There’s a good reason for the law enforcing seatbelt usage in many states. Seatbelts saved nearly 12,000 lives in the year 2000. In this Moment of Science, we take a look inside these simple but highly useful machines.

**The Retractor**

A seatbelt consists of a belt made of flexible webbing and a retractor device. The retractor, usually located inside a plastic housing above the passenger’s outer shoulder, consists of a spool around which the belt winds, and a spring attached to the spool to keep the webbing taut.

When you pull a seatbelt across your chest and pelvis, the spool spins counter-clockwise, untwisting the spring. Since the spring wants to return to its coiled position, when you let go of the belt the spring causes the spool to spin clockwise, reeling in the slack.

**The Locking Mechanism**

The most important part of a seat belt is the spool’s locking mechanism — a device that makes the belt hold tight in the unfortunate event of a crash. The locking mechanism is activated either by the car’s movement or by the belt’s movement.

In car-activated systems, when the car stops suddenly a weighted pendulum swings forward, causing a metal bar to jam into a toothed gear attached to the spool. Unable to unwind any further, the belt holds the passenger tightly in place.

In belt-activated systems, centrifugal force, cause by a sudden jerking of the belt, causes a lever attached to the spool to move outward. The extended lever activates a device that catches the toothed gear attached to the spool, stopping its spinning motion. In both systems, the point is to tighten the belt so that its stopping power is spread across the sturdiest parts of your body.

在许多州，执法安全带是有充分理由的。安全带在2000年挽救了近12,000人的生命。在这个科学的时刻，我们来看看这些简单但非常有用的机器。

### 牵开器

安全带包括由柔性织带制成的带和牵开器装置。牵开器通常位于乘客外肩上方的塑料外壳内，由一个绕着皮带缠​​绕的线轴和一个连接在线轴上的弹簧组成，以保持织带绷紧。

当您将安全带拉到胸部和骨盆上时，线轴逆时针旋转，解开弹簧。由于弹簧想要返回其盘绕位置，当你松开皮带时，弹簧会使线轴顺时针旋转，从而松弛。

### 锁定机制

安全带最重要的部分是阀芯的锁定机构 - 一种在不幸发生碰撞时使皮带保持紧固的装置。锁定机构由汽车的运动或皮带的运动激活。

在汽车激活系统中，当汽车突然停止时，一个加重的摆锤向前摆动，导致金属杆卡在连接到阀芯上的齿轮上。无法进一步放松，皮带将乘客紧紧地固定到位。

在皮带激活系统中，由皮带突然猛拉引起的离心力导致连接到线轴的杠杆向外移动。延长杆激活一个装置，该装置捕获连接到线轴的齿轮，停止其旋转运动。在这两个系统中，重点是收紧腰带，使其阻止力量分散到身体最坚固的部位。