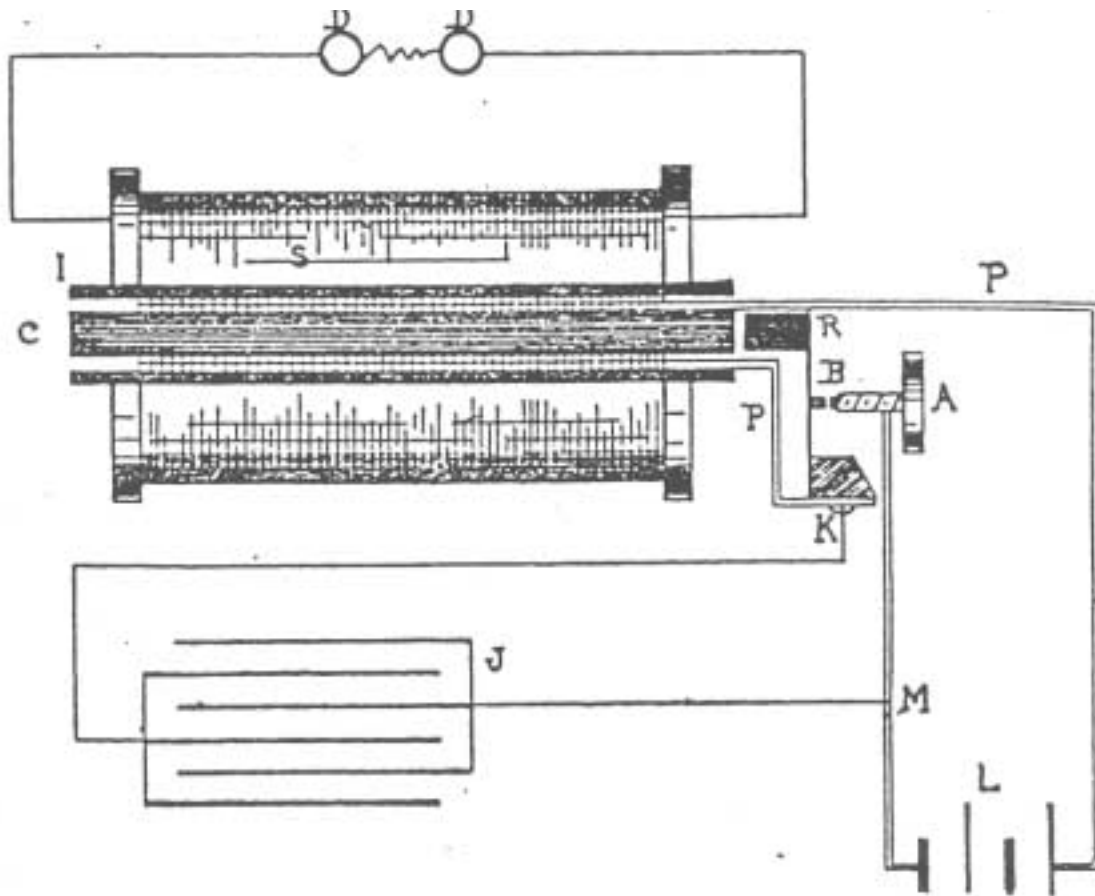


Jacob's Ladder



With current running through the primary (center coil) the primary core becomes an electromagnet. This attracts the permanent magnet (position R on diagram) at the end of the core and thus breaks the electrical circuit. At this point two things happen: first, since the current has abruptly gone from some finite value to zero, a large voltage is produced across the primary and thus the secondary as well (where $v_L = L(di/dt)$). This produces a spark (between D and D on diagram). Second, when the current stops so does the magnetism of the electromagnet (primary core), and so the spring (position B on diagram) pulls the permanent magnet back to close the circuit. Again the current abruptly changes (this time from zero to some finite value) and another spark appears. The process now begins again.

With this jagged AC current through the coil "continuous" sparking is produced. The sparks climb the ladder because the air that is being ionized during the sparking is also being heated and thus rises, taking the sparks with it.

