Captured Ball Lip Tool, Version 1.0

By R. G. Sparber

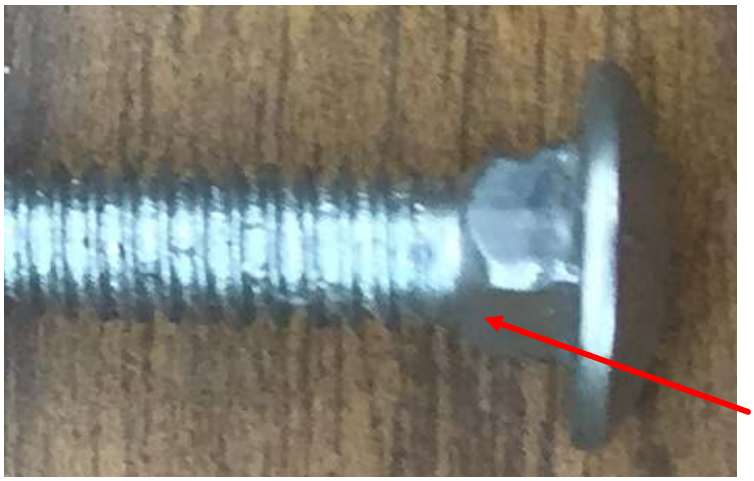
I needed to have a 0.250 inch diameter ball able to slide freely in a 0.257 inch diameter hole yet not fall out the bottom. I did not want to get into precision machining in order to make it work.

The solution can be found by looking inside of any quick connect air jack. Inside the female end are balls that are captured. Pull back on the collar and these balls are free to fall away from the center.

Insert a male jack, release the collar, and the balls now engage the male jack's lip and lock it in place.

So how do they keep those balls from falling out yet charge so little money for the female jack? The answer is they re-form the metal at the opening of the hole.

[1] You are free to distribute this article but not to change it.

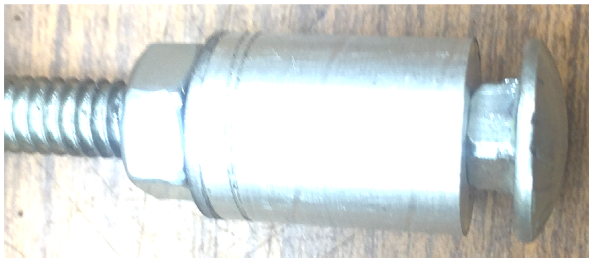


I chose to use a carriage bolt as my re-forming tool. First I put it on the lathe and used a cut off tool to square up the bottom of the head.

Here you see the end before being cut square.

Squaring the bottom of the head with a parting tool gave me a flat surface that would contact the face of the hole.

Not much to the set up. Just the ¼-20 carriage bolt, the part, a washer, and a nut.



Run the nut down until finger tight.

I first tried to hold the head of the carriage bolt in my bench vise but it slipped. So then I used my belt sander to put flats on each side of the head. This helped.

With the nut just snug, I used a wrench to turn it ¼ turn more.

Since the nut has 20 threads per inch, the pitch is 0.050 inches. One quarter turn is therefore $\frac{0.050\ inches}{4} = 0.013\ inches.$

This was enough movement of the square end of the head into the aluminum to form four effective bumps. If it wasn't, I would experiment with how much to turn the wrench and then record the successful value.

These bumps are not very strong but since they only need to deal with the weight of the ball, they are fine.

I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

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