

## HISTORY

The history of ammunition can be traced back to the invention of fireworks around 900 AD. The Chinese developed a black gunpowder that was composed of Charcoal, Saltpeter, and Sulfur.

The Chinese later attached gunpowder tubes to the bottom of spears to propel them forward to devastate any oncoming attackers. These flamethrowers became more and more efficient as time went on, and this led to the development of the first known firearms in China. The history of ammunition used in firearms dates back as far as the late 13<sup>th</sup> Century. Long before manufactured cartridges, owners used gunpowder to propel any shrapnel they could find.

After that, the use of firearms began to spread westward into Arab countries. Arab armies are credited as the first to use cannons in battle against their enemies during the 14<sup>th</sup> century.

The development of the cartridge was the next step in the history of ammunition. Bullets began transforming from musket balls into the cylindro-conoidal bullet we see today. The advantage of these newly shaped bullets was their ability to expand inside the barrel. The earliest known cartridges were made of paper in the late 1500s but were replaced by brass casings. Muzzleloaders used cartridges for years, but speed remained an issue.



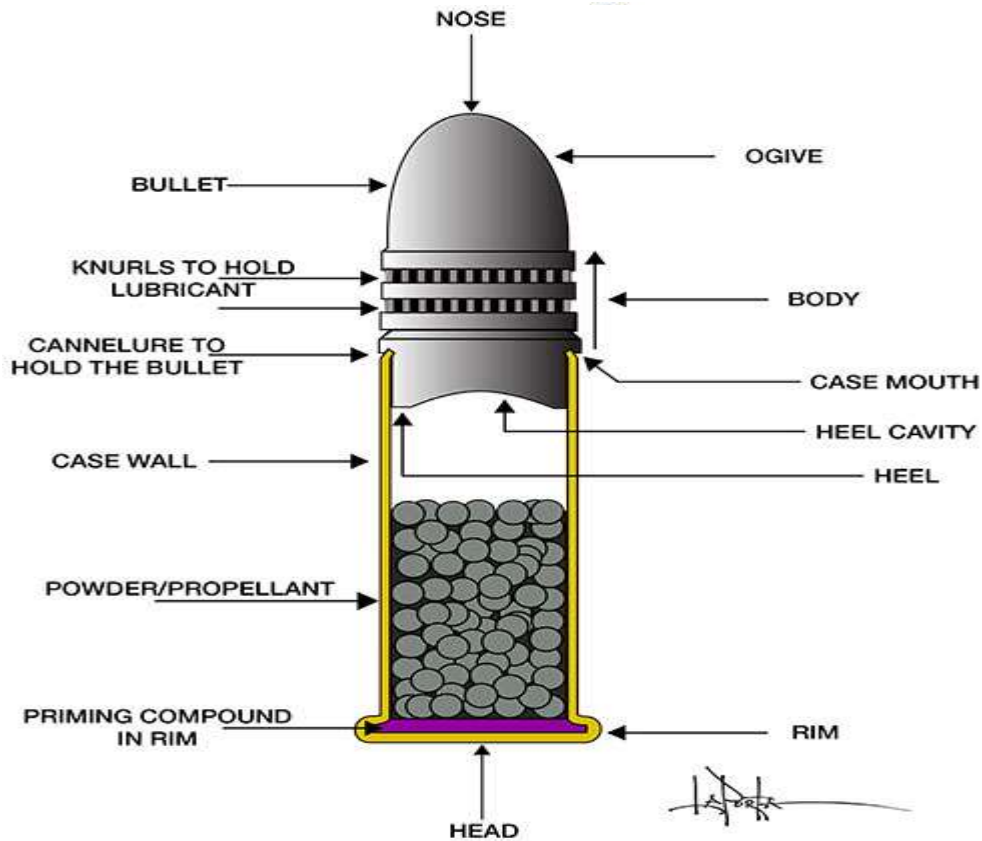
Firearms continued to evolve and during the mid-1800s breech-loaders first came on the scene in America. Instead of seating ammunition into the muzzle of the gun, breech-loaders allowed for chambered cartridges at the back of the rifle. The breechloader broke apart the cartridge and fired the bullet out of the end of the chamber.

With a growing demand for ammo, the need for better cartridges was also at an all-time high. This led to the formation of the modern day cartridge. The gunpowder was tightly sealed inside a brass casing with the bullet attached to the end. A strike to a primer in the base of the brass case became the new way of igniting the cartridge and shooting the bullet out of the barrel. This method marked the first time that cartridge casings ejected out of the gun, which allowed shooters to reload the firearm immediately.

### ❖ Anatomy of Ammunition ?

Ammunition refers to the complete round/cartridge or its components, including bullets or projectiles, cartridge cases, primers/caps and propellants that are used in any small arm or light weapon.

### ❖ Basic components of ammunition



The basic components of ammunition are the case, primer, powder, and projectile(s). Shotshells have an additional component called wad. The container that holds all the other ammunition components together. It's usually made of brass, steel, copper, paper, or plastic.

#### ▪ Propellants:-

A chemical mixture that burns rapidly and converts to an expanding gas when ignited. Modern smokeless powder will burn slowly when ignited in the open (outside of the case). Black powder is less stable and can be explosive when impacted or ignited in the open. Another powerful product was TNT the material comprising the explosives furnishes oxygen for its own combustion upon explosion.

Gun cotton can be used alone is known as single based powder and when used in combination with Nitro glycerine is called double base powder.

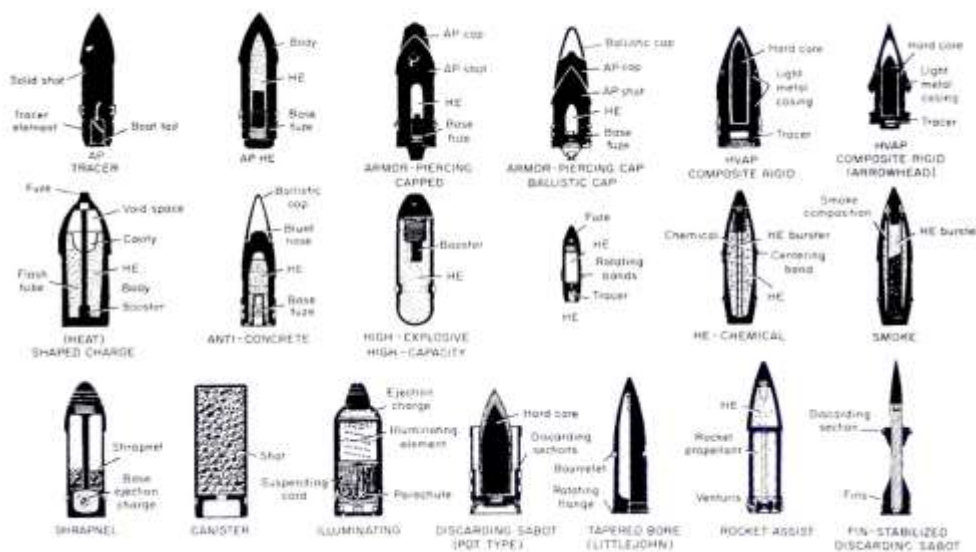
- SINGLE BASE 1:- Pure nitroglycerin with incomplete solvent and combination with stabilizer.
- SINGLE BASE 2:-Pure nitrocellulose with complete solvent.
- DOUBLE BASE 1:-Nitrocellulose and nitroglycerin with no other solvent
- DOUBLE BASE 2:-Nitrocellulose and nitroglycerin with complete and incomplete solvent.

▪ Primer

The primer is the chemical or device responsible for initiating the propellant combustion that will push the projectiles out of the gun barrel. To accomplish this task, the primer has a small amount of explosive inside that's secured by a metal cap. The explosive powder is typically a mix of lead, styphnate, barium nitrate, antimony sulfide, and tetrazene. The active ingredient is **lead styphnate** which has an ignition temperature of 636° F (330° C).

▪ Projectile

The object expelled from the barrel. A bullet is a projectile, usually containing lead, fired through a rifle or handgun barrel. Most pistol bullets are made of a lead-antimony alloy encased in a soft brass or copper-plated soft steel jacket. In rifle and machine-gun bullets, a soft core of lead is encased in a harder jacket of steel or cupronickel. A slug is a solid projectile, usually of lead, fired through a shotgun barrel. Shot is a group of lead, steel, tungsten alloy, or bismuth pellets fired through a shotgun barrel.



- Wad

A seal and/or shot container made of paper or plastic separating the powder from the slug or shot in a Shotshells. The wad prevents gas from escaping through the shot and holds the shot together as it passes through the barrel. Wads are essential ingredient of shotgun ammunition and mostly 6 types of set wads are used:-

- Base wad
- Paper wads
- Over powder wads
- Cushion wads
- Under shot wads
- Top shot wads
- Cup wads

Bullets used in rifle and handgun cartridges come in various designs, sizes, and weights.

❖ **Common types of Rifled bullets:-**

- Pointed Soft Point: High velocity, accurate bullets with a flat travel path(trajjectory),excellent mushrooming.
- Rounded Soft Point: Popular for low-velocity calibers, recommended for tubular magazines.
- Protected Tip: Highly accurate with excellent expansion
- Full Metal Jacket: Maximum penetration without mushrooming; these bullets are illegal for big game hunting in most states.

❖ **Common Types of Handgun Bullets:-**

- Roundnose Lead: Good penetration, little expansion.
- Full Metal Jacket: High penetration, no expansion.
- Semi-Wad Cutter: Balances penetration and expansion.
- Hollowpoint: Designed for high expansion on impact.
- Wad Cutter: Flat-ended, used for target shooting; creates clean hole in paper.



❖ **Pinfire, Centerfire and Rimfire Ammunition (Types of primer)**

**Pinfire:-**

The original pinfire system was still a metal case head, but with a cardboard body.

In fact the original way it worked is you put a percussion cap on the outside of the case head and then you had essentially a self-contained firing pin running through the cartridge case and you would hit that firing pin, which would then detonate the primer on the inside and it uses either the inside of the chamber or the inside of the case itself as the anvil.



**Centerfire :-**

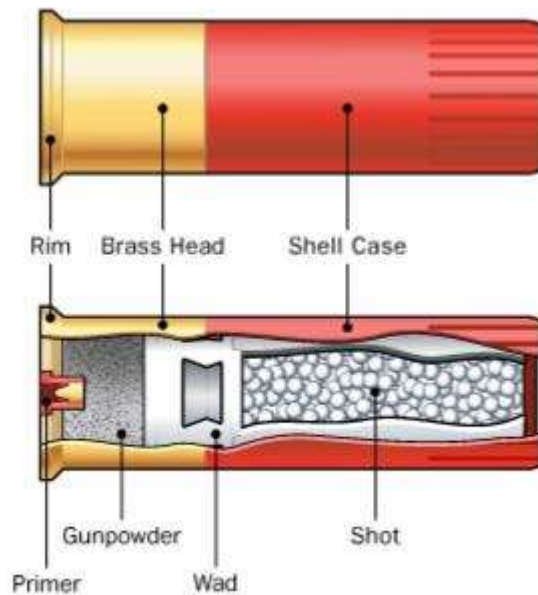
Centerfire ammunition is used for rifles, shotguns, and handguns. In this type of ammunition, the primer is located in the center of the casing base. Most centerfire ammunition is reloadable.

**Rimfire**:-Rimfire ammunition has the primer contained in the rim of the ammunition casing. Rimfire ammunition is limited to low-pressure loads. Rimfire cartridges are not reloadable.



❖ **Shotgun Projectiles:-**

Shotgun projectiles are fixed rounds of ammunition loaded either by a single ball, pellet or buck shots encased in a suitable shell of appropriate size made either of paper or plastic with a metallic brass end and provided with priming mixture in a percussion cap introduced in the center at the base of the cell.



The first shot shell was patented by Clement Potter in 1858.

- Bird Shot

Bird Shot is a shotgun shell filled with a large number of very small shot. It's called bird shot because it's most commonly used to shoot birds. The large number of projectiles means that they have an even and wide spread, making it easier to hit moving, small targets. In addition, the lightweight projectiles cause less damage to smaller targets, whilst still being lethal.

Birdshot pellet sizes are typically smaller than 3mm and shells tend to have hundreds of pellets in them.

- Buckshot

Buckshot is a much heavier form of shotgun round and fires 6-10 larger diameter ball bearings (no larger than 9.1mm). They carry more energy and do much more damage to a target when compared to birdshot. Typically, this kind of round is only used for large game where legal and humane to do so.

- Slug

Slugs are simply one large chunk of lead like a bullet. It may be rifled to give it spinning stability in a smooth barrel, or the barrel itself may be rifled to stabilise it.



## ❖ Conclusion:-

Firearms are any weapon that is used to fire a projectile with the help of gunpowder. They are developed day-by-day with modern technologies by different countries to make themselves superior to others making it extremely dangerous for the people as every person has access in one way or another. Illegal firearms have also come a long way making it easy to access without any trace. Firearms started developing after 1260 when the Chinese had developed gunpowder in the 9th century. After the development of gunpowder in China, they were later transmitted to the Middle East, Europe, and Africa. Almost all the guns are made on the basis of a simple concept i.e., Applying explosive pressure behind a projectile to launch it down the barrel. There is some evidence that the first paper cartridges were in use as early as the 14<sup>th</sup> Century, but they didn't become widely used until the 17<sup>th</sup> Century. Invention of the percussion cap revolutionized small arms ammunition. The next huge advance in small arms ammunition was the introduction of the integrated cartridge, where all the components of the ammo – the percussion cap, the propellant, and the bullet itself – were built into a single unit.