

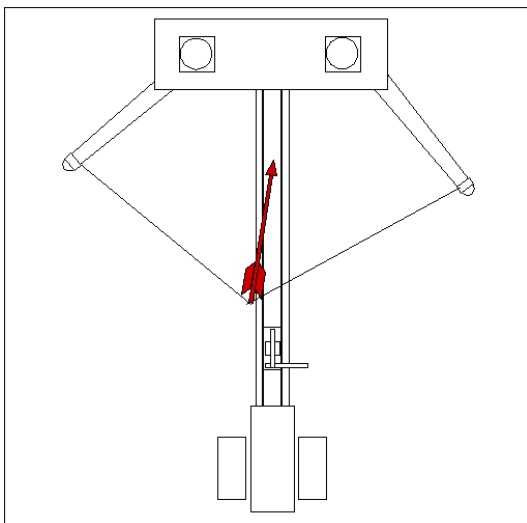
Ballista Tuning

Some notes on the tuning of a Ballista and conflicts with accepted academic interpretation.

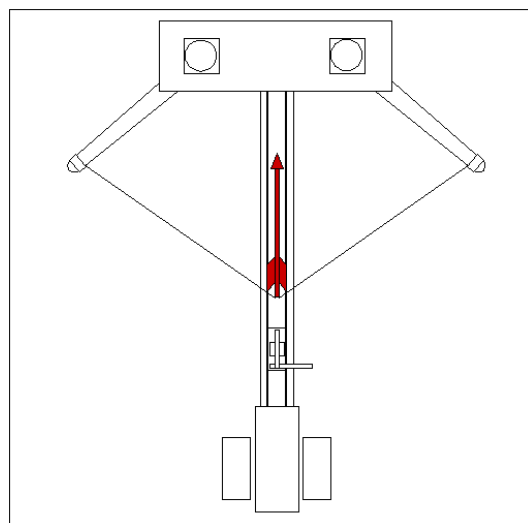


The ballista is a very powerful arrow or stone throwing machine descended from the gastrophetes invented in 399BC. Its power is derived from a pair of twisted ropes or “skeins” that drive two throwing arms in unison as with a crossbow. And therein lays the key. In “unison”.

If the arms are not rotating in unison the string and/or sling will be pulled to one side as the machine releases resulting in an uneven launch line. The missile can smash into the frame of the machine causing alarm and despondency amongst the crew who are inside the splinter range of disintegrating arrows.



Bad release, bolt angled



Clean release, bolt in line

During the American Civil War one inventor came up with the idea of firing two cannon together with the shells linked by a chain. This would – he predicted – cut down whole swaths of enemy in one shot. Well any gunner could have told him that this idea had one teeny tiny flaw. It’s bollocks. You cannot get two guns to fire together as, due to the vagaries of burning powder, there will always be a difference in the exact time that the guns discharge.

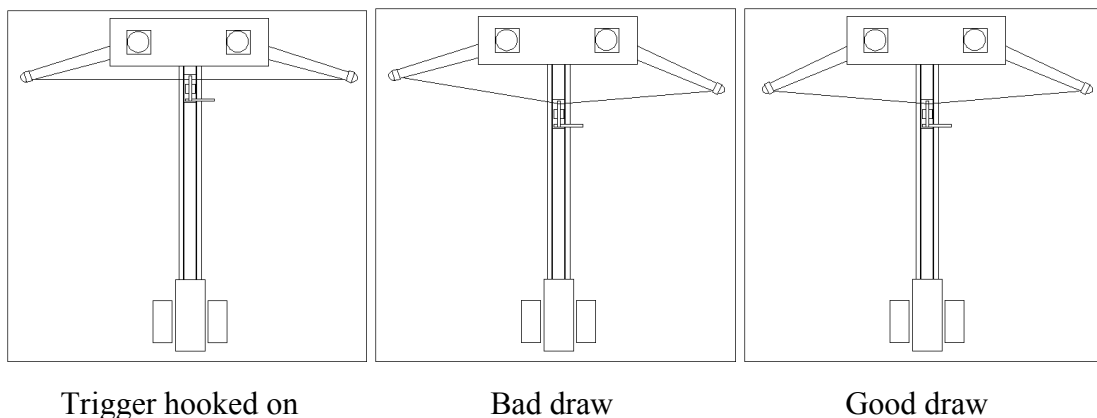
The resulting spectacle of one gun firing and the other having an impromptu game of “tether ball” may be entertaining but its military applications are severely limited not to mention hard on gun crews.

We face a similar problem with a machine that requires two arms to rotate at the same speed, but we do have ways of “tuning” the machine to get the result needed. That being to get an arrow or stone moving at high speed and which represents a greater danger to the target than the crew.

In his exhaustive work on [\[1\]](#) siege weapons and warfare Konstantin Nossov describes the ballista as being tuned “musically” via tapping the skeins to literally tune them in by matching the notes they produce. Unfortunately I do not have the benefit of Konstanins extensive academic education having wasted my youth shooting at things and wandering the high country aimlessly with a pack the size of a small town on my back. Consequently I need a method that is more “grunt friendly”.

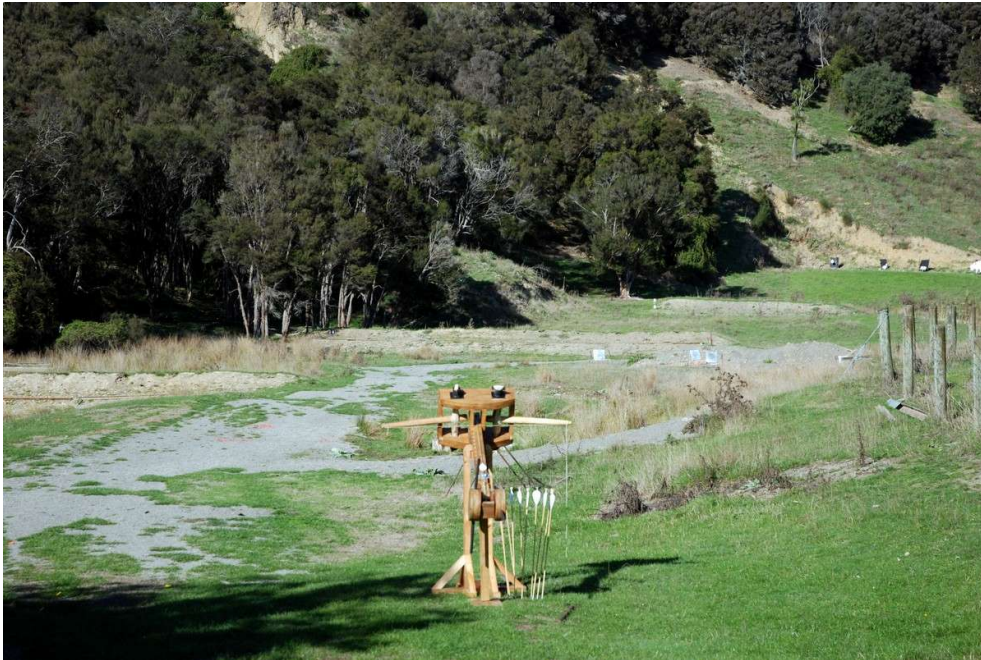
Some experimentation has revealed one. To recreate this experiment you will need one (1) Greek ballista. Lay the ballista face down on the ground and pull the centre of the string. The hypotheses is that if the arms BEGIN to rotate back when the machine is being drawn they will return the same way. In unison.

To perform this check in the field – which would equate to the more modern headspace and timing check of a .50 calibre machinegun – you simply hook up the string to the trigger and begin to draw the arms. If they move together you’re good to go. If one moves before the other then you tighten up that skein until they match.



This method may be more pedestrian than the musical one, but from experience grunts are not known for their musical ability or perfect pitch. Expecting a legion to find in one in ten of legionaries musicians of good ear is somewhat over optimistic. Soldiers are simply not choirboys and while it might be nice to carry a Haley Westenra in your range box, it’s not always practical.

However after field testing the “give it a pull and look” method does seem entirely functional.



On the 27th of April 2008 the ballista pictured (Scipio) threw an arrow 160 meters with a three arrow grouping of 30mm at 100 meters range after being tuning using the method described. This machine had been completed the day before.

Scipio has produced no audible note at to date beyond “thunk”.

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[1] **Konstantin Nossov** *Ancient and Medieval siege engines – A fully illustrated guide to siege weapons and tactics* The Lyons Press 2005