infantry weapon, which fires a projectile weighing 1.25 pounds from a brass cartridge and has a muzzle velocity of 2,000 feet per second and a maximum range of 5,400 yards.

Another important type of artillery weapon is the howitzer. This is a short cannon employed to throw highly destructive shells at comparatively short ranges and high angles, thus dropping the shells into "dead" spaces that cannot be reached by the high-powered guns.

For purposes of silencing hostile artillery, destroying trenches, and interrupting enemy operations behind the lines, heavy guns and projectiles, classified as medium artillery, are employed. Still heavier guns, many of them mounted on railway carriages to provide greater mobility, are used to destroy field works, ammunition dumps, storage depots, transportation systems, and other objects far in the rear of the enemy lines. The principal U. S. army medium and heavy artillery projectiles, including those for howitzers, are provided for the following guns: 105-millimeter howitzer; 155-millimeter howitzers and rifles; 240-millimeter howitzer; 8-inch, 10-inch, 12-inch, 14-inch, and 16-inch rifles and mortars.

Anti-aircraft artillery is a highly specialized branch of this arm of the service. The principal weapons used by our army for combating enemy aircraft are the .50-caliber machine gun and the 3-inch anti-aircraft and 105-millimeter anti-aircraft guns. Projectiles for these weapons are fired from brass cartridges, and the two larger guns are easily and quickly transported on motor truck trailer carriages, which may be quickly removed and the fixed ground mounting as quickly set up. The 3-inch shell has a range of 14,200 yards and the larger shell a range of 20,000 yards. Both guns may be elevated to extreme angles quickly.



Largest of the heavy artillery projectiles of the United States army are the 16-inch shell (right), which weighs 2,340 pounds and can be hurled 28 miles in less than a minute, and the 14-inch shell, which weighs 1,200 pounds and has a maximum range of 47,000 yards, or about 26 miles. Guns which fire the 16-inch shell are mounted on heavy fixed emplacements. Many of the 14-inch guns are mounted on railway carriages. The figure of the doughboy illustrates the comparative size of these huge projectiles.