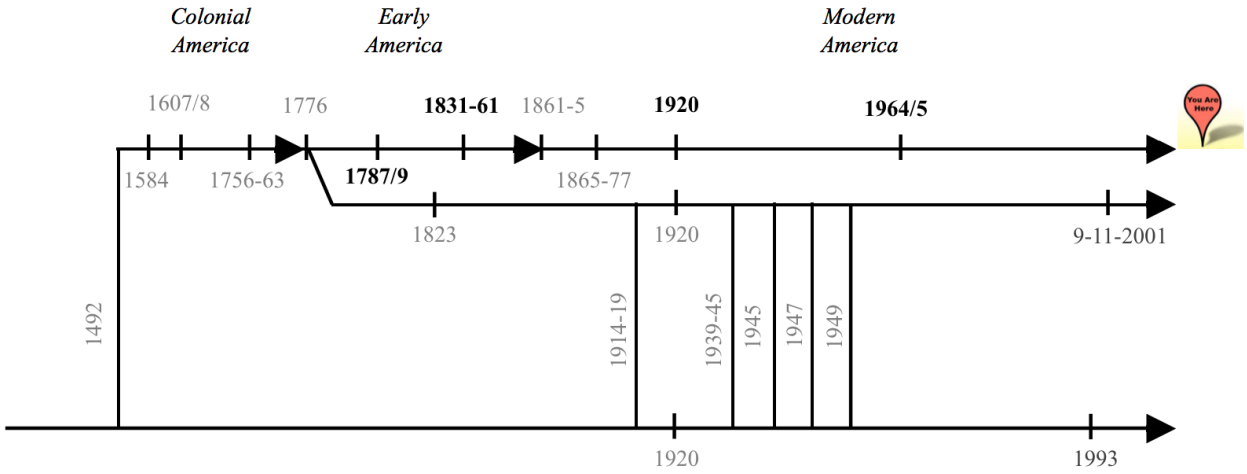
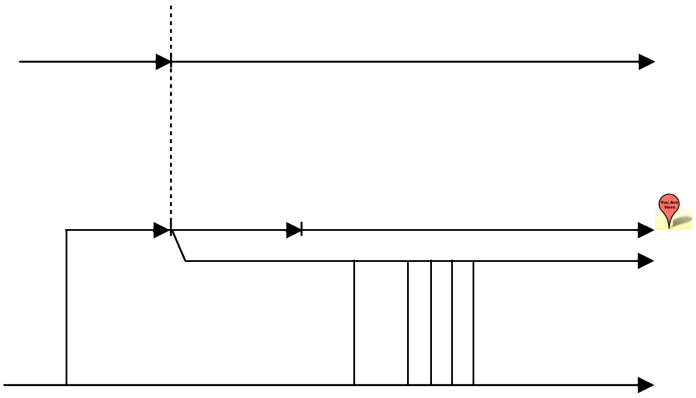
VI. The Story of Technological Progress

A. "3-D" History

1. History is complex. Many things happen at the same time. So far we have seen:
   a) America's relationship to the world, which has changed from political separation to policing the world.
   b) America's evolving form of government, which was initially based on natural rights but included slavery, and then changed into its modern incarnation focused on "civil" rights.
2. By separating the story of rights from the story of America's relationship to the rest of the world, we can add our new anchor facts (**1787/9, 1831-61, 1920,** and **1964/5**) to a timeline of their own.



3. We will now add a third "dimension" to the story: technological progress. It will be a third line above and parallel to the others. Here's the basic idea:



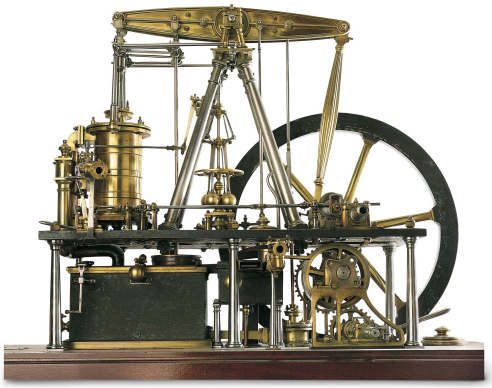
4. The line representing technology is placed above the line representing American history itself.
5. A dotted line extending upward from the *Declaration of Independence* of **1776** shows us that a great invention occurred at almost the same time. Then the *industrial* era began.

B. Pre-Industrial Life (- c.1769)

1. Before industrial times, people lived a "pre-industrial" way of life. This means they did not possess any of the advanced technology we have today.
2. The vast majority of human energy was directed towards agriculture or farming. The so-called "Agricultural Revolution" occurred some time before **3000 BC**. People learned how to grow crops and raise certain types of animals.
3. This permitted just enough of an improvement in the standard of living of our ancestors to give them the spare time to spend on such things as the invention of writing, and thus the recording of history.
4. Amazingly, little beyond the creation of agriculture was accomplished to improve life for the next 5000 years. The pre-industrial era is an era of stagnation.
5. Sadly, during this time, life expectancy for human beings worldwide was about 25 years.

B. The Watt Steam Engine (c.1769)

1. The discovery of America by Christopher Columbus in **1492** was part of a scientific revolution where science (and then technology) progressed rapidly.
2. By far the most important of these technological advances was the Steam Engine of James Watt, invented **c.1769.**
   a) As anyone can observe, when you boil a pot of water with a lid on it, the steam forces the lid to jump as its escapes.
   b) If one can create a container where water is heated to produce vapor and the pressure created by that vapor is captured as a mechanical force, one can produce an *engine.*
   c) There were a number of simple designs of engines during the scientific revolution, but none worked well enough to produce power in a way that could transform human industry.
   d) It was by examining a prior engine, made by another engineer named Thomas Newcomen, that James Watt was able to create his breakthrough design, the *Watt* Steam Engine **c.1769.**



An early working model of the Watt Steam Engine. Large stationary engines like this were used in mining to raise large amounts of ore up out of the ground.

   e) Because the process of invention is usually long and difficult, it is often hard to choose a date for an invention. Does one choose the first moment when an inventor had the basic idea? Does one choose the time when his first prototype is created? What about the year when the government gives him a "patent" (official recognition)? It is sometimes impossible to assign a single year. For that reason, we will say the invention of the Watt Steam Engine occurred **c. ("circa") 1769.**