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Naval warfare has undergone tremendous transformations over time. One of the most significant developments in naval warfare was the evolution of naval cannon balls. These projectiles, fired from powerful ship cannons, played a critical role in battles at sea. In this article, we will explore the design, usage, and evolution of naval cannon balls, along with the different types of balls used in naval warfare. Naval cannon balls have been used since ancient times. The earliest cannons were small, and their balls were made of stone or iron. These early cannon balls were highly inaccurate and often failed to penetrate the thick wooden hulls of enemy ships. Cast bronze cannons from The Mary Rose. Ironically it was the weight of her cannons that sank her! The first significant improvement in naval cannon balls came in the 16th century with the invention of the iron cannonball. These balls were heavier than their stone counterparts and were more accurate when fired. However, they still lacked the power needed to penetrate thick wooden hulls. Naval cannon balls came in various sizes and weights. The size and weight of the ball depended on the type of cannon that fired it. Here is a look at the most common sizes and weights of naval cannon balls: 6-pounder ball This ball weighed around 6 pounds and was fired from a 6-pound cannon. 9-pounder ball This ball weighed around 9 pounds and was fired from a 9-pound cannon. 12-pounder ball This ball weighed around 12 pounds and was fired from a 12-pound cannon. 18-pounder ball This ball weighed around 18 pounds and was fired from an 18-pound cannon. 24-pounder ball This ball weighed around 24 pounds and was fired from a 24-pound cannon. 32-pounder ball This ball weighed around 32 pounds and was fired from a 32-pound cannon. Naval cannon balls were fired from ship cannons, and the crews responsible for operating these cannons were critical to the success of naval battles. The size of the ship determined the size and number of cannons that it could carry. The largest ships, like the line of battleships, could carry up to 100 or more cannons, while smaller ships, like frigates, would carry between 20 and 40 cannons. A French warship of the Napoleonic era fires one of its cannons. The boy at left is a powder monkey. Ships cannons were typically made of cast iron or bronze and were designed to be mounted on swivel gun carriages or fixed gun carriages. The size and weight of the cannon varied depending on its purpose and the size of the ship it was mounted on. Read More:Mysterious Wreck off English Coast Identified as Historic Dutch Warship Cannons were typically classified based on their poundage, which referred to the weight of the cannonball that the cannon could fire. For example, a 12-pounder cannon could fire a cannonball weighing 12 pounds. There were several different types of ships cannons used during the Age of Sail, each with its own specific purpose. Some of the most common types of cannons included: Carronade: The carronade was a short-barrelled, large- calibre cannon that was popular during the late 18th and early 19th centuries. It was designed to fire a large, heavy cannonball at close range, and was effective at inflicting damage to an enemy ships hull. Read More:WW2 Shipwreck: Time to Remove 1400 Tons of Explosives Long Gun: The long gun was a longer, more narrow cannon that was designed to fire a smaller, lighter cannonball at longer ranges. It was typically used for long-range engagements, and was often mounted on the upper decks of ships. Swivel Gun: The swivel gun was a small, lightweight cannon that was mounted on a swivel gun carriage. This allowed it to be easily aimed in any direction. It was typically used for close-range engagements, and was effective at repelling boarders or attacking small boats. The crew responsible for operating the cannon consisted of several men. These were primarily the gunner, the loader, the sponger, and the powder monkey. The gunner was responsible for aiming and firing the cannon, while the loader was responsible for loading the cannon with the appropriate type of cannon ball. A powder monkey as late as 1864 during the American Civil War. The sponger was responsible for cleaning the cannon between shots, and the powder monkey was responsible for carrying the gunpowder to the cannon. A naval cannon gun crew typically consisted of between six and ten men, depending on the size of the cannon. The crew was led by the gun captain, who was responsible for giving orders and ensuring that the crew worked together efficiently. Loading the cannon was a complex process that required careful coordination and precision. The first step was to prepare the cannon by cleaning it and applying lubricant to the bore. This helped to prevent fouling and made it easier to load the cannon. Read More:Civil War Cannonball Found in River & it Was Live The gun captain would then give the order to load the cannon. The gunner would place a charge bag with the appropriate amount of gunpowder and put it into the cannons barrel. In older cannons this was poured in and a wad of paper or cloth used hold the powder in place. British sailors and a gun captain prepare to fire a cannon. Next, the loader would insert the cannonball into the cannons muzzle, using a special tool called a rammer to push it down the bore. Finally, the gun captain would give the order to prime the cannon. The gunner would use a small amount of gunpowder to create a spark that would ignite the main charge of powder inside the cannon. The cannon was now ready to be fired. Firing the cannon was a dangerous and physically demanding task that required strength and agility. The gun crew had to work quickly to load and fire the cannon, while avoiding the recoil of the gun. When the gun captain gave the order to fire, the gunner would apply a lighted match or friction primer to the touchhole of the cannon. This would ignite the powder inside the chamber and propel the cannonball out of the muzzle at high speed. The recoil of the gun was significant and could cause serious injury or even death if the gun crew was not careful. The gun crew had to stand clear of the recoil and be ready to quickly load the cannon again if necessary. British and Danish ships firing their cannons at the Battle of Copenhagen in 1801. When this was done and the cannon fired, the sponger would then use a wet sponge to clean the inside of the bore and extinguish any remaining embers or sparks. Th process was then repeated. Overall, the naval cannon gun crew played a crucial role in the success of naval warfare during the Age of Sail. Their expertise and skill were essential for operating the powerful cannons that could turn the tide of a battle. Naval cannons fired a variety of different types of cannonballs that were designed for specific purposes, such as penetrating the hull of an enemy ship or setting it on fire. The gun crew had to select the appropriate type of cannonball for the situation and load it carefully into the cannon. Read More: Medal Given to Battle of Trafalgar Hero Aged ELEVEN Auctioned for 15,000 Some of the most common types of cannonballs included: Round Shot: Round shot was a solid iron ball that was fired from the cannon. It was designed to penetrate the hull of an enemy ship and cause damage to its internal structure. Grapeshot: Grapeshot was a type of cannonball that was made up of multiple smaller balls, like a giant shotgun shell. It was designed to be fired at close range and could inflict serious damage to an enemy ships crew. Cannon balls progressed like any other weapon. Here we see canister shot, round shot and shrapnel shot. The attached black powder bag is at the rear. Chain Shot: Chain shot was a type of cannonball that was made up of two balls connected by a chain. It was designed to be fired at the enemy ships rigging, in an attempt to disable its masts and sails. Shell: Shell was a type of cannonball that contained explosive powder. It was designed to explode on impact with the enemy ship, causing significant damage. Hot Shot: Hot shot was a type of cannonball that was heated red-hot before being fired from the cannon. It was designed to set enemy ships on fire and cause horrific fires and damage. Naval cannon balls played a critical role in many famous naval battles throughout history. One such battle was the Battle of Trafalgar, which took place on October 21, 1805, off the coast of Spain. The battle was fought between the Royal Navy of the British and the combined fleets of France and Spain. During the battle, the British used a combination of round shot and grape shot to devastating effect. These round shot were used to damage the enemy ships hulls and rigging, while the grape shot was used to clear the decks of enemy crews. The British victory at the Battle of Trafalgar was largely due to their superior use of naval cannon balls. The Battle of Trafalgar in full swing. Thousands of cannon balls were fired throughout the day. The naval cannon gun crew was a critical component of naval warfare during the Age of Sail. These skilled men were responsible for operating the powerful cannons that could decide the outcome of a battle. Loading and firing the cannon was a complex and dangerous process that required precision and coordination. The gun crew had to work together as a team to load the cannon quickly and fire it accurately, while avoiding trapping fingers and limbs. Cannon balls distance varied based on the type of cannon and the angle at which they were fired. In general, during the 18th and 19th centuries, a cannon ball from a large cannon could fly a distance of up to several miles. However, the most effective range, where they could do the most damage, was usually much shorter. The size of the cannon, the weight of the ball, and the amount of gunpowder used all influenced the distance. So, while they could travel far, the exact distance depended on many factors. Naval cannon balls played a critical role in naval warfare throughout history. The evolution of naval cannon balls from stone and iron balls to the more sophisticated shells and hot shot allowed naval commanders to inflict significant damage on their enemies. Read More:Civil War Cannonball Found in River & it Was Live The different types of naval cannon balls, including round shot, grape shot, chain shot, shell, and hot shot, gave commanders a variety of tactical options depending on the situation. Ship cannons and their crews were equally critical to the success of naval battles. The size and number of cannons on a ship were determined by its size, and the crew responsible for operating the cannons were skilled and highly trained. Naval cannon balls were used in some of the most famous naval battles in history, including the Battle of Trafalgar and The Spanish Armada. These battles demonstrated the devastating power of naval cannon balls and the importance of their strategic use in naval warfare. Read More:WWII Ammunition Dump Explodes in Berlins Grunewald Forest In conclusion, naval cannon balls were an essential component of naval warfare throughout history. They allowed commanders to inflict significant damage on their enemies and played a critical role in the outcome of many famous naval battles. Photo by Ken Bohrer c/o AmericaRevolutionPhotos.com Cannon were identified by the weight of ball they were capable of throwing. By the 1600s this became standardized. Their calibers went from the smallest a two pounder used with swivel guns, mortars and small bore cannon on specially made carriages, to the largest a fifty pound garrison gun. Photo by Ken Bohrer c/o AmericaRevolutionPhotos.com The distance or range varied tremendously by the size of the ball and the amount of powder used to propel it. This proved to be very dangerous work for gun crews as cannon did explode, showering the crew with deadly metal shards. Factors that could come into play in which this occurred: in the heat of battle, artillerists expert in the balance of powder and shot per gun could inadvertently add too much powder; mistakenly insert two canisters (measured powder packed in paper); add a bit more powder to send a shot further to hasten the enemys retreat; improperly swab the barrel; improperly wade hot shot; or fail to remove unspent powder. In addition, shells sometimes exploded prematurely, or the weapon failed due to fatigue of iron or poor manufacture of the barrel. Projectiles can be grouped into the following: cannon ball or shot, shell, canister or case shot, grape and pineapple, split shot, chain shot, bar shot, and hot shot. Each will be explained further in that order. Six pounder cannon ball. Cannon ball or shot was a sphere cast in iron. Mass times velocity gave it its most destructive punch; therefore it was less effective at a greater range. Fired in a flat trajectory, the iron ball was meant to bounce upon impact, like a stone skipping over water until it slammed into a line of infantry with the intent to behead or disembowel one or more soldiers packed tightly in ranks. Joseph Martin writes of soldiers eagerly chasing after spent British cannon balls that rolled harmlessly among them. Lugging the ball to the artillery officer, the ball was immediately added to the American munitions to return the favor; meanwhile the soldier was rewarded with a ration of rum for each ball he retrieved. Shell Shells were cast iron balls, but during pouring, were molded to have a hollow core. A small tube was figured into the manufacture so powder could be poured inside; this also enabled a fuse to be added. There were two basic types, non-fuse and fuse. The former, when fired, was expected to generate enough friction heat against the inside of the shell that it would ignite either while in route or upon impact. The second had a fuse inserted that was ignited prior to the shell being fired. If timed right, the shell would be over enemy troops when it exploded, raining down deadly steel shards. Unfortunately, as already noted, the shell sometimes exploded while leaving the barrel, which had a disastrous effect on the gun crew. Canister and shot. Canister or case shot and grape evolved from what were known as scatter projectiles. The earliest muskets would use buck and ball when the commander wanted a more effective punch with his line of infantry. Beside a cartridge of ball, additional smaller pieces of lead were added creating a fanning effect when the gun was discharged. In the fourteen hundreds, stones and bits of metal were encased in a wad of cloth or leather giving the cannon more of a fowling piece or shotgun effect. Canister and shot. Grape Canister was a thin metal cylinder filled with iron balls. Case was the same thin cylinder filled with lead musket balls. The cylinder was fixed to a sabot, French for wooden shoe. A strong seal is required to trap propellant gasses released from the powders explosion and keep projectiles centered in the barrel. This necessary gap is referred to as the windage. Wadding filled the role for solid shot and shell. The wooden shoe or sabot did the same for canister and case. When released, the thin outer cylinder was immediately shredded by the shock of the explosion and its shared metal, along with the iron or lead balls, created a deadly cone pattern: in effect a volley from infantry with a two to three hundred yard range. Grape shot was used when a longer range was needed. Similar to canister and case in its destructive affect on infantry, a canvas or leather bag contained the lead or iron balls which were half in size as musket balls instead of the thin metal covering. To make such an unwieldy container easier for gun crews to carry and load, a center rod ran up from a wooden base enclosed by the bag. The bullets were stacked around the rod and a length of cord was continually lashed around pulling the bundle into a shape that was both manageable and could fit the caliber of gun from which it would be shot. It was similar to a bunch of grapes thereby received its name. Pineapple shot was a variation of grape shot. When grape and case were used together, the result produced a killing field of up to 600 yards. Chain shot Split shot, per its name, was simply a solid ball halved then bound together. Loaded as one shot, upon firing, it separated with each half taking a different and unpredictable path due to asymmetry. Chain shot was generally used aboard ship as it was designed effectively to carry away masts and rigging. Either split shot (two halves) or two solid shot were connected by a length of chain. Upon firing, each shot would pull in a different direction creating a rotating motion around a center mass. On land, it was most effective against a cavalry charge, taking out the horses legs or gouging a chunk of infantry in line. Bar shot. Bar shot was similar to chain shot except a metal bar attached the shot at each end. The bar was one to two feet long. A type of this was referred to as a sliding shot. The connecting bar was actually two bars which, upon firing, would slide over each other by connecting grommets that expanded the distance between shot as well as its destructive force. All forms of bar shot were called angel shot for its appearance in flight to deliver a not so angelic impact. British bomb circa 1759 care of the History Blog. Hot shot proved to haunt a gun crews sleep. Iron shot was heated in a portable forge that was brought to the rampart or upon the field of battle until red hot. A charge of powder was loaded but with a tight fitting dried wooden wad that was tightly rammed on top. Shrapnel Wet cloth and oakum soaked in water were rammed home, acting as insulation between the hot iron and susceptible powder. The heated shot was then rapidly brought to the gun and loaded and fired as quickly as possible. This type of shot was most effective in ship to ship warfare and against fortifications housing supplies or munitions in wooden structures. Artillery Battle Tactics During the American Revolutionary WarCannon in the American RevolutionFiring Field Cannon in the American RevolutionGeneral Henry Knox: The Continental Armys Commander of ArtilleryCannon Carriages of the American RevolutionCannon in the American RevolutionRedoubts Americas Forts During the Revolutionary War Shades of Libertyis the exciting new action-packed series that chronicles African Americans who fought in the American Revolutionary War. Boatner, Mark M. Encyclopedia of the American Revolution. NY: McKay, 1966. Butler, John G. Projectiles and Rifled Cannon. 1875 D. Van Nostrand Pbl. NY Callahan, North. Henry Knox, General Washingtons General. South Brunswick, NY: Barnes, 1958. Downey, Fairfax. Birth of the Continental Artillery. Military Collector and Historian, 7 (Fall 1955). Manuey, Albert. Artillery through the Ages. 1985 U.S. Gov. Printing Office National Park Service. Do you like them? What is your experience with them? I like them for some of my rifles. A couple of things I have learned about them that may help you:The .45, 50 and .54 caliber REALs come in two lengths. Pick the shorter one if your gun has slow twist rifling, or the longer one if 1 in 48" or faster. Most rifles shoot REALs better if they are loaded with a wad between them and the powder charge.You may need to experiment with how much lube is needed. Most (but not all) of mine shoot best with all lube grooves filled.When casting them, use nearly pure lead with 1/2% tin added for better mold fill-out. A lot of accuracy problems with REALs can be traced to low quality castings. The REAL design is such that bullets can LOOK good but not fully filled out. Keeping the mold and melt hot (800 to 850 degrees) helps with casting quality bullets. Both the longer and the shorter versions shot grreat in my Great Plains Rifle and in every TC I ever tried them in. Just use plenty of lube. And while I never saw the need, a lot of people have excellent results by usin an over powder wad. I've been shooting these since the molds first became available. All my shooting was in slow twist rifles. Per a review in Guns&Ammo magazine, I used the lower of the two weights offered in my slow twist rifles. They shot well. But as mentioned, it is a good idea to weigh them for consistency. I loaded both sizes in a TC .50 and the five shot groups off the bench were all touching with both at 50 yards. Then to 100 and they became 12" groups. I hunted with Maxi balls for about five years in the mid '70's and got good accuracy with them but went to balls for deer and 54 balls for elk and results were just dandy.Another conical i tried was the Lee 450 grain 50-70 bullet sized down from it's 515 diameter. That one shot with excellent accuracy at all distances. Recoil was noticeable. pretty sure the telegraph was invented during the civil war- andif not, than it was definitely used during the war My step son found a 'cannon ball" that is 3 and 5/8 inches across and weighs 8.05 pounds. While it was found in inland NJ in an area frequented by all three armies- Brit, American and French- it is very unlikely to be from that era, as they used 3, 4 and 6 pounders in the field. It is an iron or steel ball, with a faint seam seen at a few points across the middle. Very well preserved. My step son found a 'cannon ball" that is 3 and 5/8 inches across and weighs 8.05 pounds. While it was found in inland NJ in an area frequented by all three armies- Brit, American and French- it is very unlikely to be from that era, as they used 3, 4 and 6 pounders in the field. It is an iron or steel ball, with a faint seam seen at a few points across the middle. Very well preserved. You may have found a grapeshot from a gun of 8 inch diameter or bigger, or, a piece of ballast from a ship or a crane counterweight. Looking at my Ordnance Manual, I see that a ball of this size should weigh between 6 and 7 lbs. In McKee and Mason's book, a ball of this size is classified as a 6 pounder. I am a bit puzzled why this one weighs 8. But we have to remember that weight designations for artillery was nominal, that is, rarely will you find a 6 or 12 pounder shot (or shell) that weighs exactly 6 or 12 lbs. Kinda like lumber. A 2 X 4 is 1 1/2 X 3 1/2 for instance. Plus, especially in the earlier days, there were a lot of variances in casting and other manufacturing processes. In the case of artillery, this causes a lot of headaches for the gunners when they had to calculate their aim using a standard table and indifferent powder and projectiles. The existence of a part line indicates that if it was a cannonball, it either slipped past the inspectors or was used for another purpose.Now, what I said above is based on Civil War period specs. There would be a greater possibility, especially since it was found in NJ and if it is a dug relic, that it was a 6 pounder shot. I'd say the location of the find would play a big part in identifying it. Check it for a fuse hole/plug; it may be a case shot. It has no holes and is a solid shot, not a shell, nor does it have any way to hang it as a weight, like a gate weight. The seam is very, very faint, and only seen at certain points- like a mold mark. If it was a 6 pound shot, then it could easily be a Rev. war artifact- the British camped there in '76, and 77, the Americans after Princeton, and both on the way to Yorktown. It was found along the road in some road work excavation. Check it for a fuse hole/plug; it may be a case shot. I thought about that, but an empty 6# caseshot only weighs about 3 1/2 lbs. I don't think that even if filled with powder, resin and lead shot, you could add 5 lbs to its weight. I'd say you probably are looking at a RevWar ball. Just thinking about this a little bit. In the revolutionary period days, fused shells came in to use for artillery. The problem would be, how to make them? In the winter time here in the north country we make hollow ice globes with water balloons. Fill them with water, place outside, and an appropriate wait later bring the balloon inside. The water on the outside of the balloon has frozen, but the inside is still liquid. It's a small matter to just drill a hole through the balloon and ice through to the core and drain out the water that remains. You then have your hollow ice globe.Would hollowed out cannon ball shells have been made in a similar fashion? Cast the molten iron, and then take the mould apart while the interior metal is still molten, and drain it away?. The hole could then be threaded for a fused plug. Col. I'm no expert here but I'm thinking they might have used a process called "slag casting". It worked much like what you describe. This took some practice. They would only file a ball mold just so full of molten metal. Then the casters would shake the ball mold so as to make the rest of the molton metal go to the outside of the mold,thus cooling it quickly. You would now have a hollow ball. Imagine the arms on those guys ,eh? Oh I get it. They would cast it with a plug in the middle much like cannon barrels were made or cast. The plug would be made out of hardened sand or clay that could be busted apart and "drained" out the hole once the whole thing was cooled. The sprue out the other side could then just be cut off and filed away.That makes much more sense and offers better quality control than the "ice globe" method. Col. I didn't explain very well. Just google "slag casting". Maybe you'll get a better understanding of the process. I understood it was done with clay or sand spheres which were knocked apart and then out through the cut open vent. I'm no expert but that's what I remember someone explaining once. Standard "shells" for howitzers were filled with powder but "cased spherical shot" or "shrapnel" had musket balls mixed with the powder for more fling chunks. The secret to both was a guy who knew how short to cut the fuses so they'd go off 20 or so feet above the ground. Simple sand castings may have been used to make the hollow cannonballs. Without going into the fine points, to make a sand casting of a solid ball you would have a wooden ball and would bury it half way into the sand in an open top box. (The box would be full with the wooden ball sticking half way out of the sand.)(This lower box is called a "drag".) Another box (the "cope") with guide pins that mate with guide holes in the lower box (the drag) would then be placed on top of the lower box. It is open on both ends and once in place on top of the lower box it will be filled with sand totally burying the wooden ball (pattern). (Rather than using dry, loose sand, the sand used for this process is dampened with oil so it sticks together when it is compressed. It is usually referred to as "green sand". Once the upper box is full of sand and the loose sand is tamped down so it is firmly around the pattern (called "ramming"), the upper box of sand is lifted straight up off of the lower box and then turned over. A hole that intersects the hollow pocket formed by the upper half of the wooden pattern is cut thru the sand to the outside to feed the molten metal thru. After removing the wooden ball (pattern) from the green sand in the lower box the upper box is then placed back on top of the lower box using the guide pins to align it and the metal is poured thru the hole to fill the cavity.The results is a solid, spherical ball. OK. Now, rather than having a simple wooden ball for a pattern we have a wooden ball with a fairly large wooden dowel sticking out of one side. The dowel is a precise length and when this pattern is being placed in the lower box the dowel is placed so it is laying in a horizontal position. The cope is placed on top of the drag and filled with green sand and rammed.When finished, the cope is removed, the pattern is removed and the feed hole is cut.(The hole is called a "gate" and the metal that is left on the casting after things cool is called a "sprue". While all of this is going on, another split box is being filled with sand.This box has a cavity cut into it much like a bullet mold and the cavity is a sphere with a round hole intersecting it. Once the green sand fills this mold and it is rammed, the box is opened and a sand sphere with a round sand rod sticking out one side is removed. (This is called a "core" and the pattern used to make it is called a "core box".) The size of this sphere is smaller than the size of the ball pattern used above to form the cavity in the cope and drag.For instance, if we wanted to end up with a 1/2" thick cast wall, this core sphere would be 1 inch smaller in diameter than the pattern used in the cope and drag. The length of the round sand rod sticking out of this sand pattern is exactly the same length as the cavity formed by the pattern that was used to form the cavity in the cope and drag. Now, the worker places this smaller sand pattern into the drag using the dowell cavity in the sand to position it and hold it in place. Once the cope is replaced on the drag with this inner pattern core in place the metal is poured. When it is cooled, the cope and drag are taken apart and the cast sphere is removed.Some pounding or hammering will break up the inner sand pattern and the sand can be poured out of the new, hollow ball. Once the sprue is removed and the hole thru the wall is machined for a plug you now have a nice new cannon ball waiting to be filled with powder and something to set it off. This sounds like a lot of time consuming work but in reality, once things are going, it can become a fairly rapid process.Remember, at a foundry where they are pouring thousands of pounds of metal there will be dozens if not hundreds of these copes, drags and cores being made to receive the molten metal.It's how tens of thousands of sand castings are made today. 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This was in 1980 and these old duffers would construct things that would be a challenge with a modern 3-D printer and CAD system. And they used chisels and hand planes - in hard maple.That was Fairbanks Valve. They couldn't compete with imported valves. Pity. If you see an inverted triangle with an "F" in it it was one of theirs/ours. From steam locomotives to submarines and WWII naval ships. While we're talking about castings, on some modern and almost all old engine blocks there are a number of sheet metal plugs pressed into the sides of the engine blocks. Most people call them "freeze plugs" saying they are there to protect the block if the water inside freezes. Actually, those are core plugs and they plug up the holes that were used to locate and support the core that forms the water jacket around the cylinders when the engine block casting was made. Ain't the Muzzleloading Forum great?A person can learn all sorts of things here without even trying. :grin: :rotf: You will find the discussions of sand casting iron balls around sand spheres held with chaplets in 17th and 18th century sources. The technique started with mortar bombs and hand grenades. Early cannon balls were all solid shot. Early 3lb grenades were all hardened clay. Later they worked out the iron hollows. Anyway, some areas and governments cast around centrally supported sand spheres, their balls flew straight. Other munitions were cast with the hollows off center and the balls tended to fly oddly. It gave some gunners a great advantage over others, especially at sea where moving targets and moving firing platforms made accuracy tough anyway. Find a copy of 'Round Shot and Rammers' by Harold Peterson. IIRC it had detailed drawings of the process Zonie was describing, along with beautiful drawings of all types of artillery pieces and carriages. It is a neat resource for cannoneers, and I really enjoyed my copy years ago, until it grew legs and ran off. Absolutely nothing else has that twang odor of a foundry.By the way, speaking of hollow fused shot, wasn't the first five minutes of Sahara just one of the best shows you ever saw! do you lube? over powder wad? Yes, use an over powder wad to prevent damage to the base of the bullet and eliminate, or at least cut down on leading. Never put anything between the powder and a mini. It inhibits expansion of the skirt to take the rifling and can be driven into the cavity to ride all the way to the target. With a solid base projectile a wad is a great way to go. Did cannonballs explode?In movies showing battles from the Civil War and earlier conflicts, cannon-fired projectiles inevitably send up dirt and smoke and flailing stuntmen upon impact. It makes a nice visual and is probably easier to stage than an iron ball bouncing murderously through a division.In reality, an array of both exploding and solid projectiles were used in the Civil War and for centuries before, but solid shot predominated until around the1850s.The earliest cannons, developed in 1300s, fired nothing but solid objects stone balls. The following century weapons makers did develop hollow iron balls filled with gunpowder and fitted with a fuse that had to be lit just before firing. But the difficulty in handling these primitive time bombs and in getting them to explode at the target made them both dangerous and unreliable. To minimize the danger of their blowing up in the cannons barrel, these lit-fuse balls were used mainly in quick-loading, wide-bore, stubby-barreled cannons called howitzers or with drop-and-fire mortars, which looked like the World War II-era weapon of the same name only much larger.Over the centuries, weapons makers devised a great variety of solid-shot combinations and techniques. The one-two punch of stone and iron balls spelled doom for castle walls. At close range, cannons were often used like sawed-off shotguns to fire bunches of smaller balls, devastating to troops massed on level ground. At sea, ships often fired iron bars, chains and small balls to take down masts and rigging. Another trick was to heat a cannonball red hot in hopes of igniting a fire on deck or, better yet, landing one in the enemy ships magazine. Blasting a hole through the hull of the enemy ship by firing into the water normally didnt work, however. The ball would skip off the surface.Elongated solid projectiles called bolts were developed for use with rifled cannons, which had a spiral groove cut on the inside of the barrel to start the projectile spinning and improve accuracy. But round balls were the most common solid shot used in the Civil War, and those are what you see today welded into a pyramid shape and set next to a cannon in a town square.Sources: Daniel A. Lindley and Keir Lieber, both Notre Dame assistant professors of government/political science;Dennis Showalter, professor of history, Colorado College;various reference works Allegheny Arsenal continued producing four types of cannonballs: Solid iron balls (solid shot), clusters or cans of small iron or lead balls (known as case shot, grapeshot or canister), exploding iron balls filled with lead shrapnel (spherical case shot) and hollow iron exploding balls (shells). The combination of sulfur, potassium nitrate and finely ground charcoal requires a high temperature 572 degrees Fahrenheit and friction to ignite. White estimated he had worked on about 1,600 shells for collectors and museums. On the day he died, he had 18 cannonballs lined up in his driveway to restore. Cannon balls were made of iron and the classic brass monkey was made of brass, an alloy with a much-greater thermal expansion than iron. Cannonball Manufacture. Cannon projectiles have been made of stone, cast iron, lead, brass, bronze, copper and even glass. As of the Ring of Fire (RoF), stone or cast iron were the norms; lead was used in small arms. Stone has the advantage (see part 2) of being compatible with lighter artillery. Johnson said the mortar ball is likely worth between $600 and $800 or more depending on where it was manufactured. But it should be in a museum, he said. Did cannonballs explode impact? Contrary to Hollywood films and popular lore, these cannonballs did not explode on contact. Percussion fuses were not used on spherical projectiles. These shells and spherical case shot were designed to explode only when a flame reached the interior charge. When assembled, the shot resembled a cluster of grapes, hence the name. Grapeshot was used both on land and at sea. Canister shot, also known as case shot fired a larger number of smaller projectiles loosely packaged in a tin or brass container, possibly guided by a wooden sabot. Projectiles fired from cannon Essential parts of a cannon: the projectile or cannonball (shot) gunpowder. touch hole (or vent) in which the fuse or other ignition device is inserted. Cannons are made of two different metals, cast iron and bronze. Most cannons were made of cast iron and that is the kind most often found by divers. Authentic Civil War cannonballs will have three distinct mold markers. The most obvious will be a faint ring around the ball, the mold seam, where the two hemispheres of the casting mold met. The second mold mark will be a circular mark somewhere along the seam. This mark is from the filler hole spruce. Did pirate cannon balls explode? No. They were simply large, heavy, deadly pieces of metal. Cannonballs were solid, round objects that would ricochet off the ground and often used to target fortifications and enemy artillery. Case shot was an anti-personnel projectile, meaning it was used against soldiers. It was a hollow shell filled with scraps of metal called shrapnel. Cannonballs are ammunition used in the Dwarven multicannon. They can be made by using osrs gold a steel bar on a furnace giving 25.6 Smithing experience and 4 cannonballs per bar. In order to make this item, players must have partially completed the Dwarf Cannon quest and have an ammo mould in their inventory. grapeshot, cannon charge consisting of small round balls, usually of lead or iron, and used primarily as an antipersonnel weapon. The biggest difference between the ball and canister shell is the shape of the effect that is produced upon explosion. Due to its oblong shape, the canister shell will break in a more unpredictable pattern. The effect from a canister shell may be a wider pattern, and may be shaped like an oval or even a bowtie. Canister shot is a kind of anti-personnel artillery ammunition. Canister shot has been used since the advent of gunpowder-firing artillery in Western armies. Canister is still used today in modern artillery. The casualties from round shot were extremely gory; when fired directly into an advancing column, a cannonball was capable of passing straight through up to forty men. Even when most of its kinetic energy is expended, a round shot still has enough momentum to knock men over and cause gruesome injury. Explosive shells came into use in the 16th century or perhaps even earlier. These were hollow cast-iron balls filled with gunpowder and called bombs. The drivers who set the November 2019 Cannonball record have bested their own achievement with an average speed of 112 mph. Cannon are typically rated by the weight of their projectiles. The most commonly used cannon during the Revolutionary War were 3-pound galloper and the steadier 6-pound guns, although larger cannon up to 18 pounds saw use in some conflicts. The history of cannon spans several hundred years from the 12th century to modern times. The cannon first appeared in China sometime during the 12th and 13th centuries. It was most likely developed in parallel or as an evolution of an earlier gunpowder weapon called the fire lance. Hern Iron Works makes very reasonable priced cannons. Do any of you use these cannons?Was wondering because they have a "clause" about that they are decoration only. Are they :hmm: I see many people arguing over this. The warning is their disclaimer. They must of been sued or something in the past. I'd inspect the tube really carefully for seams. Then take it to a field where you can fire it safely at a backstop, even if you're firing a blank, and use a long piece of fuse so you have time to get behind an embankment or jump in a hole before it fires. Don't look at it the first time it fires, if she blows, even the smallest piece of shrapnell could blind ya! I have a buddy in NC that has one of the Hern full scale "Carronade" tubes mounted on a Rev War field carriage. His unit bought it second hand after it had sat in someone's yard for 10 years as a decorator. They cleanded the rust off, polished the bore and vented it. They have fired hundreds (if not thousands) of blanks through it. Usually about 4 OZ of 1F. He mentioned that they have fired live also, but don't know the loads used.There have never been any issues with the gun or the bore liner. The 4 oz charges they use have a significant and peircing report in the 2.25 inch bore when they fire this gun. I know, because I have been laying on the ground about 100 feet in front of them when they fired during a reenactment one time! I have one of their 2/3 scale 6 pounders. It has been shot with blanks only, waiting for wheels. Now have the wheels and need to get it mounted. I traded into it about 20 years ago when they were selling for around $180. The barrels are cast around a piece of shelby tube that has a welded plug. If the tube goes off center when casting then the bore is filld most of the way with cast iron so it can't be loaded and sold to parks as ornaments. John Hern died several years ago and his son is running thing now I think. I had a chance many years ago to work in their machine shop but decided not to. Have sold them many engine blocks so if you have one of their older barrels I may have supplied the iron. Someone came to the shop once and tried to trade one of the barrels that had been filled. That's when I found out about the rejects and that the barrel in question had been stolen. John and I talk about it and he thought it was a former employee that had stolen the barrel. As I understand it they do not drill the vent hole and you are buying a non firing canon. This protects them from lawsuits. The ones I have seen will hold as much powder as you want to put in. I have never heard of one blowing up. Sounds right to me John. I purchased two 55" ordinance rifles from them last year., they give me no worries. Could you imagine selling a Cannon in 2005 without a disclaimer? I fire mango juice cans filled with concrete (Mangojuice is 2 3/16) for 1500-1700 yards. The Tall Ship Royaliste operating under the golden gate and plays in war games with the Hawaiian Chieftain and The Lady Washingtan uses HERN carronades. You'll be safe,. HERN doesnt sell an exploding cannon. I didn't like the juice can, couldn't hit the target with my 2". Went to a 2 pound fishing weight mold and cast out some junk lead balls and was able to do much better. I did win a shoot in Canada about 25 years ago with juice cans, I was the only one to hit a 5 gallon can at 100 yards. RCMP pulled me over to look at my canon and told me to have a good time at the shoot. Nice people up there.Harbormaster, your just up the road from me. Someday we will have to get together. Harbormaster, your just up the road from me. Someday we will have to get together. Yes not too far.,I go to Toledo 2 or 3 times a month during work. Hern supplies cannon barrels for Dixie, John told me before he went under. Dixie vents them and raises the price considerably. I have the scale carronade, 1-1/2" bore. It is fun to shoot. Bill I've bought scale replicas for the bookshelf from Dixie. They fire too. To the naked eye, they look good, but I too heard somewhere that Dixie was crooked as all he** and he buys rejects from other manufacturers, vents them and off to market with them! Even if the bore is drilled crooked and there's only 1/4 inch thick wall at the breech. The tiny replicas I bought are the last from them! :bull: There's simply too much risk in this hobby! Thats possible., I dont know.,I have bought from Dixie myself.,Powder flask.,2" worm.,Percussion Duckfoot kit ect.,ect.,but never a cannon.,not at those prices. I can tell from personal experience however., If you are buying from the Hern Foundry Direct..your getting a straight bore heavily built piece of iron at a bargain price that will take a stout black powder charge for what ever given cannon it may be. I cant see ever damaging my ordinance rifles with a black powder charge. They are buffed and the weakest link in the chain of events happening under the gas expansion of fire under pressure is ...., out the end of the muzzle. :thumbsup: My new Grey Stars I bought are awesome as well., they too are a cast iron with a steel sleeve. There's simply too much risk in this hobby! I agree !!! My personal preferance for buying cannons is to ALWAYS buy your cannon from the manufactor. Not some 2nd or 3rd generation retailer who doesnt really know what he or she may be selling. When dealing with Boom Boom stuff they guy building it probably can tell you more info and more than likely has played with his own toys before during and after they began selling thier wares. A backhoe operator excavating the site of Pittsburghs Allegheny Arsenal for the construction of new apartments recently discovered hundreds of Civil War-era cannonballs. The contractor alerted the bomb squad and precautions were taken to keep residents near 39th and Foster streets safe from the 150-year-old artillery projectiles. But what are these balls made of, how did they get there and how dangerous are they?Historians long have suspected the existence of cannonball caches beneath the old arsenal site at 40th and Butler streets, a location locals today know as Arsenal Middle School and the Rite Aid pharmacy. Established in 1814, Allegheny Arsenal produced cannonballs for Commodore Matthew Perrys fleet battling the British on Lake Erie during the War of 1812, and later became one of Americas principal ordnance innovators and manufacturers of ammunition for small arms and artillery in the years before the Civil War.From 1861 to 1865, the sprawling complex of shops and laboratories on the banks of the Allegheny River turned out millions of rounds of musket ammunition and a wide range of shot for the horse-drawn field artillery needed by the Union armies to battle the Confederacy. So great was Pittsburghs wartime production that some historians refer to it as the Arsenal of the Union.Established during the War of 1812, Allegheny Arsenals entrance featured bronze British cannons (foreground) captured at the battle of Saratoga in 1777 and pyramids of stacked cannonballs (background).The Department of Public Safety, along with the contractor, Milhaus, has sandbagged and secured more than 300 cannonballs at the Allegheny Arsenal site.On Sept. 17,1862, 78 women and girls were killed, and many more wounded and maimed, in the worst industrial accident of the war. Leaking gunpowder barrels exploded at the cartridge laboratories where girls were filling paper tubes with black powder (saltpeter, charcoal and sulfur) and lead bullets for muskets.The shops closer to the river, where men and boys loaded ammunition for artillery, were not affected by the fire. Allegheny Arsenal continued producing four types of cannonballs: Solid iron balls (solid shot), clusters or cans of small iron or lead balls (known as case shot, grapeshot or canister), exploding iron balls filled with lead shrapnel (spherical case shot) and hollow iron exploding balls (shells). These cannonballs were classified as 6-pounders, 12-pounders or 24-pounders, depending on the weight of the solid shot intended for the muzzle-loading bronze and iron cannons used during this period.Artillerists of the day used solid shot to batter enemy fortifications, disable opposing cannons or bounce (ricochet) on the ground through massed infantry formations. Shells, though not very powerful because of the small charges of black powder they contained, were used to ignite enemy caissons (ammunition wagons) and powder magazines.The Duquesne Greys drilled at Allegheny Arsenal in 1870 between rows of surplus cannons and stacks of cannonballs left over from the Civil War.Ordnance officers long had known that canister and grapeshot were the most effective rounds. When fired at close range, the small balls in these cases scattered like a giant shotgun blast and devastated closely-packed enemy ranks. The problem was that beyond 100 yards, the small projectiles scattered too widely to be effective.In the early 1800s, Maj. Henry Shrapnel of the British Army invented spherical case shot. He put the small projectiles inside a thin-walled hollow iron shell and added a wooden tube with slow-burning powder that could be cut to the lengths corresponding to the number of seconds the cannoneer wanted the fuse to burn before exploding the ball in front of enemy formations. The momentum of the ball would carry the iron shell fragments and small balls (shrapnel) into the opposing ranks.The U.S. Ordnance Department soon adopted this revolutionary idea, but American officers found that the wooden and paper fuses were susceptible to moisture and shrinkage that resulted in duds or premature explosions, sometimes even before the fired round left the muzzle of the cannon.Allegheny Arsenal cannonballs, from the cache of 1,250 recovered in 1972, deactivated and sectioned at Picatinny Arsenal, NJ.This 24-pounder shell, with its pewter Bormann fuse screwed halfway out, was recently excavated by backhoe at the Allegheny Arsenal site and impounded by the Pittsburgh Bomb Squad.Boys, aged 10-12, arranged lead shrapnel balls inside the hollow iron spherical case shot shell. Men poured molten asphaltum (pitch) over the balls to fill the air spaces. Then they inserted a tin tube containing a small black powder bursting charge and screwed in the pewter Bormann time fuse. Credit: Jack MeltonAllegheny Arsenal worked to remedy this problem and to ensure safety while storing and transporting exploding-type cannonballs in horse-drawn caissons that bounced over all kinds of roads and terrain. In the late 1850s, the arsenal began producing shells and spherical case shot fitted with Bormann fuses. This waterproof pewter fuse screwed into the iron ball. It featured a sealed powder channel that could be exposed by the gunner, who used a chisel to punch a small hole through a number (between 1 and 5) cast into the face of the fuse. The numbers corresponded to how many seconds the gunner wanted the fuse to burn. When the cannon fired, the flame of the propelling charge wrapped around the ball and ignited the exposed powder train, which in turn sparked the bursting charge after burning for the selected number of seconds.Contrary to Hollywood films and popular lore, these cannonballs did not explode on contact. Percussion fuses were not used on spherical projectiles. These shells and spherical case shot were designed to explode only when a flame reached the interior charge. Another widely held misconception is that black powder becomes unstable over time. In fact, the opposite is true. With exposure to moisture, the saltpeter (potassium nitrate), charcoal and sulfur components degrade and, in many cases, will not even burn after 150 years in the ground.Horse-drawn caissons and limbers, pictured here, carried chests of artillery ammunition. After the Civil War, these vehicles were parked at Allegheny Arsenal and the ammunition unloaded and stacked.The confusion likely results from the publics greater familiarity with the high explosives developed after the Civil War. Alfred Nobels invention of nitroglycerin spawned a new era of gunpowder. Nitro-based explosives, such as dynamite, can become less stable and more dangerous over time. Hence the appropriate caution exercised by government agencies when unidentified ordnance is discovered.Historians believe that after Allegheny Arsenal was decommissioned in 1905, stacked pyramids of obsolete cannonballs (all four types) were used as fill as new construction replaced the old buildings. In 1972, while digging footings for a warehouse fewer than 75 yards from the recently discovered cannonballs, workers found 1,250 balls, mostly 6- and 12-pounders. Most of these were packed in water-filled barrels and removed to Indiantown Gap Military Reservation and are believed to have been exploded by the 56th Explosive Ordnance Detachment. A number of the balls escaped destruction and were sent to Picatinny Arsenal in New Jersey. About 20 were unloaded or cut in half and examined. Some wound up in the hands of private collectors. Much information was lost to history. Only a dozen specimens found their way into the collection of the Heinz History Center, where they are exhibited today.Archaeologists and curators are eager to examine the recent discoveries. Many questions can be answered by a careful inspection of the site and an analysis of the cannonballs. Simply weighing the projectiles and matching them to military specs can tell us whether the fused projectiles are shells or spherical case shot. Some Bormann fuses manufactured at Allegheny Arsenal bear telltale marks. Non-destructive X-ray techniques are now available that would allow researchers to safely see inside the balls.Little is known about how the manufacture of cannonballs varied from arsenal to arsenal. If we can determine the distinctive features of Allegheny arsenal projectiles, those found at Civil War battlefields can be definitively identified. There is the possibility that after the Civil War, balls from different arsenals (perhaps even Confederate) were brought to Pittsburgh to be unloaded and subsequently discarded in a disposal pit.The discovery of the cannonball cache at the Allegheny Arsenal site represents a rare opportunity to learn more about our history at a time when Pittsburgh was the smoky Iron City and the Arsenal of the Union during the Civil War.Andy Masich is the president and CEO at the Senator John Heinz History Center. Cannonballs may be a thing of human warfare past, but it is not difficult to imagine the sense of dread at seeing a 40-pound metal projectile headed toward your ship, unable to tell for a few agonizing moments whether it will find a deadly mark.In addition to being the stuff of pirate legends and a prominent feature in video games, including some of the earliest home games of the 1980s, cannonballs provide a superb lesson in the physics of basic projectile motion.Instead of gold doubloons, though, your "treasure" will come in the form of improved skills at unraveling basic ballistics problems. You won't find cannons or cannonballs for sale at your local big-box retailer these days, but there was a time when having a good cannon on hand was important for a group of individuals possessing, or bent on possessing, a great deal of valuable property. Cannons were once very effective at deterring thieves, or alternatively, making it easier for them to ply their questionable trade.As you might expect, there is really no such thing as a "typical" cannonball weight. To get a general idea, the British forces of old made cannonballs in discrete masses ranging from about 4 pounds to about 42 pounds. As these were made of iron, a typical density was about 7,860 kg/m3. That's about eight times denser than water.Did pirate cannon balls explode? No. They were simply large, heavy, deadly pieces of metal. The vision of exploding cannonballs surely infuses thoughts of centuries-old conflicts on the high seas with drama and intrigue, but this idea fails to accurately reflect reality. The 17th-century genius Isaac Newton did a lot of things, including inventing many of the methods of modern calculus. But perhaps his greatest feat was deriving the mathematical equations that govern the behavior of objects subjected to the influence of gravity and other forces.The general solution for the horizontal position x, velocity v and acceleration a of an object at time t is:$x(t)=x_0+v_0t+\frac{1}{2}at^2$This can be combined with other equations of motion to derive related expressions. Note that when you fire a cannonball into the distance at a given angle, it is subject to the influence of gravity in exactly the same way it would be if you merely dropped it off the top of a building. That is, if you fire the cannonball with enough force to get it 100 feet into the air, it will fall to the ground just as rapidly if it is moving horizontally while falling as it will if only falling.One crucial quantity is the range, or the maximum distance the cannonball will travel. This is a function of initial velocity _v0 and launch angle _:$R=\frac{2v_0^2\sin{2\theta}}{g}$Because the maximum value of sine is 1, and this occurs at 90 degrees, you can see that the ideal launch angle in terms of maximizing horizontal distance is 45 degrees. Beck, Kevin. "How Cannonballs Work" sciencing.com, . 21 December 2020. APA Beck, Kevin. (2020, December 21). How Cannonballs Work. sciencing.com. Retrieved from Chicago Beck, Kevin. How Cannonballs Work last modified March 24, 2022. Cannon balls were usually called solid shot, or round shot,during the Civil War. There were many types of ammunition forartillery. Round shot were used on ships, to smash through thesides of enemy ships, and also against forts, to smash down walls,but were not the favorite type to use against enemy troops. Shells,bombs, shrapnel or "carcasses" were preferred against enemyinfantry, until they got close, then the preferred load wascanister, case or grape shot. The first types were all hollowprojectiles filled with explosive and some type of metal pieces,such as rifle balls, that would scatter when the shell was explodedby a fuse. The second type were all projectiles filled with manysmall balls, which made the cannon like a giant shotgun, and wereverу devastating against enemy infantry at close range. The mostcommon types of ammunition carried with the artillery operatingwith the armies were shells, and canister or case shot.Cannon balls, and the smaller balls filling a canister or a caseshot, or a bag of grape shot, were all made of cast iron. Themolten iron was "cast" into a mold, usually a sand mold. Aftercooling the ball was removed, and the seam around the middle wherethe two halves of the mold met had to be filed off, along with thesprues where the hot iron was poured into the mold, and the ventsprue which allowed the air to come out of the mold as the liquidiron poured in, and let the caster see that the mold was full.See the related links below for a more detailed explanation oftypes of ammunition and the manufacturing process.These generalities all hold true for the most common type ofcannon used by both sides, a 12 pound "napoleon". They were called"12 pounders" because the balls weighed 12 pounds; the gunsthemselves weighed about a ton, and could be made of iron, orinfrequently brass or bronze. There were other types of cannon inuse, including some types of rifled guns, which had grooves insidethe barrel to make the ball spin. This made rifled guns much moreaccurate than the smooth bore (no grooves) 12 pounders. Some ofthese rifled guns required special ammunition, molded to fit snuglyinto the grooves in the barrel. Armstrong and Whitworth guns werecommon types of rifled guns. Much bigger guns could be used onships, which were so heavy that if used on land they would sinkinto soft ground and get stuck. Dahlgren and Parrot guns were hugecannon used on ships, some of which fired 300 pound balls.Sometimes massive mortars were used to bombard forts, from ships,or if used on land they were fired from railroad flatcars or fromspecially constructed, heavy-duty platforms. These mortars firedhuge projectiles at a high angle, to get over the walls of a fortand explode inside. Larry Dale Gordon/Photographers Choice RF/Getty Images Exploding cannonballs were hollow iron balls filled with gunpowder, fit with a fuse and lit before they were placed in a cannon and shot toward the enemy target. While often seen in movies, the exploding variety was less common than solid round shot made of stone or cast iron, due to difficulty in timing the explosion and impact, according to Notre Dame Magazine.Solid shot cannonballs did damage due to their weight and momentum without an explosion. They were useful against fortified walls of castles. At sea, the crew of the ship attached chains and other materials to help take down the enemy ships rigging. They heated the metal balls to

glow red hot with the hope of starting a fire on board the ship, or that the cannonballs would land in the ships magazine and explode with their stored gunpowder. In battles on the land, the cannon shot the projectiles into columns of soldiers, which led to multiple casualties on impact as well as with each subsequent bounce. A single shot was capable of passing through 40 men and often continued to produce additional gruesome injuries.While they do not include an explosive load, cast iron cannonballs recovered after years under the ocean sometimes explode. The time underwater, aided by chemical and biological reactions create gases in the porous cast iron. When brought to the surface, the lower pressure of the atmosphere allows the gases to expand, exploding the already rusty cannonball. MORE FROM REFERENCE.COM

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