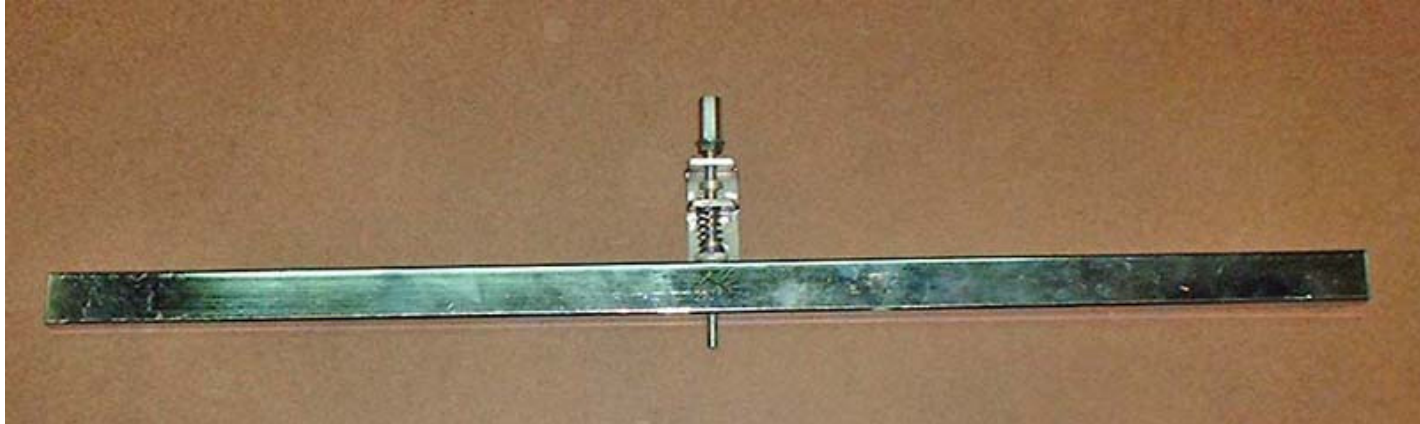


Belt Tension Gizmo

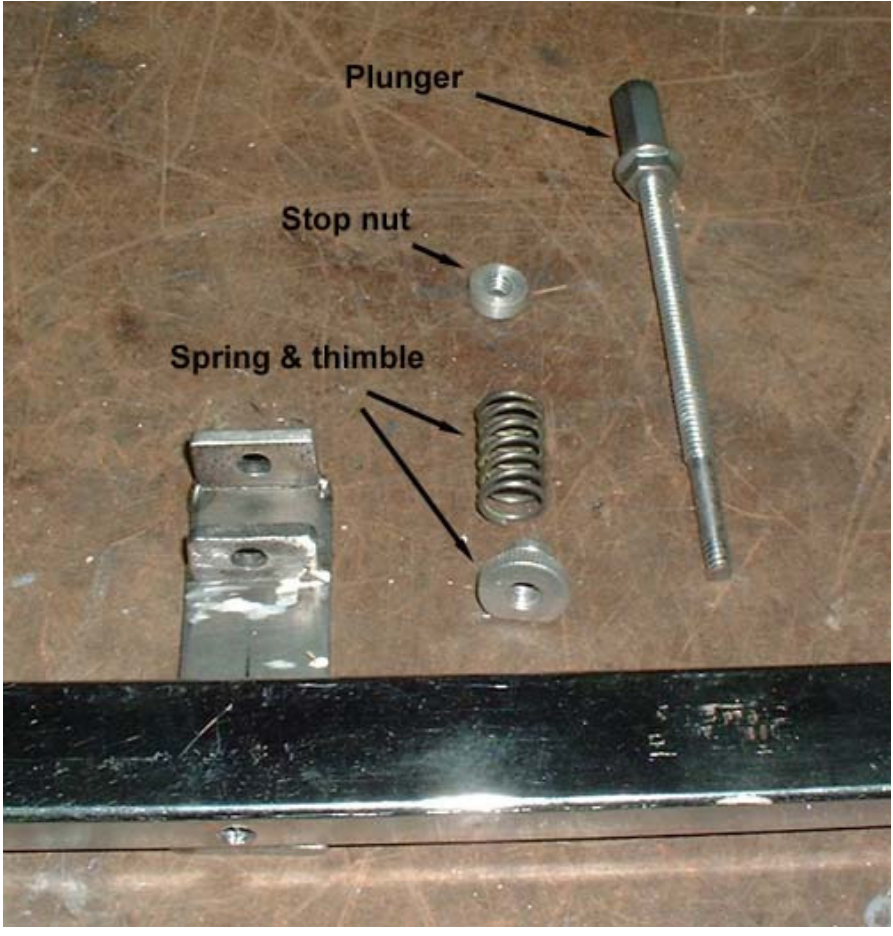
The owner's manual for my new (to me) compressor is pretty specific about the belt tension: there should be a deflection of .34" with a force of 5.5 - 8 lbs on the center of the belt span. There are tools for doing this; the one shown [here](#) is basically a spring scale with force and deflection markings. But I didn't want to buy one of those, when I figured that I could make something to do it. I figured it was an opportunity to make something **better**.

This is what I came up with:



The bar sits on the pulleys and the plunger presses against the belt, with adjustable force and deflection.

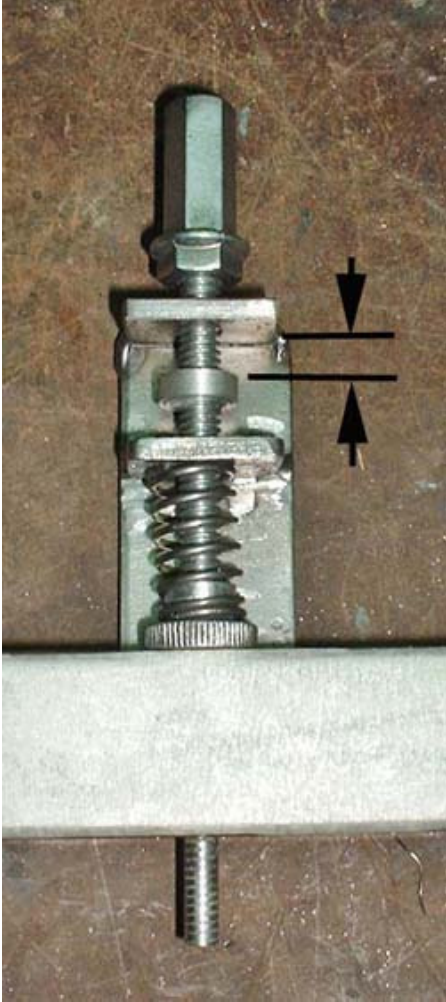
The pieces. In case that it isn't obvious, the thimble is threaded and the plunger screwed through it. Also, the stop nut is really just a position indicator and in use just touches its stop when the belt is tensioned properly.



To use, the gauge is adjusted off the belt. First, the plunger is advanced until the stickout is equal to the desired deflection, and the stop nut is set against its stop:



Then the plunger is further advanced to set the desired force. This time the stop nut moves with the plunger, so it moves away from its stop. The advance can be calculated using the spring rate and then that distance set between the nut and its stop. The calculation is simply $\text{advance} = \text{desired force} / \text{spring rate}$. The spring rate may be available from the supplier (e.g., see McMaster catalog), or may be calculated by measuring the compression with a known load/force.



Alternatively, the force can be set using a scale. I like to use the scale - the spring rate doesn't have to be calculated (and remembered) and there is less opportunity for error. To use the scale, the plunger is advanced some guessed amount then pressed on the scale until the stop nut reaches its stop and the "weight" noted. If the weight is greater than the desired force, the plunger is backed off & vice versa. Repeat as necessary.



At this point, the plunger has been adjusted such that when it is pushing with the desired force, it will retract to where the stop nut touches its stop, leaving the plunger sticking out the desired deflection.

The bar is placed over the pulleys and pressed down. If the belt isn't tight enough, the plunger will not fully retract ("fully" is when the stop nut touches its stop). In this case a too-small force has produced a too-large deflection:



If the belt is too tight, the stop nut will bottom out before both ends of the bar are touching the pulleys. I.e., the target force has produced a deflection smaller than desired.

An unanticipated method of using the gauge presented itself. If one end is clamped to one of the pulleys, the tension can be adjusted with the gauge in place. I.e., if the belt is too loose, tightening until the stop nut touches its stop. Or if too tight, loosening it until both ends of the bar touch the pulleys.

Applied to my compressor, the gizmo showed that the belts were way too loose. Without a good way to measure the force applied, setting the tension amounted to a wild-ass guess. Now I'll put this thing away and hopefully I'll remember where it is 10 years from now, when I need it again!