



San Mateo, CA  
May 19-20, 2007

# The King of Fling Catapult Contest

Rules and Manual Version 1.1

Announcing the King of Fling Catapult Contest! It takes place on both days (May 19 and 20) of the 2007 Maker's Faire at the San Mateo Fairgrounds. Join us by building a real, working catapult and enter it our competition. If you don't know how, don't worry; this manual will help you figure it out.

Catapult building is fun, exciting, and as easy (or as intricate) as you want to make it. In a nutshell, you'll be competing against and cooperating with other Makers to produce a hurling machine. Your goal is to be the Maker who can build the most accurate catapult.

You have wide latitude in determining how your machine is to be built. But, we want the environment to be as safe as possible, so your machine must be constructed in conformance with the rules described here. All machines entered in the event must pass inspection prior to hurling.

The people in charge of the event, called the Marshals, have jurisdiction over all aspects and have final say on all matters pertaining to it. This includes, but is not limited to, machine eligibility and performance evaluation.

All expenses, transportation, and liabilities are the responsibility of the contestant. All contestants must sign the Contest Liability Waiver prior to participating.

Don't miss this wonderful opportunity to make something historically significant, highly kinetic, and exciting to behold. It's a chance to meet Make Magazine staff members and your fellow Makers.

The first, second, and third place winner in the English Battle will receive a beautiful trophy, desirable items of value from the Make Store, and will be recognized on the Make website and in the magazine. But most importantly, the winners will be covered in heaps of glory and revel in well-earned admiration.

## ***Call for Makers***

### **King of Fling Catapult Contest**

Going to Maker Faire? Then here's your opportunity to make things fly! If you like to build things (and what Maker doesn't?) you can become the Earl of Hurl, the Count of Catapults, or the Baroness of Ballistas.

**Announcing the King of Fling Catapult Contest.** It takes place May 19-20, 2007 at the San Mateo Fairgrounds. We want you to build a real, working catapult and enter it our competition. If you don't know how, don't fret, we'll help you figure it out.

There's nothing cooler than a catapult. It's fun, exciting, and as easy or as intricate as you want to make it. Be part of the excitement of Maker Faire.

*To register, visit <http://www.makezine.com/go/fling>.*

## ***How to Participate***

It's easy. Complete the entry forms online and pay the \$50 dollar entry via credit card or Paypal (?). Then, show up with your catapult and a copy of your completed entry form to Maker Faire on May 19 and/or May 20 and be ready shoot.

Fifty dollars? Isn't that a lot? No, it's a bargain! Not only does it enroll you in the contest but it also includes

- One Weekend Ticket of Maker Faire
- A one day parking pass in the special (and close-in) participant's area
- Official King of Fling T-Shirt
- An Autographed Copy of catapult guru William Gurstelle's terrific book "The Art of the Catapult"
- Most importantly, a chance to build a catapult, compete against other Makers, and hopefully, cover yourself with glory!

*To register, visit <http://www.makezine.com/go/fling>.*

## ***The Event***

You can set up on the firing range starting at 10 AM on each day of Maker Faire. This will give you a chance to sight in and adjust your machine before the actual contest begins. There will be event marshals present to coordinate practice shooting and answer questions. But all practice shooting must end by noon.

At noon, the official contest will begin and you'll be provided with a schedule so you know what's going on. You can leave your catapult in the area overnight, but the organizers are not responsible for watching or taking care of them.

There are two events on each day of Maker Faire: the English Battle and the Chinese Battle. The English Battle takes place first.

### **The English Battle (The Siege of Stirling Castle)**

The goal of the contest is to hit targets. The targets battle will be placed at intervals as shown in the Field Set Up Diagram. During the actual contest, each contestant fires 6 projectiles while the judges observe. At the judge's signal, your team's time on the firing line will begin. Then, firing will commence and you may shoot as many as 6 projectiles. All projectiles must be hurled within a total of 4 minutes. Teams experiencing mechanical problems will be allowed reasonable time to correct problems and allowed to shoot again after all other teams have completed their hurls.

More than one contestant may be on the firing clock simultaneously.

What will you shoot? Two types of projectiles are allowed: Water balloons or dead horses. (Note: Dead horses are more historically authentic catapult projectiles, but water balloons are somewhat easier to procure.) Participants must supply their own water balloons and/or horses. Safety glasses are required.

Please note: Balloons (or horses) must weigh 4 ounces plus or minus 2 ounces and the event marshals will weigh the balloons.

Points are awarded to each team based on the number of hits on the three targets.

Targets are "Bop-Bags" set on 6' X 6' plastic tarps. Teams whose projectiles hit the Bop-Bags are awarded 3 points. Teams whose projectiles miss the Bop Bag but land on the tarp score 1 point.

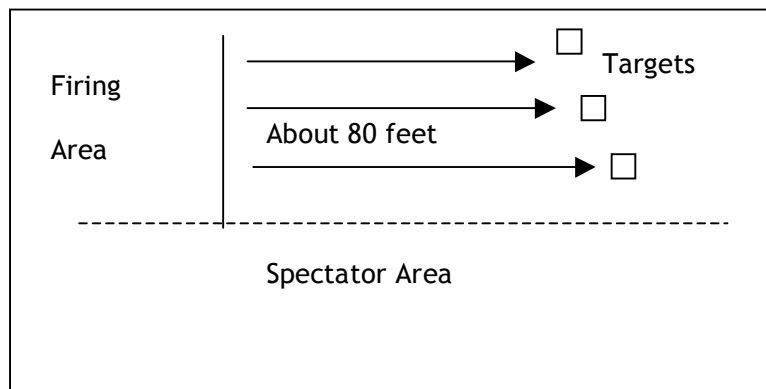


Bop-Bag

The team with the highest point total wins the King of Fling Trophy.

Other trophies may be award based on appearance or other criteria at the judge's discretion.

#### DIAGRAM OF KING OF FLING FIELD SET UP



## Chinese Battle (Battle of Xiang Yang)

The Battle of China is inspired by the Battle of Xiang Yang. This was a six-year battle consisting of skirmishes, ground assault, and the siege of the fortified cities of Fancheng and Xiang Yang in modern-day Hubei, China, starting in AD 1268.

All contestants are divided into two teams, the Fancheng and the Xiang Yang. Teams are arranged at opposite sides of the firing range as shown in the diagram.

Every catapult is placed within the firing area on a square eight-foot by eight-foot tarp. At the starter's signal call of "bai fā bai zhòng! (Shoot with unfailing accuracy!)", teams begin firing catapults at the opposite side. Each water balloon landing on a tarp, as determined by the field judges, scores a point.

The siege continues for 5 minutes or until all water balloons are exhausted.

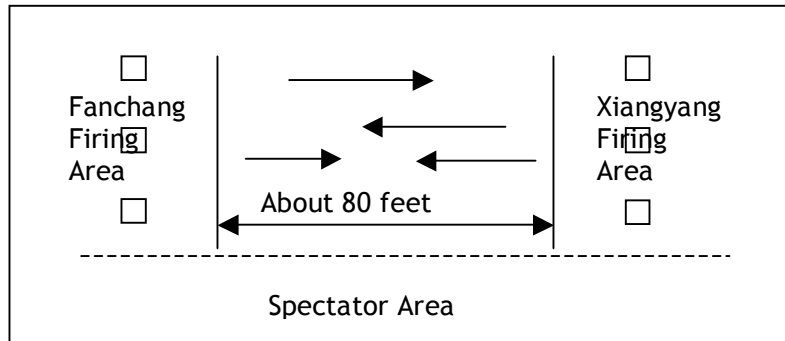
Machines that shoot with excessive velocity or shoot potentially dangerous (e.g.) too heavy or non-breaking water balloons) projectiles will be barred from this event.

All participants in the Chinese Battle must wear fully enclosed eye goggles.



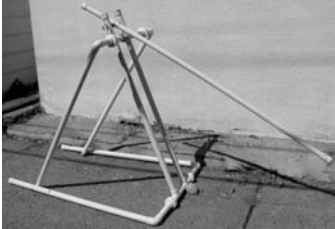
Participation in this event is voluntary. No prizes are awarded for the Chinese Battle. Because of the nature of the event, the organizers cannot guarantee the safety of participants.

DIAGRAM OF BATTLE OF XIANGYANG FIELD SET UP



## ***Specifications and Rules:***

There are several types of hurling machines you can build: Human Powered (Traction), Spring Powered (Tension/Torsion), and Gravity Powered (Trebuchet).



Human Powered



Gravity Powered



Spring Powered

### **Rules for Human Powered and Spring Powered Machines:**

A moving lever, powered either by a human or a spring must hurl the projectile. Projectiles may not be thrown by hand.

### **Rules for Gravity (Counterweight) Powered Machines**

The counterweight must be immobilized with hooks or straps except during the actual competition hurl.

#### **Rules for All Machines**

1. No person can be in the line of swing while the machine operates. No person can be in front of, or behind the line of fire.
2. Your catapult must remain in contact with ground during firing. Operation of the machine may not cause any ground contact point to move more than 3 inches in any direction. If your machine wants to move more than that, then use sandbags, stakes, or tiedowns, to secure the machine while the machine operates.

3. The Marshals will inspect each machine for safety prior to the contest. Your machine must pass visual and operational safety inspection. If the marshals think your machine is a danger to yourself or others, you will have to fix it to the marshal's satisfaction before you can use it.

4. Remember, safety first! Safety glasses must be worn inside the restricted areas whenever machines are hurling.

5. You can use a spoon or a pouch to hold the water balloon, but the use of a sacrificial sling is allowed which is much easier to engineer. A sacrificial sling is a short length of cord tied to a water balloon at one end and having a small non-slipping loop at the other. The sling travels along with the water balloon after launch.



6. All machines must have a safety hook to hold the throwing arm.



7. You must supply your own water balloons. We recommend you bring a bunch with you, but **some** hoses will be available for filling in case of emergencies.

## ***How to Get Started***

1. Check the forum set up on the Make website for questions, rule clarifications, and other issues.
2. A simple spring powered catapult is described later in this manual. A reasonably accurate machine can be constructed for less than \$25, excluding the release mechanism.
3. Just start building! A little experimentation may yield a terrific catapult.

## ***Projectiles***

Water filled balloons are the approved projectiles. While big balloons make it easier to hit the target, they are harder to hurl without breaking. Use of a sacrificial sling (a string or cord with a loop tied to the balloon that travels with it as it is hurled) is allowed, but note that the sling pulls hard on the balloon and may cause it to break prematurely. Participants must supply their own water balloons and string.

Note that balloons vary in quality and you may have to look around for acceptable balloons. Poor quality balloons will often break in flight. Balloons that break in flight are considered “scratches” and won’t score points.

## ***General Notes***

Teams must supply own tools and materials. Some simple emergency tools may be available.

Teams must supply their own water balloons. Some emergency water balloons and water hoses may be available.

Cooperation is as important as competition! Help out your fellow hurlers by loaning tools, providing advice, and offering encouragement. Good sportsmanship and a good attitude is the most important thing you can bring!

## ***Check in Procedure***

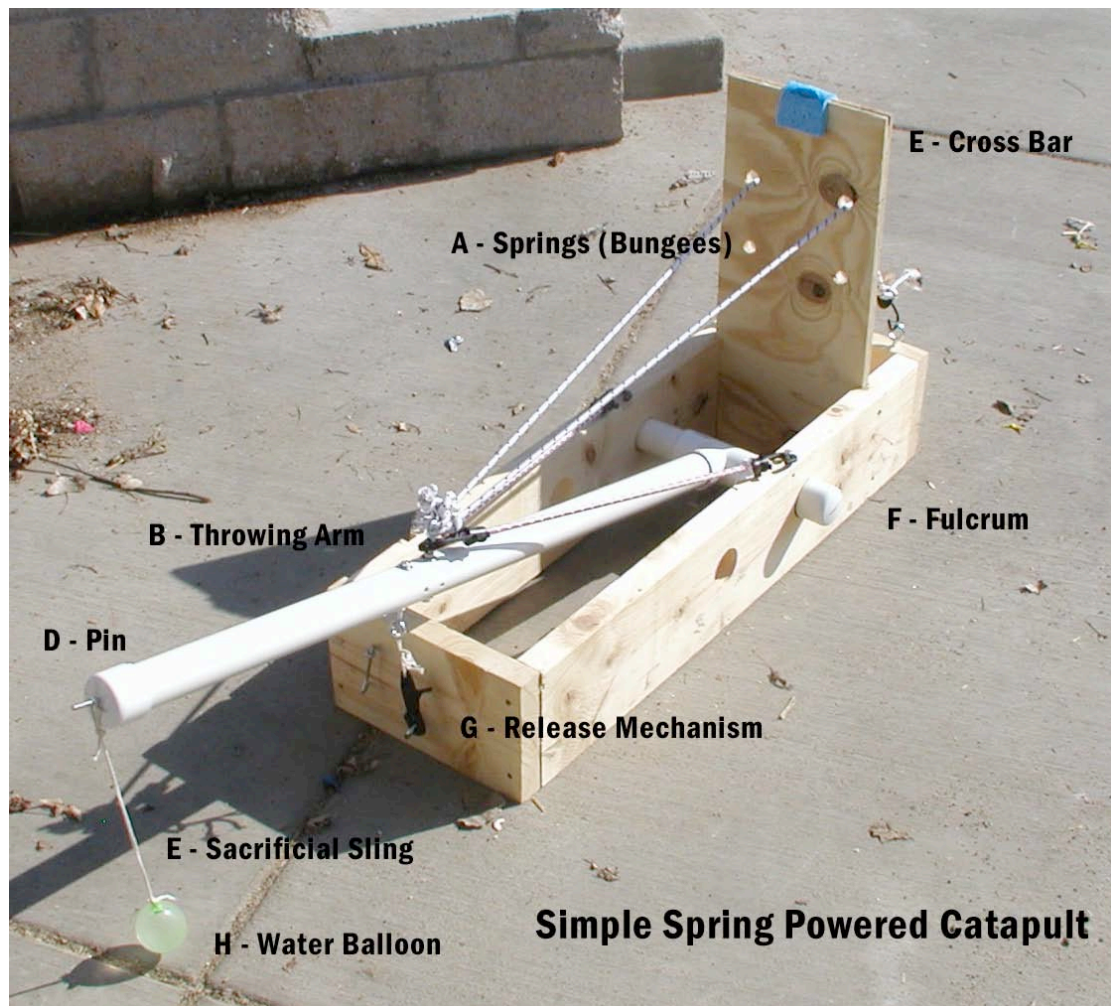
On each day of Maker Faire, contestants may park one vehicle in the King of Fling parking area. Contestants may set up as early as 10:00 AM.

After check-in and inspection, hurlers may claim a space on the firing line and “site in” their machines. This is your opportunity to aim and fire your machine.

At 11:30 AM on both days, all teams must attend a short meeting: The purpose of this meeting is to explain rules and procedures, (and even better) to hand out the shirts, books, and other swag.

Shortly after the meeting, the day’s hurling schedule will be posted near the firing line.

## ***A typical catapult***



This simple bungee cord powered catapult shoots a 3-ounce water balloon 80 feet with excellent accuracy and repeatability. It costs less than \$25 excluding the release mechanism.

The Simple Spring Powered Catapult produces about 30 to 35 pounds of total force at the cord connection point with the bungees fully extended. It easily hurls a small water balloon between 80 and 100 feet.

The mechanism that releases the throwing arm is the most complicated part of the machine. You may build your own release, or use an archer's arrow release, from an archery supply store (Internet search term: "tru-fire patriot release" provides an

example), a pelican hook from a sailing supply store, or a horse trainer's panic snap from a horse tack shop (search term: "horse panic snap".) A panic snap costs around five dollars, a pelican hook goes for about \$10 and an arrow release starts at \$25.



Arrow Release



Pelican Hook



Panic Snap

## ***Things to Consider***

Caution! Do not build a needlessly powerful machine. Machines with oversized springs, great lengths of bungee cords, or extremely heavy counterweights break frequently, and when catapults break, bad things happen. Marshals will disqualify machines they deem dangerous.

Catapults are wonderful machines: they are as simple or as complicated as you want to make them. You have many ways to control the length and height to which your machine hurls. This is a fine opportunity to experiment. All of these items make a difference:

1. The strength of your springs (Item A on diagram) in spring powered machines, the weight of the counterweight in gravity powered machines, and your own strength in human powered machines.

2. The length of the throwing arm (Item B).

3. The length of the sacrificial sling (C).

4. The angle of the pin to which the sling is attached (D).

5. The length and smoothness or roughness (D) of the pin's surface.

6. The position of the cross bar (E) and the fulcrum (F).

7. The position of the release mechanism (G)

7. The weight of the water balloon.

8. The quality of the rubber in the balloon.

Try various combinations of the factors listed above to determine which provides you with the machine that shoots the most consistently towards a target approximately 80 feet away.

You can visit [www.building-a-catapult.com](http://www.building-a-catapult.com) for additional ideas.