

PRACTICAL EXPERIMENT ON CATAPULTA, USING METHODS OF MECHANICAL PHYSICS.

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Abstract. This research aims to expose and present the theme "Catapult", which is clearly to understanding the entire audience. The catapult word means a weapon of war that has the intention to throw objects, such as stones, wood, water among other things.

The meaning comes from the Greek which is defined as Katapeltes that is used to define a medium and large machine had been created by the Greeks during the reign of Dionysius I this being used as a weapon of war.

We remember that the calculations presented here are based on the book mechanical physics Fundamentals 1 author Halliday Resnick Walker.

keywords: Catapult, elastic strength, physical, trebuchets, mangonel, and ballistics.

1. INTRODUCTION

Before the invention of firearms, catapults were important weapons of war to society. A catapult was a simple machine, used to launch projectiles, or heavy objects against an enemy, with great strength and great distances.

To use it, the soldiers tightened the rope, turning the trouble. With this, the strings in the arm base were twisted, getting tighter. The soldiers then placed in the receptacle a particular object, which is preferably very large, then the rope loosened. The ropes around the base were unfolding all at the same time and the arm moved forward, releasing its load. Catapults were usually used to destroy walls of castles, castles and other buildings. The army used large and small catapults. the smallest were mounted on wheels and taken to the battles. Carpenters who traveled with the armies built catapults along the path until the battle. large ones usually kept in one place and were used by the inhabitants of cities and castles to defend against enemies.

The first catapults appeared in the thirteenth century BC The ancient Romans improved the artifact and built catapults on wheels.

Fun fact: Today's armies use equipment based on the catapult to launch missiles and aircraft.

2. BACKGROUND KNOWLEDGE

2.1 Trebuchets (trebuchet)

Trebuchet is the oldest of the siege weapons and the most powerful and effective. It believed to have been invented in the Middle East or China, which became a part of the war in Europe during medieval times and was known in England as "ingenium". The French had a special liking for the trebuchet and remained a part of his military equipment for years. Historians believe that the trebuchet continued to be used by the Europeans, even after gunpowder was invented. The trebuchet is different from other types of catapults to the fact that, while most in catapults, the force required to release the object is generated by the tension in the rope or string a trebuchet uses a large mass balance that is instrumental in the projection the object connected to the opposite end.

The trebuchets were used aiming to launch several objects, and these (rocks, animals, people ...). The trebuchets were used in medieval time varying in pitch range, accuracy, and size. A trebuchet PE alone can be used to throw thousands of stones per day. There are two types of trebuchets: the first traction trebuchets that have people feeding them, and stones the other used as a counterweight and were known as a counter-weight trebuchets.



Figure 1- Trabuco (trebuchet)

2.2 Mangonel

The creator of mangonel was the Romans who invention will weapon in the century 400 BC, they wanted to produce something that had as its objective a weapon of destruction, and it is fast locomotion, unlike ballistic. Initially, the mangonel had a sling in which the projectile was placed, but later, the sling has been replaced by a wooden arm.

Referring to the three types of catapults, (mangonel, trebuchets, and ballistics), the mangonel has among the three machines the longest range about 1330 feet (about 396.24 meters), the mangonel is higher compared will ballistics, but smaller compared to the trebuchet.



Figure 2 - Mangonel

2.3 Ballista

The creation of ballistics was invented by the Greeks in the 8th century BC. That has its origin from the Greek word, and the meaning of "play." It has to function fling arrows and other sharp objects, this has another name which is, (javelin). The ballista was still, not moving, so it had to be built on site that would be used in the future.

The ballista comes down to the second principle of the catapult, where the tension of the braided wire is used to throw huge rocks, which are with a lot of mass, always high speed along a flat trajectory. The Romans said to succeed in building their empire by Roman used this equipment for destroying walls of fortresses and enemy cities in seconds.

The ballista has a disadvantage: their short range.

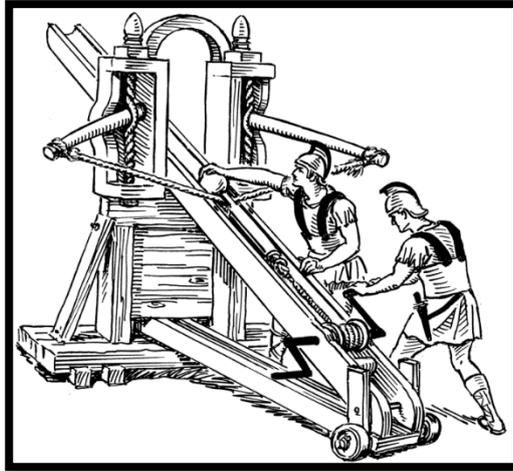


Figure 3- Ballista

3. RESULTS

Cálculacion

Times: T1=0,07 segundos	Space: S1= 159 cm
T2=0,09 segundos	S2= 161 cm
T3= 0,08 segundos	S3= 160 cm
Average time: 0,08 seconds	Average area:: 160 cm

$$X = 0.8$$

$$V = S / T = 1.6 / 0.08 = \pm 20 \text{ m / s (SI) or } \pm 5.5 \text{ Km / h}$$

$$A = V / T = 20 / 0.08 = \pm 250 \text{ m / s (SI), or } \pm 69.45 \text{ Km / h}$$

$$F = m * a = 0.01 * 250 = \pm 2.5 \text{ N (SI)}$$

$$F * = K x ' = K * 2.5 \text{ } 0.08' \text{ } 31.25 \text{ K} = \text{N / m}$$

$$\text{Epel} = k * x^2 / 2 \text{ } "31.25 * (0.08)^2 / 2" \text{ } 31.25 * 0.0064 / 2 \text{ } "0.2 / 2 \text{ } " = 0.1 \text{ Epel N}$$

Looking back:

X = spring deflection in the event = 10g or 0.01 kg. V = velocity

S = Space = Space in English.

T = time

A = Acceleration

F = Force

M = mass of the object

K = spring constant

Epel = Potential Energy Elastic

SI = international system of abbreviation for units (SI), for example:

A = m / s, S = m, if T = V = m / s.

4. CONCLUSIONS

We conclude that Catapult has the intention to throw objects including: (stones, woods, water among other things), was created by the Greeks during the reign of DIO I Nisaeon this being used as a weapon of war.

There are three main types of catapults: trebuchet, mangonel, and ballista.

The army used large and small catapults. The minors were mounted on wheels and taken to the battles. Carpenters who traveled with the armies built catapults along the path until the battle. The generally large mind was in one place.

Trabuco is the oldest of the siege weapons and the most powerful and effective, which became a part of the war in Europe during medieval times.

There are two types of trebuchets: the first traction trebuchets which have Alimenterius people them, and stones and others used as a counterweight and were known as trebuchets balance.

The mangonel was created by the Romans who invented will weapon in the century 400 BC, as they wanted to produce something that had as its objective a weapon of destruction, and it is rapid locomotion.

The creation of the crossbow was made by the Greeks in the 8th century BC It has with are- function

Messer arrows and other sharp objects. The ballista was still, not moving, It is, therefore, had to be built on the spot that the future would be utilized.

The ballista is summed with the second principle of the catapult, where the tension of a wire braided is used to throw huge rocks.

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