

Cheap and Simple Gear Puller

by [travis7s](#) on May 18, 2009

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intro: Cheap and Simple Gear Puller

This instructables describes and shows how to build a simple gear puller.

If you like to tinker with motors you'll find that a lot of motors from toys and equipment have stubborn pinion gears stuck on the shafts. These can be a pain to remove, and while prying on them or punching them out with a hammer can sometimes work, you risk damaging the motor.

This will show you how to make a very effective gear puller with basic tools and next to no cost.



step 1: Cutting the frame

You will need something to act as the frame for the puller. Square metal tubing works great for this as long as the wall is thick enough to tap threads.

I used a piece of 1" square steel tubing with 0.1" wall thickness. I cut it to a length of 0.75" with a hacksaw, it doesn't have to be pretty.



step 2: Drill the screw hole

Drill a pilot hole in the center of the tube, going completely through the tube. This will ensure that everything lines up nicely in the end.

Since I'm using a #10-32 screw for my puller I drilled a 5/32 hole in the top wall and tapped threads into it.



step 3: Cutting the shaft slot.

You will have to add a slot going to the pilot hole in the bottom plate to let the motor shaft in. You can make the slot whatever size you like but it should be bigger than the motor shaft yet smaller than the gear you intend to pull.

There are a variety of ways to do this. Hacksaw, dremel cutting disks, drilling more holes in a path...



step 4: Modifying the screw

It is likely that the screw you want to use will be too big to push out the gear you want to take off, a pin will need to be added on the end of the screw for this.

Center the hole the best you can on the end of the screw, a 1/16" is a good size to use as most motor shafts are not that small. You should drill at least a 1/4"-1/2" down.



step 5: Adding the pin

You will need a pin that is small and very hard so that it will not bend when it is pushing the motor shaft.

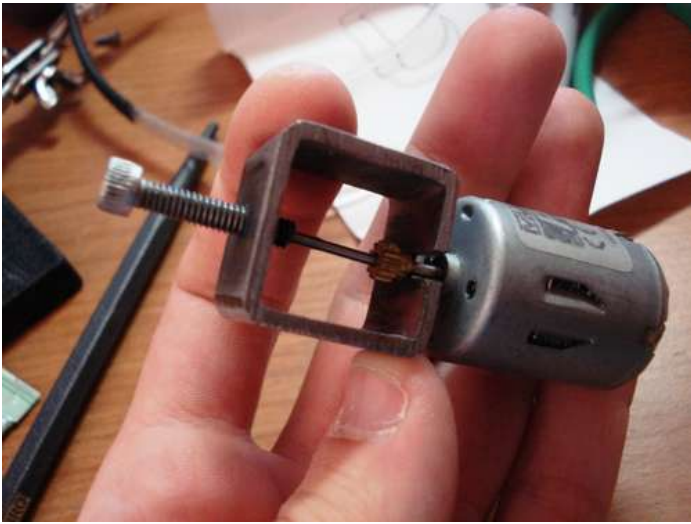
I just used an old dull 1/16" drill bit which I put in a vice and tapped it with a hammer to snap it. Eye protection is a good idea just in case.

Put the broken bit into the screw hole and glue it in place. Feel free to use a real pin if it's available though.



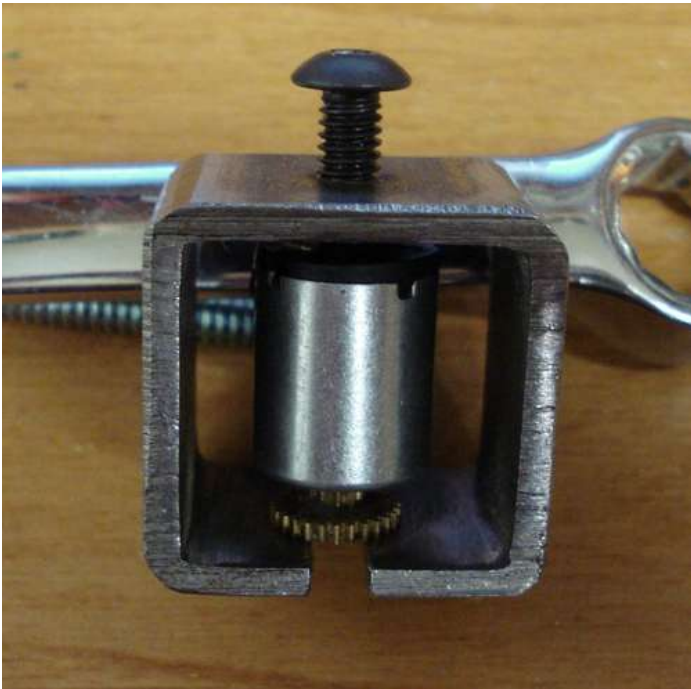
step 6: Assemble it and test it out!

That's about it, put the screw into the frame, slide a motor into place and tighten the screw until the motor is safely pushed out of the gear.



step 7: Gear pushing

If you need to push a gear back on to a shaft, you can use the same concept with a bigger sized puller.



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Comments


45 comments [Add Comment](#)


 **meeze** says: Jun 17, 2009. 8:41 AM [REPLY](#)
linear actuator?

 **purplemonkeydishwasher** says: Jun 2, 2009. 7:09 PM [REPLY](#)
it works on the same principle that bicycle chain breaker tools do -small amounts of force applied over a long period of time have lots of strength - you can drill holes in pennies with chain breakers


 **static** says: Jun 2, 2009. 3:01 PM [REPLY](#)
Clever idea, should work well up to it's limitations, all tools have them, pleas don't read that as a negative. Great instructable showing others how to do it. Well worth it's inclusion in the weekly email bulletin. A rare 5 rating from myself.


 **ve2vfd** says: May 18, 2009. 4:58 PM [REPLY](#)
Awesome mini puller!
I made something similar years ago, except I just drilled a straight hole and tacked a nut onto a 4x4 square tubing, darn it I should I threaded the tubing instead! :D

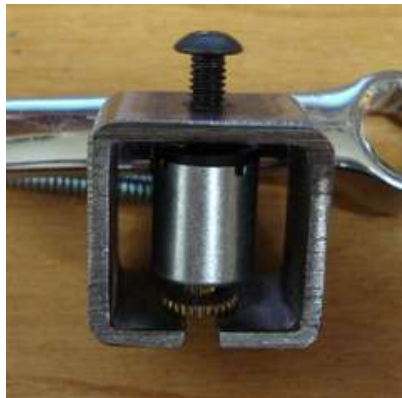
 **kelseymh** says: May 18, 2009. 5:08 PM [REPLY](#)
Depends on your tool kit. If you have a tap and die set, then use it. Otherwise, your solution is a good alternative!


 **static** says: Jun 2, 2009. 2:54 PM [REPLY](#)
No tap or welder? Simply put a nut on the underside. Adds a level of awkwardness. But it may convince to the buy a tap handle and tap, to begin equipping your shop. Actually if you can get a good tack weld without altering the properties if the nut, the thread in the nut will last way longer than tapped in the tubing. Then again if you get the tap you you can simply make a new tool, when needed.

 **lemonie** says: May 19, 2009. 1:55 PM [REPLY](#)
Lovely tool, do you have plans for a gear-*pusher*?
L

 **static** says: Jun 2, 2009. 2:31 PM [REPLY](#)
a bench vise works well for that job, for small parts. For a dedicated tool for the job HF has their 1 T. versicle press on sale a lot.

 **travis7s** says: May 19, 2009. 4:02 PM [REPLY](#)
You can use the same idea as a pusher, it just has to be bigger. I won't make an instructable as it would be near identical but it would work like this:



 **lemonie** says: May 20, 2009. 12:10 AM [REPLY](#)
Neat. You could add it in as step 7 rather than make a separate instructable?
L



sleebus.jones says:

Cool! Great use of tubular (boxular?) steel. Definitely something I need to build.

May 21, 2009. 6:45 AM [REPLY](#)



static says:

tubular(or simply tubing) works. When you go to the machine shop to buy the stuff you ask for certain size of rectangular or square tubing, or round if you need that. Go ahead and ask for boxular, you may put a grin on the face of the staff for the rest of the day. I wouldn't be surprised if they took to calling it boxular within their shop for a while. Tradesmen can be funny in that way. Nope according to the urban dictionary boxular is already taken

Jun 2, 2009. 2:26 PM [REPLY](#)



mister fixit says:

this gear puller is a good design .I look for new pullers to make all the time ,as i work in the mechanical trade. Thanks

Jun 1, 2009. 10:08 PM [REPLY](#)



thematthatter says:

that looks like a blank firing adapter for a M16

May 18, 2009. 7:12 PM [REPLY](#)



sublingual says:

My thoughts exactly. You could probably adapt a BFA even quicker than starting with square tubing...

Jun 1, 2009. 7:59 AM [REPLY](#)



cafriend says:

Damn sure does. Ah the BFA...

May 18, 2009. 11:16 PM [REPLY](#)



deaton says:

For us model railroaders, such a gear puller is available commercially but cost more than a few bucks. Nice to see a home made copy that looks identical and seems to function the same.

May 28, 2009. 8:15 PM [REPLY](#)



jovino says:

Easy, simple and well documented. Good job. :)

May 28, 2009. 12:58 PM [REPLY](#)



bd5 says:

Great Instructable!

May 28, 2009. 12:19 PM [REPLY](#)



clasher says:

A bigger version of this would be easy to modify for removing cottered cranks on bicycles. Thanks for the idea!

May 28, 2009. 8:07 AM [REPLY](#)



jghagen says:

This is a good design that emulates the NorthWest Short Line pullers except this is a heavier duty design, at least when comparing to the original HO puller from NWSL. I have owned the standard puller for years and it has given me good service.

May 28, 2009. 7:01 AM [REPLY](#)



unclejack says:

I am a mechanic and have big pullers, but this is a quick and easy puller for a smaller item, good one!

May 27, 2009. 5:44 PM [REPLY](#)



benthekahn says:

It seems this would also work well as a chain breaker for bike chain.

May 23, 2009. 8:38 PM [REPLY](#)



rada194 says:

exactly what i was thinking

May 24, 2009. 7:33 PM [REPLY](#)



3leftturns says:

Adding a larger knob or using a tuning peg screw would make it easier to turn the screw. Cool project dude!

May 23, 2009. 8:58 AM [REPLY](#)



travis7s says:

That is true. I typically need to use a allen wrench to to the screw.

May 23, 2009. 11:02 AM [REPLY](#)



3leftturns says:

Also, I don't know if the spacing between the motor and the gear always allows the motor to be slid on the unit easily... maybe you could file down the edge to make a little wedge for the motor/gear.

May 23, 2009. 9:44 PM [REPLY](#)



travis7s says:

Good observations, really small motors tend to not fit in this particular size. You can file the bottom down, or make a new one with thinner walls for small motors.

May 24, 2009. 11:11 AM [REPLY](#)



Einsteins Circuitry says:

This is an awesome idea. I wish I had known about this before I ruined a couple gears trying to pry them out with pliers.

May 24, 2009. 7:31 AM [REPLY](#)



uguy says:

Excellent, well done!!

May 23, 2009. 8:18 PM [REPLY](#)



reprapper says:

Great -ible. Those gears are always hard to get off motor shafts.

May 23, 2009. 1:47 PM [REPLY](#)



T3h_Muffinator says:

Niceun! I usually end up damaging the gear by using pliers, but determined another (pretty easy) technique!

@ Use dikes with low-gauge wire strippers.

@ Place the shaft of the motor in the stripping part of the dikes (dikes upside-down)

@ pull!

I suppose it may damage the motor, but 'hasn't yet for me...

May 19, 2009. 12:58 PM [REPLY](#)



travis7s says:

What do you mean by dikes?

May 19, 2009. 1:32 PM [REPLY](#)



T3h_Muffinator says:

Diagonal Cutters!

May 19, 2009. 5:07 PM [REPLY](#)





corey_caffeine says:
water retaining structure?

May 19, 2009. 3:55 PM [REPLY](#)



corey_caffeine says:
keeping is SFW

May 19, 2009. 3:55 PM [REPLY](#)



stephenniall says:
Hmm very smart idea Rated 5/5 for your excellent idea

May 19, 2009. 2:25 PM [REPLY](#)



appsman says:
Great instructable. Very clever. What's your favorite way for pushing a gear back onto the shaft w.o. damaging the motor?

May 18, 2009. 11:31 PM [REPLY](#)



travis7s says:
I usually just use that small vice in step 4. You just have to have something spacing the can of the motor so you don't crush the solder tabs or anything else.

May 19, 2009. 6:29 AM [REPLY](#)

If you built a bigger sized gear puller you could use it in reverse as well, where the motor sits on top of the slot, and then have a regular screw pushing on the gear.



Devery says:
It's good thinking. Well done.

May 19, 2009. 5:18 AM [REPLY](#)



mowdish says:
Great idea. A scaled-up version would also work reasonably well for removing pulleys on cars.

May 18, 2009. 4:59 PM [REPLY](#)



Swishercutter says:
You mean this?

May 19, 2009. 12:51 AM [REPLY](#)

http://www.denlorstools.com/home/dt1/page_1955_15/kd_tools_kd_2289_pitman_arm_puller.html



Swishercutter says:
As in a scaled up version. The pulley pullers are similar but not exactly like these--the ones I used for my power steering pulley were 2 piece and specific. There are many pullers that are very similar (some more or less complex) that are commercially available. Tie rod end pullers, bushing pullers, etc... they are all a great place for ideas to DIY.

May 19, 2009. 12:55 AM [REPLY](#)

Great instructable by the way.



travis7s says:
Thanks. Not sure on car pulleys as I'm a lousy mechanic but the nice thing is you can scale it up or down as you see fit, it's a really quick build especially if you've already done one.

May 18, 2009. 9:41 PM [REPLY](#)



nousaw says:
Nicely done. Like the idea of using an old drill bit for a pin. I have a lot of old/broken drill bits that I can now use. Thanks.

May 18, 2009. 10:18 PM [REPLY](#)