

Topic no. 47

STILL CAMERA MECHANISM

Photography is undoubtedly one of the most important inventions in history -- it has truly transformed how people conceive of the world. Now we can "see" all sorts of things that are actually many miles -- and years -- away from us. Photography lets us capture moments in time and preserve them for years to come.

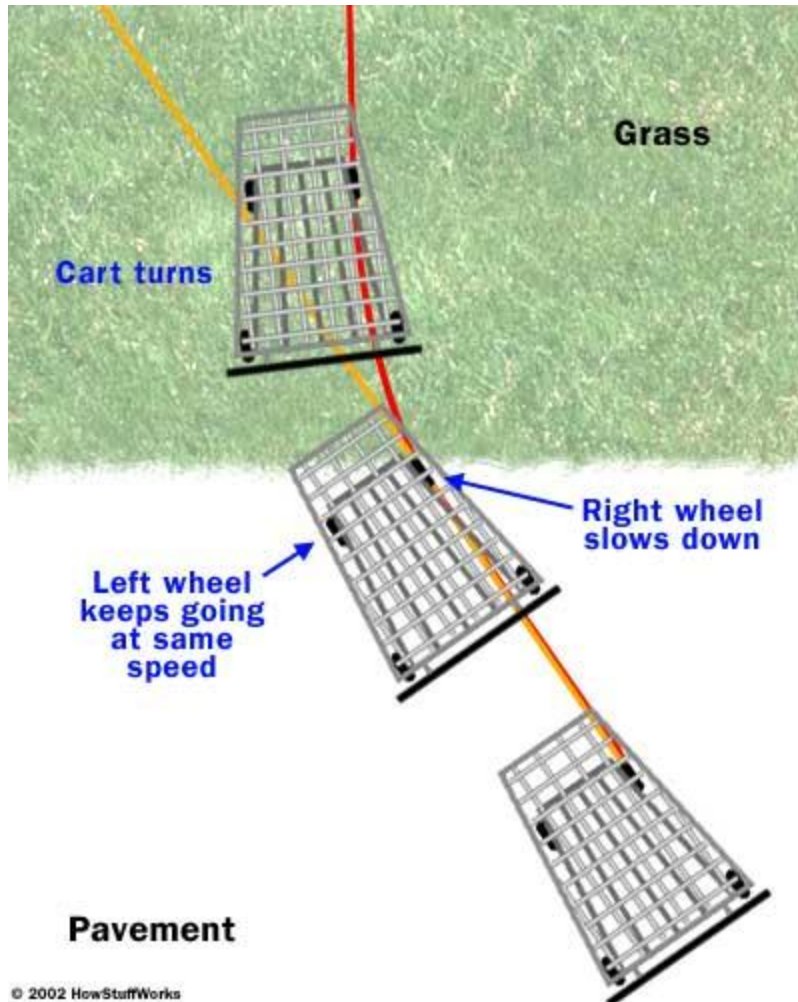
The basic technology that makes all of this possible is fairly simple. A still film camera is made of three basic elements: an optical element (the lens), a chemical element (the film) and a mechanical element (the camera body itself). As we'll see, the only trick to photography is calibrating and combining these elements in such a way that they record a crisp, recognizable image.

There are many different ways of bringing everything together. In this chapter, we'll look at a **manual single-lens-reflex** (SLR) camera. This is a camera where the photographer sees exactly the same image that is exposed to the film and can adjust everything by turning dials and clicking buttons. Since it doesn't need any electricity to take a picture, a manual SLR camera provides an excellent illustration of the fundamental processes of photography.

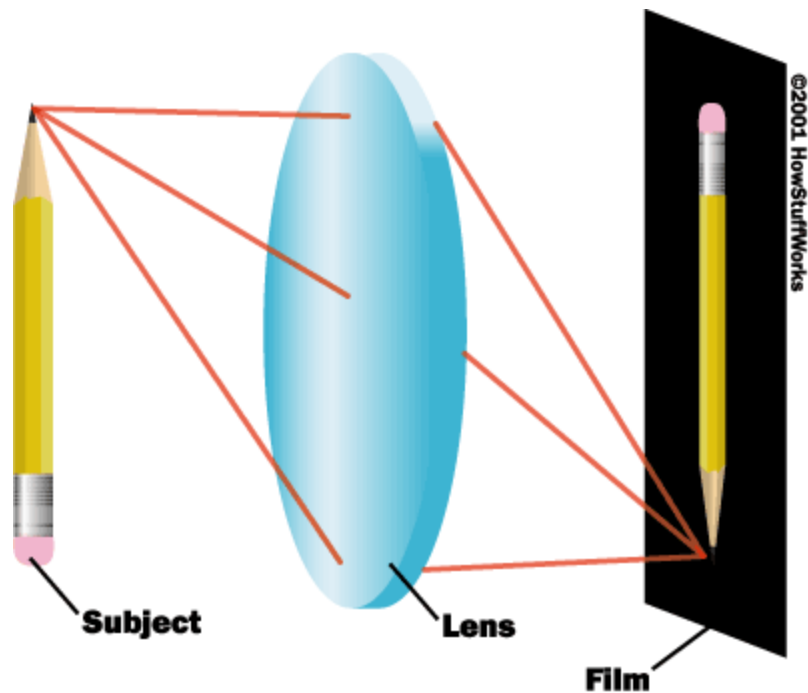
The optical component of the camera is the **lens**. At its simplest, a lens is just a curved piece of glass or plastic. Its job is to take the beams of light bouncing off of an object and redirect them so they come together to form a **real image** -- an image that looks just like the scene in front of the lens.

But how can a piece of glass do this? The process is actually very simple. As light travels from one medium to another, it changes speed. Light travels more quickly through air than it does through glass, so a lens slows it down.

When light waves enter a piece of glass at an angle, one part of the wave will reach the glass before another and so will start slowing down first. This is something like pushing a shopping cart from pavement to grass, at an angle. The right wheel hits the grass first and so slows down while the left wheel is still on the pavement. Because the left wheel is briefly moving more quickly than the right wheel, the shopping cart turns to the right as it moves onto the grass.



The effect on light is the same -- as it enters the glass at an angle, it **bends** in one direction. It bends again when it exits the glass because parts of the light wave enter the air and speed up before other parts of the wave. In a standard **converging**, or **convex** lens, one or both sides of the glass curves out. This means rays of light passing through will bend toward the center of the lens on entry. In a **double convex lens**, such as a magnifying glass, the light will bend when it exits as well as when it enters.



This effectively reverses the path of light from an object. A light source -- say a candle -- emits light in all directions. The rays of light all start at the same point -- the candle's flame -- and then are constantly diverging. A converging lens takes those rays and redirects them so they are all converging back to one point. At the point where the rays converge, you get a real image of the candle. In the next couple of sections, we'll look at some of the variables that determine how this real image is formed.