Guardians of the Kingdoms: The Artillery Arsenal of Amber, Jaigarh and Jaipur Through the Ages

1. Ram Krishna Sharma, Department of History, Apex University
2. Dr. Sunita Faujdar, Apex University
3. Dr. Priyank Talesara, Madhav University

Abstract: This research paper delves into the rich historical legacy of artillery in the princely states of Amber, Jaigarh and Jaipur, spanning the Mughal and British periods. As guardians of their kingdoms, the artillery of Amber, Jaigarh and Jaipur played a pivotal role in shaping military strategies and influencing key battles. This comprehensive study explores the evolution, craftsmanship, typology and strategic impact of the cannons, revealing them as masterpieces of the foundryman's art. Through a meticulous examination of historical records and artifacts, this paper sheds light on the enduring significance of the artillery arsenal in safeguarding the realms of Amber and Jaipur over the centuries.

Keywords: Artillery, Cannons, Jaipur, Amber, Jaigarh, Historical Weapons.

1. Introduction

Military organization and strategy have consistently played a crucial role in shaping the history of various states. Throughout recorded history, the chronicles extensively cover military administration and organization, from the ancient "Astra-Sashtras" and "chaturanga" to the Mauryan Age's innovative "six-board" structure. The Arab cavalry's renowned "Tutkoman horses" and Akbar's "Mansabdari system" have been meticulously examined by modern historians. However, an often-overlooked aspect is the artillery's significant role in military organization.

Babar, the eminent "empire builder of the 16th century," introduced decisive artillery that played a crucial role in establishing Mughal rule in India. The adoption of Bahar's "Rumi" fighting style by contemporary Indian princes marked a pivotal moment in military strategy. The expertise in cannon-making, initially brought by Babar, disseminated among the Mughal Empire's allies. Among these allies, the Kachawas of Amber emerged as one of the most formidable, leading to the establishment of Jaigarh as a key artillery center in the region. Despite the historical significance of artillery, it has received limited attention from scholars, overshadowed by other aspects of military organization.

1.1 Brief History of Artillery

A concise history of artillery reveals that the essential principles of modern artillery find their roots in ancient war machines, such as the Roman catapult, Indian gophan, and gule. These early weapons, dating back to the 8th century B.C., laid the foundation for the evolution of artillery.

Among the ancient war machines, the catapult played a significant role, resembling the howitzer or mortar of ancient times. Capable of striking enemies behind high walls and breaking defensive lines, the catapult could launch a hundred-pound stone at a distance of 600 yards, following a high arc trajectory. The mechanism involved soldiers winding down a wooden arm, attached to a sling, which, when released, catapulted the stone into the air.

Another notable war machine, the ballista, differed from the catapult by shooting low and straight at the enemy. This weapon featured bow-like arms with a cord tied to them, allowing the launch of various projectiles, including stones, arrows, wooden pieces, and darts. Despite its crude nature, the ballista proved useful, as exemplified by Caesar's purported use of catapults and ballistas during his landing in Britain.

During the Middle Ages, the trebuchet emerged as a significant war machine, operating akin to a seesaw. With a heavy weight of up to 10 tons fastened to the short arm and a projectile in the sling of the longer arm, the trebuchet could throw a 300-pound stone to a distance of 300 yards. Notably, these war engines continued to be utilized even after the introduction of gunpowder, coexisting with cannons and other artillery weapons.

The Mughal system of warfare wielded significant influence over the military strategies of numerous contemporary rulers, becoming widely adopted by the 16th century. The Mughals' approach to war, encompassing army organization, the science of warfare, and the technical expertise in casting cannons, was embraced by various princes across India. Notably, the Kachawas of Amber emerged as one of the most formidable and renowned allies of the Mughals. The alliance between Akbar and Bharmal marked a pivotal turning point, not only in the history of the Amber State but also in its artillery organization. This collaboration ushered in a new era, showcasing the transfer of military knowledge and technological advancements that significantly shaped the trajectory of both the Mughal Empire and its allied states.

In summary, ancient war machines like the catapult, ballista, and trebuchet set the groundwork for modern artillery, showcasing the endurance of these technologies throughout various historical periods.

2. Artillery of Amber and Jaipur

- Historical Parity with Mughal Artillery:

The lineage of Amber artillery extends as far back as the Mughal artillery, showcasing a shared and venerable history in the realm of military technology.

- Role in Mughal and British Period Battles:

Amber and later Jaipur State artillery played a remarkable role in pivotal battles spanning both the Mughal and British periods, contributing significantly to the military landscape of these eras.

- Exemplary Craftsmanship:

The cannons crafted by the Amber artillery are acknowledged as masterpieces, reflecting the artistry and skill of the foundryman. This attests to the sophistication and quality of the weaponry produced.

- Trajectory-Based Classification:

Amber's cannons are classified based on trajectory into three distinct categories.

1) Flat-Trajectory Cannons: These were adept at launching shots with a relatively level flight.
2) Medium-High Trajectory Cannons: This category represents a hybrid, combining features of mobile field cannons and heavy mortars, striking a balance between flat and high trajectory capabilities.
3) High-Trajectory Cannons: Designed to surmount obstacles and strike targets from above, these cannons exhibited advanced tactical capabilities.

- Diversity in Cannon Types:

The Amber artillery possessed cannons from all three trajectory categories within its State army. Although flat trajectory cannons were prevalent, the inclusion of varied types emphasized adaptability and strategic flexibility.

- Undeniable Role Alongside Cavalry Forces:

While there is ample literature on the valor of Amber's cavalry forces, the achievements of the State artillery stand as a testament to its strategic importance. The artillery's contributions in battle should not be overshadowed by other military components.

- Realization of Artillery's Importance:

The rulers of Amber demonstrated foresight by recognizing the pivotal role of artillery in warfare. This awareness underscored their commitment to maintaining a well-rounded military force equipped with the latest advancements in weaponry.

- Quotable Wisdom from Luis Collado:

The profound acknowledgment by Luis Collado, a Spanish mathematician and historian, reinforces the significance of artillery in warfare. Describing it as "a machine of infinite importance," his words resonate with the timeless role played by artillery in shaping the outcomes of historical conflicts.

2.1 Field Cannons

Field cannons, integral to battlefield strategies, were characterized by their flat-trajectory smooth bore design. These cannons, essential for swift actions, prioritized mobility, being lighter in weight to facilitate easy transportation across varying terrains. The mobility of these cannons was achieved through the strategic shortening of the barrel and thinning down of bore walls. Mounted on light two-wheeled carriages, these field cannons demonstrated agility and were designed for movement alongside army troops. The use of wood for wheels and cheeks enhanced their lightness compared to carriages with cast iron components, ensuring superior mobility. To facilitate transportation, a two-wheeled limber was employed, connected to the gun carriage through the hole in the cross beam of the trail. This arrangement allowed for easy drawing by horses or oxen. Some field cannons within the Amber artillery were equipped with an elevating screw mechanism, enabling precise adjustments for the elevation and depression of the cannon barrel. The successful deployment

of these field cannons in battles across distant regions like Bihar, Bengal, and the Deccan highlighted their effectiveness on the battlefield.

2.2 Siege Cannons

Distinguished by their weight and purpose, siege cannons surpassed field cannons in size and capability. Mounted on a two-wheeled carriage with larger wheels than their field counterparts, these cannons were specifically designed for the formidable task of besieging and demolishing enemy forts. Transported alongside a two-wheeled limber, which functioned as a four-wheeled carriage, the sheer weight of these siege cannons necessitated up to 200 pairs of oxen for ground-level movement. Their formidable capacity allowed them to hurl 30 Maunds of iron balls and 60 Maunds of stone balls, showcasing their destructive power.

The significance of siege cannons witnessed a substantial increase during both the Mughal rule and the British period. Siege operations incorporated the construction of covered paths known as 'Sabat,' comprising two parallel walls near the fort. From these paths, cannons were strategically fired, and mines were meticulously dug and operated. This method, famously employed by Akbar during the siege of Chittor in 1567-68 and Ranthambore in 1569, marked a crucial development in siege warfare. Siege cannons, equipped with elevating screws, boasted a maximum elevation of 12 degrees. While accurate in their targeting, these cannons posed challenges in terms of maneuverability due to their considerable size and weight.

2.3 Garrison or Fort Camions

Garrison or fort cannons, a permanent fixture safeguarding forts, often surpassed the siege and field cannons in weight. Unlike their mobile counterparts, these cannons remained stationary within the fort, strategically positioned in bastions or burj. Jaigarh, for instance, boasts numerous circular gun bases specifically designed for mounting these cannons. The construction of these cannons involved the use of single massive planks for the cheeks or side pieces, a design akin to Spanish carriages. In contrast, the British and Americans employed multiple planks joined together for their gun carriages. The cheeks of Amber artillery were impressively thick, ranging from 6 to 8 inches. Commonly made from Neem, Sagwan, Seesum, and similar woods, these cannons featured cast iron wheels, though wooden wheels were also used in the early stages of cannon-making in Jaigarh. The elevating screw for fort cannons allowed for an elevation of 12 to 15 degrees, and in smaller cannons, U-shaped stands were utilized to raise the barrel. Notably, the Jaigarh fort houses one of the most renowned fort cannons, the Jaivana cannon.

2.4 Shots

During the early stages of artillery warfare, projectiles were predominantly stone balls, later evolving to lead-coated variations. By the 15th century, a significant advancement occurred with the introduction of cast iron shots, gradually supplanting the use of stone balls. Babar's artillery, exemplifying this transition, utilized both cast iron and stone balls. These projectiles served the primary purpose of demolishing fort walls and countering enemy batteries. Despite

the Venetians pioneering explosive shells in 1376, it wasn't until the 19th century that their widespread adoption in flat-trajectory cannons became prevalent. Notably, the artillery forces of Amber did not incorporate explosive shells; instead, they adhered to the use of stone balls throughout their operations.

2.5 Rockets

The inception of rocketry finds its roots in India, where, although rockets had long been popular in fireworks, their utilization in warfare began in the 18th century. The British army first encountered the use of rockets in India around 1780, and within the subsequent 25 years, William Congreve developed rockets with an impressive range of 2 miles. These advanced rockets were employed by the British against Boulogne in 1806. Notably, the rockets made their debut in European land warfare during the battles of Liepsig in 1812 and Waterloo in 1815. Jaigarh houses several historical rockets, along with empty rocket shells, providing tangible evidence of their use in Amber artillery. Constructed as cast iron cylinders filled with gunpowder and equipped with a fuse, these rockets were positioned in launching stands. When fired, the rockets, especially those targeting the cavalry, caused significant disruption and chaos among the frontline troopers.

3. Jaigarh's Artillery Collections

Several artillery pieces are showcased in the Jaigarh Fort, each with a rich history of deployment in numerous battles involving the Kachawas of Amber and Jaipur. Notably, all the cannons on display within the fort were crafted in its own gun-foundry. Among the significant cannons, the following list highlights key pieces and the notable battles in which they played pivotal roles:

3.1 The Jaivana Cannon

A prominent attraction at Jaigarh Fort, the Jaivana Cannon is renowned as the world's largest cannon on wheels, surpassing even the Russian claim in terms of barrel size. Crafted in the Jaigarh gun-foundry in 1720, Jaivana stands as a testament to medieval military science, often described by Nihal Mathur as a "quirk of military logic" beneath a vast corrugated iron shed. The cannon's total length, from barrel tip to carriage tail, spans 31 feet 3 inches, with the barrel measuring 20 feet 2 inches and weighing an impressive 50 tons. Elaborate floral designs, featuring an elephant, peacocks, and ducks, adorn the barrel, showcasing its artistic craftsmanship. The bore diameter is 11 inches, with a varying barrel thickness and two lifting rings for crane support, remnants of which remain in Jaigarh.

Mounted on a high four-wheeled carriage, the front and rear wheels measure 9 feet and 4.5 feet in height, respectively, with a thickness exceeding one foot. The barrel rests on a 24-foot-long carriage shaft, 8 inches thick and 2 feet 3 inches broad, featuring hooks for rotation using ropes and elephants. An elevating screw, 6 feet long, facilitated barrel adjustment. Contrary to the belief that Jaivana was purely ornamental, internal marks attest to its firing history. With approximately 100 kg of gunpowder per shot and a 50 kg cannonball,

the cannon experienced minimal recoil, estimated at four feet. Debunking myths, it's clarified that Jaivana did not require a football field-sized space for firing due to recoil.

Figure 1: Jaivana Cannon of Jaigarh (World's largest Cannon on Wheels.)

3.2 The Bajrangvana Cannon

Unique among the cannons in Jaigarh Fort, Jaivana stands alone in featuring iron sleeves inside its barrel, providing additional resistance. Another notable piece, Bajrangvana, serves as a prime example of a fort or garrison cannon. This sizable cannon is positioned on a two-wheeled gun carriage and, similar to Jaivana, is transported by a limber pulled by 16 pairs of oxen. Bajrangvana, in essence, can be considered a miniature version of Jaivana, demonstrating the diversity and significance of the artillery collection within the fort.

3.3 The Karak Bijli Cannon

Believed to be one of the earliest cannons within Jaigarh Fort, this artillery piece dates back to the reign of Bhagwandas. Functioning as a flat-trajectory cannon, it is notably lightweight compared to other fort cannons. Deployed by the forces under Man Singh I, this cannon played a pivotal role in battles across regions such as Bihar, Orissa, Bengal, and the Deccan. Its historical significance lies in its association with early military campaigns and its representation of the evolving technologies during Bhagwandas's rule.

3.4 The Badli Cannon

Crafted in the year 1600 AD, this cannon found utility under the command of Man Singh I and subsequent leaders. Mirza Raja Jai Singh, notably, employed this cannon in 1652 during

operations against rebels in Balkh and Kandahar. Furthermore, in 1660, the cannon played a pivotal role in the capture of the Purandar fort, a significant event in the conflict with Shivaji, who was subsequently sent to Delhi. This cannon's historical journey underscores its role in various military campaigns led by different commanders over the years.

3.5 The Cannon Machhban

Forged in the year 1606, this cannon served under Sawai Ram Singh during several significant battles. In the years 1670, 1671, 1675, and 1690, it played a crucial role in military engagements in Assam, Kangra, the North-West Frontier Province, and Kabul, respectively. The cannon's participation in these diverse campaigns underscores its enduring utility across different regions and conflicts under the command of Sawai Ram Singh. The cannon Machhban was also used by the Amber forces in the battles of Jawar-ki-Gari and Kanota in 1698 and 1711 respectively.

3.6 The Cannon Dhoomban

Crafted in 1622 at Jaigarh, the Cannon Dhoomban saw extensive use under Mirza Raja Jai Singh and his successors. In 1642, Mirza Raja Jai Singh employed this cannon during the assistance provided to Dara Sukho at Kandahar against Shah Shafi, the King of Iran. Subsequently, the cannon was utilized against Maharana Jagat Singh of Chittor in 1653. Sawai Jai Singh II later deployed Dhoomban against Rao Budh Singh of Bundi in 1735. Maharaja Ishwari Singh showcased the cannon's firepower in the Battle of Raj Mahal in 1748 against Madho Singh and his allies. The historical journey of Cannon Dhoomban reflects its active participation in significant battles under different leaders across various periods.

3.7 The Cannon Nahar Mukhi

Forged in 1675, the Cannon Nahar Mukhi derived its name from the lion-shaped tip at the end of its barrel. Sawai Jai Singh II wielded this cannon strategically in historical conflicts, notably deploying it against Churaman Jat at Kama in 1708. Additionally, in 1736, Nahar Mukhi played a crucial role on the frontiers of Rajputana when employed by Sawai Jai Singh II against Baji Rao Peshwa. The cannon's distinctive design and its role in these notable battles mark it as a significant artifact in the military history of the region.

3.8 The Cannon Singhban:

Forged in the year 1701, Cannon Singhban found its place in several pivotal battles under the command of Sawai Jai Singh II. It played a crucial role in the Battle of Thoon in 1722-23 and was deployed against Rao Budh Singh of Bundi in 1731. Additionally, Singhban saw action against Nadir Shah at Bhatinda in 1740. Subsequent commanders, like Sawai Pratap Singh, utilized this cannon in the Battle of Rajgarh in 1781 against Rao Raja Pratap Singh of Macheri and in Lalsot in 1796 against Madhoji Scindia's general Deboigne. The cannon's participation in these diverse conflicts reflects its enduring significance in military engagements over the years.

3.9 The Cannon Nagin:

This unique cannon, crafted with six barrels, earned the name Cannon Nagin. Its distinct feature allowed it to fire six shots simultaneously, enhancing its firepower. Deployed in various battles, including Rajmahal in 1749, Bagroo in 1750, Luniawas in 1751, and Deedwana in 1755, Nagin proved highly effective in striking the frontline enemy forces. The innovative design and functional capabilities of Cannon Nagin marked it as a valuable asset on the battlefields of its time.

3.10 The Cannon Madhuri

Crafted in the year 1752, Cannon Madhuri holds a significant place in military history. Under the command of Sawai Madho Singh, this cannon was actively employed in various battles, including the Battle of Deedwana in 1754, the Battle of Barwara and Tonk in 1757, and the Battle of Rampura in 1759. Its role extended to subsequent conflicts, where Sawai Pratap Singh utilized it in the Battle of Rajgarh in 1781, Baswa and Bhandarej in 1782, Lalsot in 1786, and Toda Bhim in 1786.

In the expansive artillery collection at Jaigarh, numerous other cannons share their historical stories. Examples include Banjari, Ramban, Shivban, Mulk-Maidan, Fateh Jung, Sher Jung, and Ram Chari. These cannons collectively showcase the diversity and historical significance of Jaigarh's artillery. It is speculated that the tradition of cannon-making in Jaigarh endured until the conclusion of the 19th century, leaving behind a rich legacy of craftsmanship and military heritage.

4. Artillery Operations

The Amber and Jaigarh Fort boasts a diverse collection of essential tools employed by artillerymen for firing, showcasing the meticulous preparation involved in artillery operations:

- Rammer: A lengthy cylindrical wooden tool designed to push powder, wads, and shots inside the cannon barrel.
- Wormer: An iron screw, intricately attached to a lengthy wooden handle, utilized for extracting stuck wads or other remnants from the bore.
- Sponge: A cylindrical wooden tool, equipped with a bristle brush at one end, intended for cleaning the cannon barrel after each discharge.
- Pick: Resembling an ice pick, this pointed tool serves the dual purpose of clearing the cannon vent and piercing the powder bag.
- Linstock: A stand crafted to hold the burning cotton rope during firing.
- Lighter (Chakmak): Employed for igniting the cotton rope in the linstock.

The House of Amber and later Jaipur not only assisted the Mughals but also collaborated with the British in safeguarding their empire in India. The 19th century witnessed significant transformations in the military organization of Indian states due to European influence. French scholar Victor Jacqumont, in 1832, provided insights into the army organization of

Jaipur State, marking a period of adaptation and change in response to European military strategies.

5. Conclusion: The Artillery Legacy of Amber, Jaigarh and Jaipur

In exploring the rich history of artillery in Amber and later Jaipur, we delve into a tapestry woven with military prowess, technological innovation, and strategic collaborations. The cannons of Amber, dating back to the Mughal era, and the subsequent developments in Jaipur, especially within the formidable Jaigarh Fort, bear witness to the region's integral role in shaping the military landscape of India.

From the majestic Jaivana Cannon, the world's largest on wheels, to the diverse array of cannons like Dhoomban, Nahar Mukhi, and Singhban, each piece narrates tales of battles fought against diverse adversaries. The chronological progression of these artillery pieces, from the early 17th century to the 19th century, mirrors the changing dynamics of warfare and the evolving needs of the state.

The assortment of tools used by artillerymen, meticulously preserved in Jaigarh Fort, unveils the precision and care taken in artillery operations. The rammer, wormer, sponge, pick, linstock, and lighter stand as symbols of the meticulous craftsmanship and technological sophistication employed in the artillery domain.

Furthermore, the collaboration of Amber and Jaipur not only with the Mughals but also with the British underscores their pivotal role in defending the Indian subcontinent. The influence of European military strategies in the 19th century ushered in a new era, as seen through the lens of Jaipur State's army organization, as documented by Victor Jacqumont.

As the echoes of historical battles resonate within the walls of Jaigarh Fort, the artillery legacy of Amber and Jaipur stands as a testament to the region's resilience, adaptability, and contributions to the broader narrative of India's military history. The cannons and tools, meticulously preserved, continue to tell stories of strategic brilliance, technological prowess, and a commitment to defending and shaping the destiny of the kingdoms they served.

Bibliography

1. Cambridge Medieval History, Vol. I, 331.

2. Manucy, Albert. "Artillery Through the Ages." A Short Illustrated History of Cannons. Emphasizing Types Used in America. Reprint 1962, p. 2.

3. Williams, Rushbrook. "Empire Builder of the 16th Century." p. 129.

4. Williams, Rushbrook. "Army of the Indian Moghuls." p. 114.

5. Srivastava, A. L. "Medieval Indian Culture." p. 15.

6. Elias & Ross. "Tarikh-i-Rashidi." Quoted from Ishwari Prasad: "The Mughal Empire," p. 89.

7. Sarkar, Jadunath. "Military History of India." p. 55. Quoted from A. L. Srivastava: "Medieval Indian Culture," p. 17.

8. Manucy, Albert. "Artillery Through the Ages." p. 31.

9. Srivastava, A. L. "Medieval Indian Culture." p. 19.

10. Sarkar, Jadunath. "A History of Jaipur (1503-1938)." p. 372.

11. Showers, Lt. Col. H. L. "Notes on Jaipur (Compiled in 1909)." pp. 2-3.

12. Showers, Lt. Col. H. L. "Op. cit." pp. 62-63.

13. Sarkar, Jadunath. "Op. cit." pp. 371-372.

14. Sarkar, Jadunath. "Op. cit." pp. 383-384.