

My experiences as a Rubber Band Gun Artillerist in SCA Rapier Combat

By Kevin O'Shaughnessy

I have been involved in rapier combat for several years now. The rapier melees I have played in have all been enjoyable; the camaraderie, the teamwork, the tactics – they all contribute to make something bigger than the sum of its parts. Rapier melee has many parallels to the heavy combat field, someplace I have also played on for over half my life. Here in the Middle Kingdom we recently added the rapier combat missile weapon – the rubber band gun or RBG – to our list of combat equipment and tactics.

Despite any person's noble and romantic ideas to the contrary, the crash and boom of gunpowder weapons have been part of the European battlefield since before the middle of the Fourteenth Century. The great battles and sieges were decided as much by placement of cannons as by feats of arms, more so as time progressed. Not including gunpowder anything has been fairly standard in the SCA since its beginnings (*with a few exceptions like the Pennsic signal cannon*). The original justification was: "Knights didn't use gunpowder!" (*demonstrably untrue*). The current reasons are more valid, having to do with liability issues and the lack of ability to safely use gunpowder in our games.

However, thanks the wonderful, clever and fiendish (in a good way) designs of people like Sir Gerhard Kendall (*May God rest his soul!*) a simulator was developed to allow a form of gunnery on the Rapier battlefield that was at least as frustrating and inaccurate as the real thing (*even if it DID load faster and fire in the rain*). I am talking about the use of "guns" that fire bands made from latex-based surgical tubing. Guaranteed to sting if they hit tender flesh at short range, but very safe through Rapier armor.

In SCA heavy combat the personal projectile weapons are crossbows, longbows and recurve bows (*javelins & throwing axes are a little different*). The artillery weapons are ballistas, catapults and trebuchets. In SCA rapier combat the personal projectile weapons are one-handed guns (*wheellock simulators*), two-handed guns (*everything from a hand cannon to an arquebus*) and in a few Kingdoms some form of combat archery device. I only know of a few artillery weapons at this time, but they have consisted of swivel guns (*tripod mounted*), large bore field pieces (*firing a wad of bands*) and multi barreled guns.

There exist a wide variety of designs for SCA heavy combat projectiles (*golf tube, fiberglass shafted, different padded heads, etc.*) but really only one basic design for the Rapier combat projectile – the not quite properly named "rubber band". I say "not quite properly named" because "rubber band" is a misleading term, given we are referring to a length of surgical tubing looped over onto itself with the ends held together by many different means. A surgical tubing shot for an SCA RBG doesn't look much like what holds the newspaper closed when it's delivered.

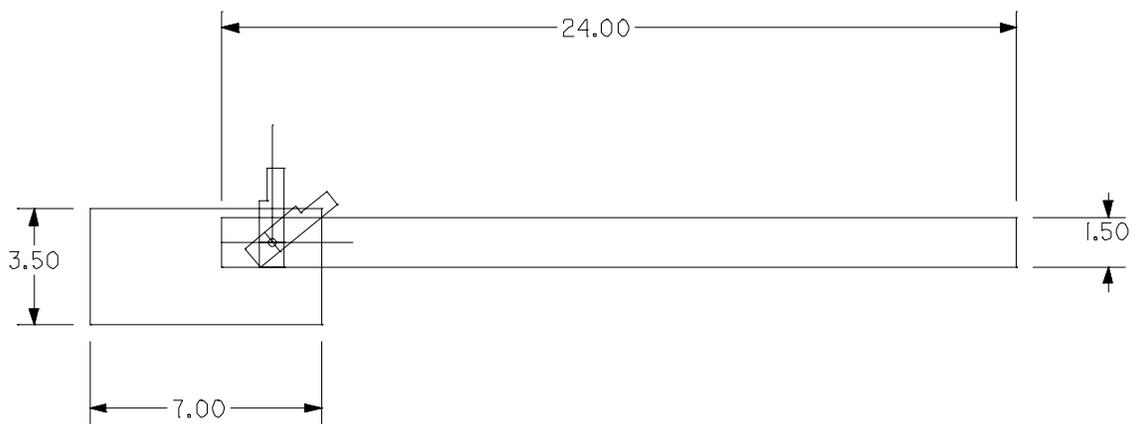
Now, just like their gunpowder burning counterparts, the big difference between little guns and big guns for RBGs is the size of their shot, or rather the length. A pistol with a 6 inch long barrel will use a much shorter band than a 5 foot long arquebus. This kind of breaks down when you transition to RBG artillery, since it would normally use bands no longer than the ones used for long guns. The key difference is the NUMBER of bands fired at a given time. Most RBG hand-held weapons fire one shot per barrel. Some of the large diameter RBG field pieces used at Pennsic fire more than 5 bands per barrel.

Why? Well, we are talking about close-range anti-personnel weaponry here. That kind of weaponry in period was often loaded with multiple shots in the barrel (*think POUNDS of flint gravel*). Pretty devastating for up-close and personal work. Hamburger anyone? SCA RBG field pieces simulate this, albeit poorly. After all, loading HUNDREDS of bands onto a single cannon, one at a time, would be a daunting proposition at best, and possibly quite unsafe at worst. And trying to launch a wad of rubber bands just doesn't work well. You have neither enough range or scatter for it to be very effective. The shot speed is pretty slow, too.

Now I had some experiences in making my own hand-held RBGs (*a serpentine matchlock and a hand-gonne*) and was looking to do more. I saw some wonderful examples of pistols and long guns done by other people and quickly decided that I wanted to do something more *distinctive (actually I didn't have good woodworking tools or skills and was intimidated by their work)*. Inspiration struck me when a somewhat nautical-themed event was approaching, and people were discussing cannons for their "ships". I was inspired to try something I hadn't heard anyone make: a swivel gun, the type normally mounted to a ship's rail or a city or castle wall. I had read that they were sometimes dismantled from the rail/wall and used in the field, mounted on tripods or other types of framework. I had also read about loading multiple balls at a time into the barrel so I wanted to make something to fire more than one ball at a time. Thus the three shot, tripod mounted swivel gun was conceived. It was my first piece of RBG artillery.

Now what was going to make it "artillery" instead of just another RBG? Well, for one thing, my initial design showed that it would be awkward as all get out to try to haul around the field and use without a tripod. Also, I hoped to treat it as artillery, and thus serve it with a crew, not just one person.

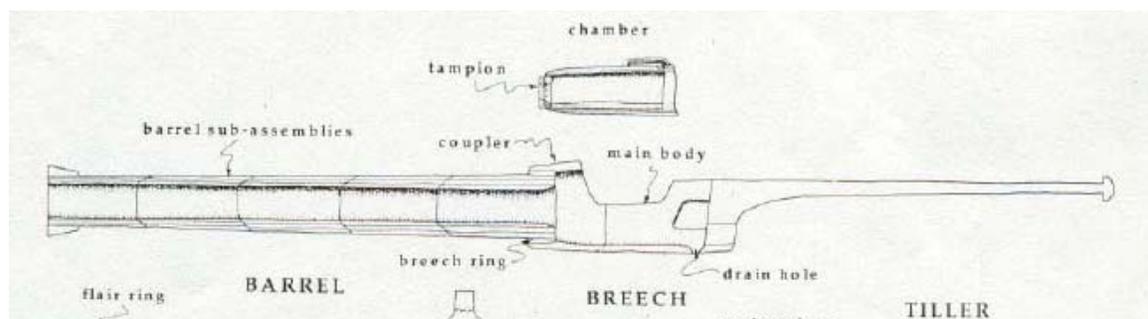
My initial Computer Aided Drafting (CAD) drawing was this:



Not very impressive, I know, but it was a starting place. It gave me the basics to start getting the materials together.

The barrel was 1 1/4" copper water pipe. I used a copper pipe fitting and a steel pipe fitting to make the "muzzle" of the barrel. The boxy area in the back was going to be made from 2 x 4 pine, but I modified that into a chunk of lawn timber. I added a long "tiller" to the back, like the period swivel guns had.

Here was my inspiration:



A sketch of a swivel gun taken from the Mary Rose

The end results of my randomly grabbing materials around my shop was this:



The swivel gun in my garage



This picture should give you a good idea of the scale of the swivel gun. That's me in the white shirt holding the tiller.

The swivel gun has a lever and drop pin firing mechanism. (1) You load the bands over the copper “drop pin”, (2) close the lever over the top of the drop pin, and (3) then stretch the bands forward over the three brass pins projecting forward around the muzzle. Pulling the lever releases the drop pin, which falls forward releasing the bands.



Firing mechanism open



(1) loading bands over drop pin



(2) Close the lever and it's “loop” over the finger.



(3) A band stretched forward over a projecting pin



A close-up view of the muzzle



A reverse view of the firing mechanism.

The swivel gun really takes a minimum of 2 people to load quickly. In combat I determined it should be crewed by three people, a loader, a holder (*to steady the gun*) and the gunner, who fires the gun. In fact, when it was first fielded I even used a wooden dowel to “tamp” the powder, “ram” the shot home and swab the barrel out afterwards as part of the loading process. It took well over a minute to accomplish the entire process. Great fun with just a touch of time pressure.

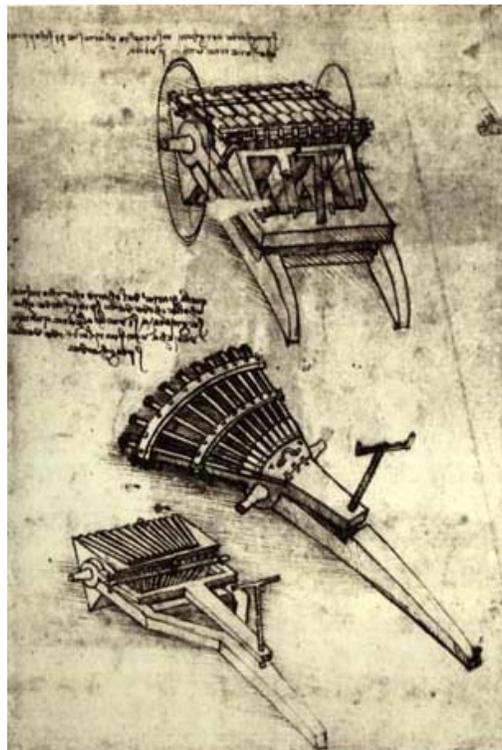
It is approximately 24 inches from the drop finger to the muzzle pins. I used 16 inch long bands of surgical tubing to make my shot. With some elevation I get a range of 20 to 30 yards. The shot moves pretty quickly for the first third of the distance too.

Better than that is what I call the “fear and loathing” factor the swivel gun has had on the field. People see it loaded and pointed in their direction and they just panic. I have pointed it at fencers who dropped to the ground to avoid being shot. Being a wise gunner, I determined they were rendered temporarily harmless and chose other targets (*while laughing so hard I could barely aim*). All in fun, of course. I don’t think any fencer felt a real fear of actual harm from the swivel gun. At least no one told me so far anyway.

My swivel gun even made it to Pennsic war, albeit without me. It caused a little bit of discussion and was used to successfully defend the Castle Gate during the “Storming of the La Rochelle” rapier melee. A spread of three bands in one pull will get people’s attention.

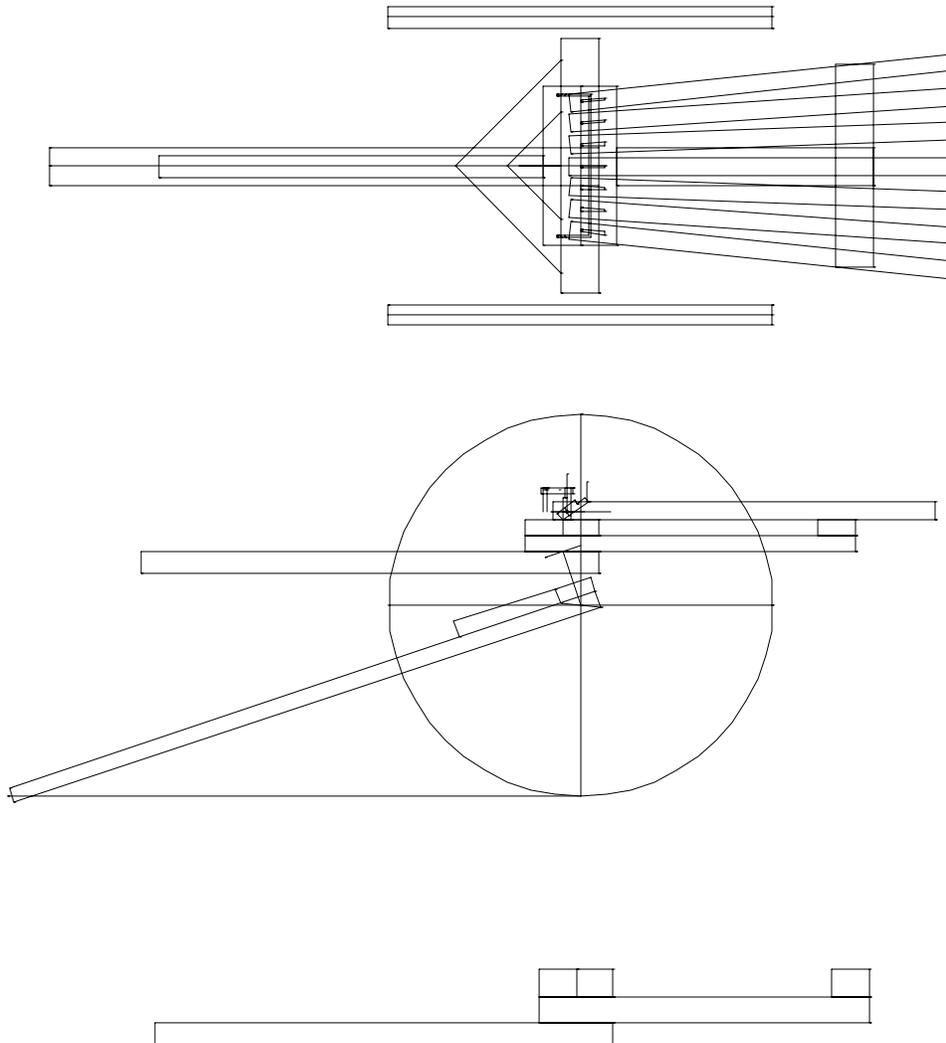
Success creates challenges all on its own. In my case I had people saying things to the effect of “Well, that was neat. What are going to bring NEXT year?” Sigh. Back to the drawing board (*Okay, CAD station...and don’t start in on me about designing medieval weapons with computers...*) What was I going to do to top the swivel gun? Being an engineer by trade, I decided to review the background literature. It seems that a clever Italian chap by the name of Leonardo (*named after some species of mutant turtle?*) had come up with some rather interesting ways to deploy the guns of his day. Thusly I was inspired to my next RBG artillery project – the DaVinci Ribaldo – a seven barrel RBG cannon on a wheeled carriage.

Leonardo DaVinci’s Codex Atlanticus, as it is called today, has many fascinating sketches of devices both practical and fantastic, for both peace and war. One of the pages showed some sketches for muzzle-loading multi-barrel carriage guns. They were guns with a rather small bore (*1 to 2 inches*) but the carriages featured LOTS of barrels. If you loaded each barrel up with two or three balls, a fairly common practice, and fired them all off at close to the same time you would put a horrendous amount of shot into the air, without using more than four or five people. The refire rate would be horrendously slow, but the shock value would be quite high, especially around siegeworks and other *fortifications* (*think narrow and twisty streets of Italian cities of the time*). Below is a picture of that page from Codex Atlanticus.



The particular gun I chose to emulate was the middle one. I had some ideas as to how I could make that work with my “trigger” design from the swivel gun. Besides, the “fan” shape of gun barrels looks rather neat and intimidating. I had NO idea what I was getting myself into.

My CAD sketch for the 7 barrel gun looked like this:



The idea was that the gun could be disassembled into smaller sections and carried in the back of my pickup truck. So I broke the design down into those components: the barrel deck, the carriage frame and the wheels. The frame pieces would be made from pine 2 x 4's and the wheels would be made from thick plywood. I planned on making the barrels out of more 1 1/4" copper water pipe.

Then I priced the copper water pipe in that size. EGADS! I had to spend a fair amount of time thinking about it, and dismissed ideas like PVC pipe, wooden dowels, iron water pipe and such. Inspiration finally struck when I was wandering through the home improvement store and saw the line posts for chain link fencing. They were galvanized steel, not too heavy and long enough for me to get 2 gun barrels out of each post. A copper plumbing fitting slipped over the muzzle end of the fence post like it was designed for it. Best of all they were WAAAYY cheaper than copper water pipe of equivalent size.

Having discovered the needed barrel materials, I purchased the fence posts, fence post caps, plumbing fittings and 2 x 4's. The day I was shopping for materials I discovered that there was not a truly flat piece of thick (3/4" to 1") plywood left in the store. It was all warped to some degree. That did not bode well for my wheels. I took my stuff home and, being an experienced dog-robber I looked over my current supplies again. What did I discover? A perfect sized, FLAT piece of plywood, nicely aged and just the right thickness. Enough to make ONE wheel. It came from the bottom board of one of the bunk beds that one of my sons had used. Well, one wheel wasn't going to support my cannon very well, so I needed more wood. Luckily, the OTHER bunk bed (*no longer bunked*) was being used by my other son. Equally lucky, I had a normal bed frame available. A half-hour later I had the other piece of plywood and my other son had a different bedframe.

I cut the wheels out, fully intending on beefing up the edges with curved cuts of wood and cutting wide spokes into the wheels. Did I mention this was nicely aged plywood? I decided that solid, oxcart style wheels would do just fine, after wrestling my jigsaw through both pieces of plywood to cut out the circles for the wheels. That plywood was TOUGH!

I assembled the basic pieces for the wheel carriage and the barrel deck. Then I cut the barrels down and assembled the drop pins into them. The pins were rectangular copper bars from a scrap pile. You have to take great care in removing all corners, edges and burrs. It doesn't take much to cut through a stretched surgical tube. Fence post caps provided a wonderful dome shape to cover the back ends of the barrels.



During construction – the barrel caps and drop pins in place.

I designed the gun to fire 2 shots from each barrel, so there needed to be 2 projecting pins from the muzzle of each gun. While I had the pins (*brass rod from the scrap pile*) I did not have an easy way to mount them. My "gun muzzles" were copper plumbing fittings and so were very thin material. I finally settled on cutting out chunks of wood to "plug" the barrels with so I would have material to epoxy the pins into.



During construction – the barrel muzzles

Discussing the actual release mechanism requires we look at something else for a moment. Since each band is individually stretched when loaded, a RBG trigger mechanism has to be able to support the load produced by the surgical rubber tubes in tension. With hand-held guns this is easy, since there is usually only one band loading the trigger. My swivel gun uses 3 bands, and generates a fair amount of force on the trigger mechanism. I had to give some serious thought to what would support the load produced by FOURTEEN bands stretched three feet each. I don't know what force is actually generated, but I know that I was able to pick up a 100-LB woman off the ground using all 14 bands without any significant stretch in the bands. Thus my trigger mechanism needed to be robust.

My trigger mechanism design was to fire all seven barrels at once. That meant that one trigger had to hold back all seven drop-pins at once, and also provide the ability to overcome their loading force in order to release them. My solution was a finished 1 x 2 with a series of holes drilled through it that fit over the drop-pins. The ends of the board were mounted to a bracket and handle mechanism with sufficient leverage to actually release the drop-pins under load.



The "triggerboard" mechanism open.



The "triggerboard" closed over the (unloaded) pins



The ribaldo loaded and ready for its first outdoor fire test.

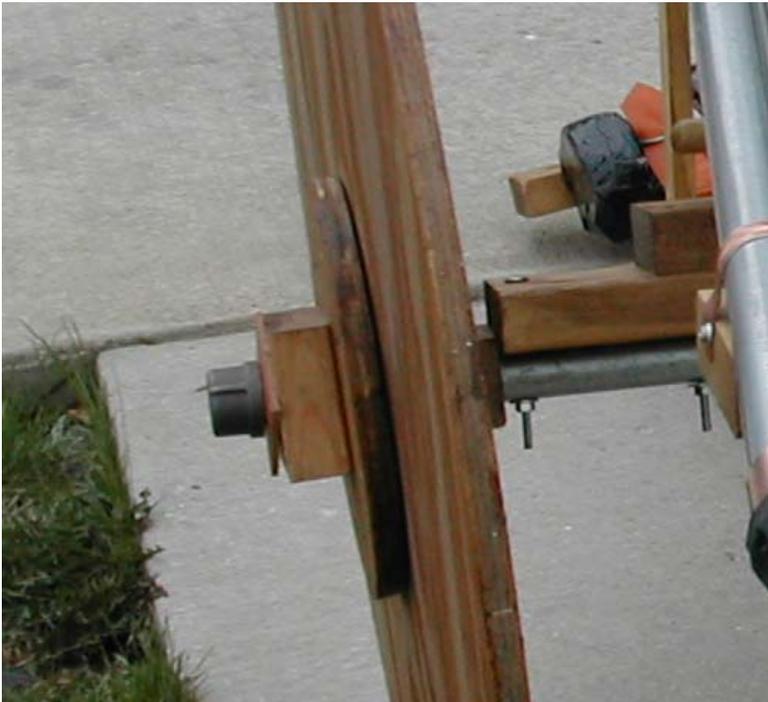
Now the first time I mounted the barrel deck onto the wheeled carriage I discovered something irksome. It seemed that the weight of the barrels overbalanced the gun and whole thing pivoted forward until the muzzles rested upon the ground. Sigh. Back to the scrap pile where I dug up an eight-inch long chunk of railroad track to use for a counterweight. I padded the edges and corners with foam so it couldn't cause someone harm if their foot struck it. I then made a mounting spot for it at the end of the carriage tiller, using a leather strap and buckle so it could be removed for transport.

Now the gun deck can be elevated up to around a 30-degree angle. My method for doing this is crude but effective. I use a pivoting wooden riser with holes drilled through the vertical supports. A large brass pin can be placed in the holes to set the elevation at a particular level. The riser can also be pivoted forwards or backwards by hand to provide fine elevation adjustment at the time of firing.



The counterweight strapped on and the elevation set for almost true level (*while the garden gnome looks on...*).

The axle for the wheels is a 1" steel pipe nipple secured to the carriage frame with, oddly enough, carriage bolts. The wheel hubs are built up with extra plywood and 2 x 4 scraps. They are secured in place by steel pipe caps that thread onto the pipe nipple ends.



The wheel hub, axle and cap. The wheel looks crooked because I hadn't yet tightened the caps.

The first test firings occurred in my basement against a blanket hanging from the floor joists. My initial comments upon firing were a mixture of unprintable words and maniacal laughter. Also, I discovered that the force of the bands pushing the drop pins forward makes for a loud CLANG when you fire, as all the pins strike the barrels virtually simultaneously. Very cool effect indeed.

The trigger mechanism worked just fine and held up under the load of 14 bands. I actually wimped out and started my testing with half-loads; one band per barrel. I quickly worked up to full loads, until my lovely Lady Wife told me to stop all the noise (*though she DID acknowledge the coolness factor...*).

I then disassembled the gun to haul it upstairs, whereupon I discovered just how amazingly heavy the individual component assemblies actually were. There were a few more unprintable words before I got everything into the garage, but no maniacal laughter. I reassembled the gun and moved it out onto the sidewalk to perform test firings in my yard.

My first firing was a little disappointing, without the range or spread I was expecting. I spent a little time loosening the drop pins, which were a little tight, and then tried again. Loading it by myself requires that I brace my foot under one of the wheels. I also was wearing my fencing gloves and eye protection, because when one of the bands lets go while loading it stings.

My reaction to the second outdoor test firing was a little different. I think the jumping up and down, war cries and loud repetitions of "Oh BABY! OH MAN! OH WOW!" were a definite improvement over the first time. My neighbors already know I'm nuts, so this wasn't anything special.

The second firing had a range of about 35 yards with a spread of almost 20 yards. That equated to one band every yard-and-a-half across a 20 yard wide line of combat. The possibilities were limitless and evil...

Thus having proved function I felt a need to improve on form a little bit. I painted the metal barrels black, leaving the copper straps and muzzles bare for contrast. It looked a lot better that way.



The DaVinci style Ribaldo at its first event. Shiny and new!

I decided that a 4-person gun crew was the minimum needed for fully manning the ribaldo. It takes a bracer (*to hold the wheels*), two loaders and the Gunner, who aims and fires it. It would take four persons to move the gun during a battle, three to load it and two to fire it. It is not really safe to fire it with just one gunner, because the “trigger pull” is still kind of stout.

I drilled with my gun crew the week before and the morning of the first event the ribaldo was unveiled at. The day I unveiled it I was informed by many people that I had way too much time on my hands and was barking mad to boot. An astounding number of people wanted to be shot by it, far more than actually wanted to shoot it. I still haven’t figured that one out.

The gun proved pretty effective in the scenarios it was used in. I had to drop the elevation to zero because I was overshooting the rapier list field, something I found to be astounding. It *looked* like a big enough field to me...



The first gun crew for the Ribaldo at its first event. That’s me in the middle.

The “fear and loathing” factor the swivel gun had came back in spades with the ribaldo. Of course, the fact that the swivel gun was in use right next to the ribaldo in the same battle may have had something to do with it. Be that as it may the ribaldo definitely has had a powerful psychological effect on the enemy when it has been deployed. It was funny to watch from the firing end, but I’m sure I’d have been cringing on the receiving end. Gun barrels ALWAYS look bigger when they are pointed at you.

Of course, my ribaldo and my swivel gun attended the next Pennsic, without me once again. And once more the carnage of “Storming of La Rochelle”, the big rapier melee in the Pennsic Castle, was enhanced by the presence of my RBG artillery. Apparently the gateway wasn’t wide enough for the shot to spread fully and so the outer bands were bouncing off of the walls.

The person who acted as Chief Gunner for the ribaldo told me that he successfully used it to clear entire front lines of fighters and even take out enemy gun crews who were advancing their guns into the fort. There were also a few “friendly fire” casualties when overeager fencers failed to get out of the firing arc of the ribaldo when ordered. Such is life on the front lines.

The “fear and loathing” factor was strong there too. The gunner said, and I quote: *“It was fairly satisfying to see sheets of opponents drop like stones. And BOY were they scared of it! I’d yell “CLEAR THE GUN” even when I was out of ammo, and they’d back off.”* A nice testimony to the psychological effects of artillery.

Why did I make these overgrown, hardly-used toys? Honestly, because I didn’t see anyone else making them. I wanted to see what the effects would be on our Rapier melees when overwhelming firepower was placed on the field. It was a part of history and I was interested in what effects could be reproduced in the psychology and actions of our modern swordsmen when someone brought, not just a *gun* but a **GUN** to the swordfight. One effect it had was to provide other people with opportunities to create tales of glory, valor and bloody deaths. A tale of one person who charged the 7-barrel Ribaldo single-handedly ahead of his melee team and took 5 of the barrels to the mid-section at point-blank range has been growing around here. He was valiantly trying to save the rest of his team. The fact that one of the stray shots killed his second-in-command did not help his team (*which was wiped out by other fencers*), but his sacrifice was still a noble act.

The swivel gun and ribaldo will still make it to whatever events I can get them to, especially if there are big rapier melees. I’m not sure what similar projects the future holds for me. I’ll just have to see whether inspiration and funds occur at the same time.

Bibliography

Website: “Hand Gones & Matchlocks, A preliminary Essay in the history of firearms to 1500” by Dis Pater Design

This website is a great resource for basic information on early firearms. The “sources” section points out some great books to read.

Web Article: “The Galley in Combat” by John F. Guilmartin

Book: GUNPOWDER AND GALLEYS: CHANGING TECHNOLOGY AND MEDITERRANEAN WARFARE AT SEA IN THE SIXTEENTH CENTURY
By JOHN FRANCIS GUILMARTIN JR.

“The Codex Atlanticus” a collection of drawings and notes by Leonardo daVinci. Biblioteca Ambrosiana, Located in Milan, Italy

Scientific American Article: Leonardo and the Invention of the Wheellock (January 1998)

Rapier combat rules for the Middle Kingdom and others.

RIP - Gerry Stevens, known in the SCA as Baron Sir Gerhard Kendal of Westmoreland. *We’ll miss you.*

Appendix

Where to get surgical tubing:

Home Depot home improvement stores carry some tubing in the region I live in. Similar home improvement and hardware stores may carry some near you.

McMaster-Carr Corporation – www.mcmaster.com – enter “latex tubing” in the search box. I have made RBG ammo with the 5/16” OD x 3/16” ID tubing and the 3/8” OD by 1/4” ID tubing. Usually I make it with natural color, because black is WAY too easy to lose. It comes in 10 to 25 foot lengths. They take credit card orders from individuals and ship to your door.

The gunners who used my guns at Pennsic were Warder Alexander de Seton using the swivel gun on the Castle wall and Warder Andrew Blackwood MacBain the Purple using the ribaldo inside the Castle gate.

No Garden Gnomes were injured during the testing of the 7-barrel Ribaldo – K.O.