A Power Rock Rake, Version 1.1

By R. G. Sparber

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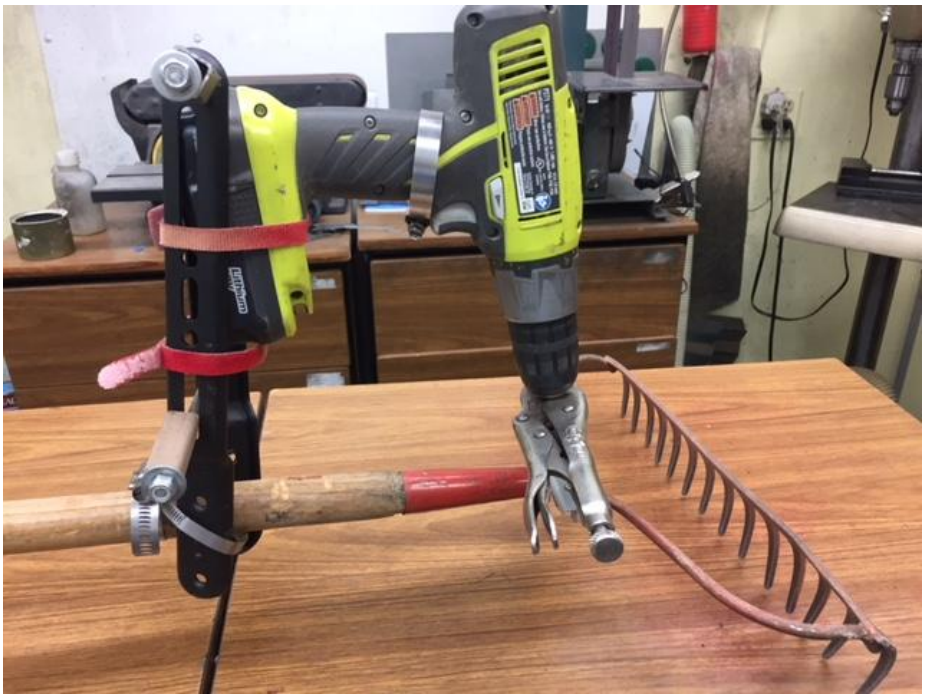
Here is a video of the problem at hand and how the Power Rock Rake solves it:

https://www.youtube.com/watch?v=R08eaFLPKHQ

The basic idea is to get the tines of a rake to vibrate in a little circle. This breaks up the dried clay and cleans the crushed rock. The vibrating rock is then easier to move out of the way.

First Proof Of Concept



The goal is to "fail fast". In other words, don't spend a lot of time making a proof of concept. If it doesn't work, learn from it and move on. In this case, the spinning weight worked well enough to move on to cutting some metal.

I weighed the Vise-Grip and measured its overall length in order to estimate the needed size of the spinning bar in my second proof of concept.

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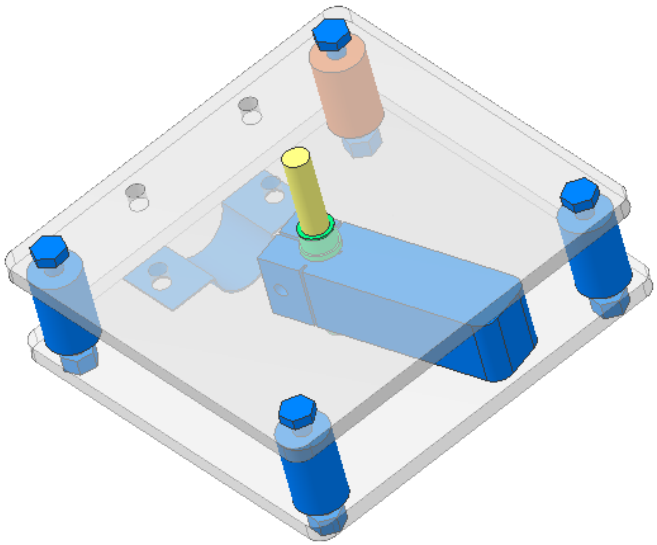
Second Proof Of Concept

The two 3/16" thick aluminum plates support a spinning bar plus protect the user. In the first complete design there will be sheet metal around the perimeter to full enclose the bar.

You can see the bar which is clamped onto the shaft. The front two bolts pass between rake tines and are secured with washers. The back two bolts anchor bailing wire which prevents the plates from lifting up. That nylon rope prevents the drill from spinning. The hose clamp around the drill handle depresses the trigger.

First Design



In this overview rendering I have made the two aluminum plates translucent. You can see the spinning bar, the handle clamp, plus one of the bronze bearings (green).

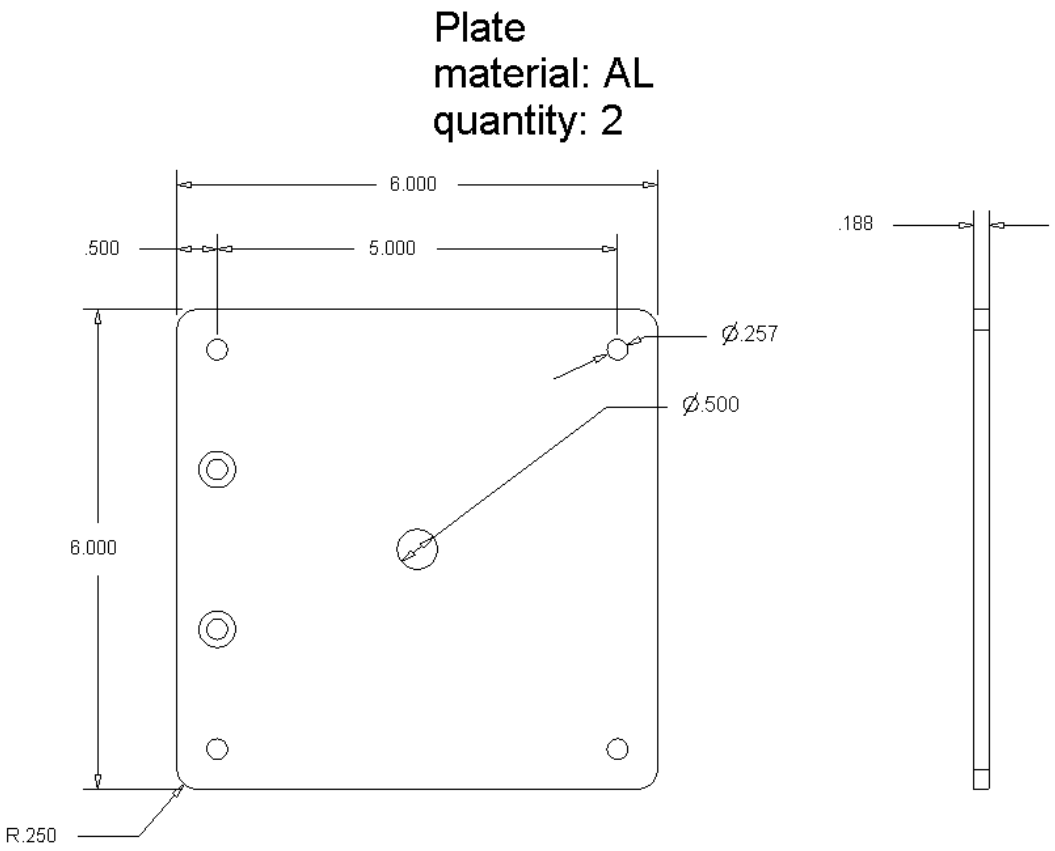
Bronze bearings were chosen over ball bearings because they are better able to handle the shock generated by the spinning bar and the impact of the tines on the rock.

The clamp goes over the rake handle and will be rubber lined to reduce the vibration coupled into the handle. Clearly I need more isolation than this as can be seen in the video.

The drawing shows solid aluminum spacers but for the second proof of concept I used ¼ -20 bolts which worked fine. Nylon locking nuts would probably be best in the long run.

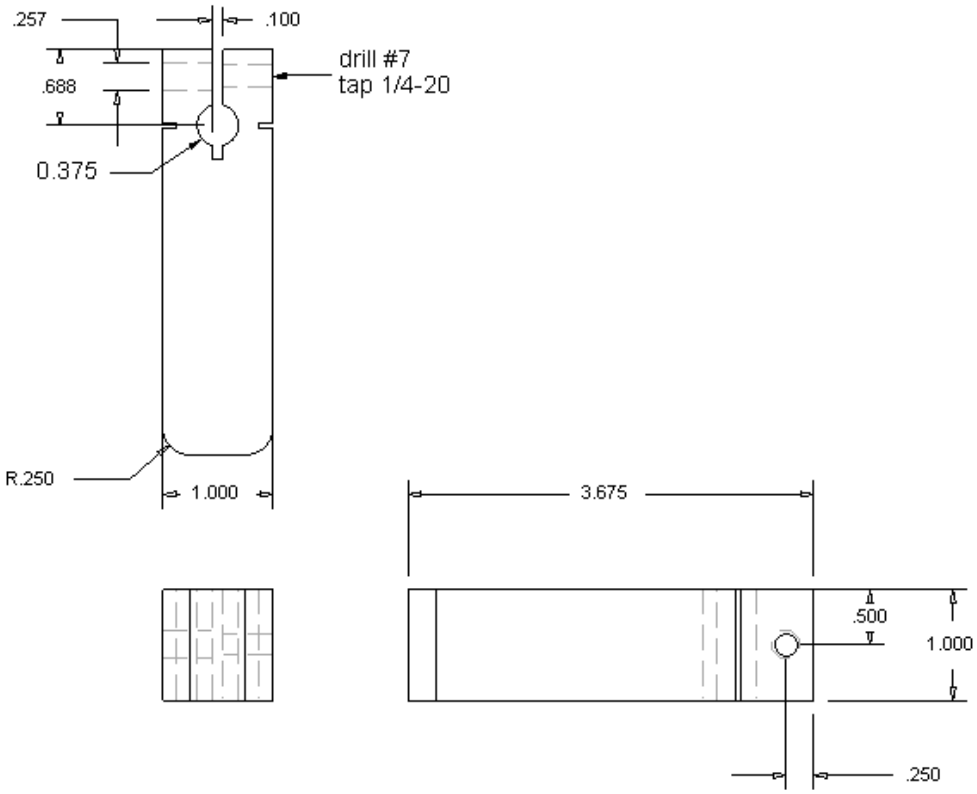
The two screws that hold on the clamp are flat head. The plate is countersunk so the head is flush with the surface and does not contact the spinning bar.

Shop Drawings



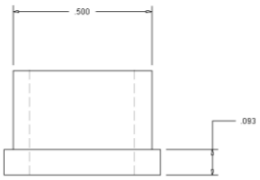
Hint: cut the plates, clamp them together, and then drill all holes. Before unclamping, mark the position of one plate relative to the other so they can go back together the same way. All holes will then perfectly match.

Counterweight
material: steel
quantity: 1

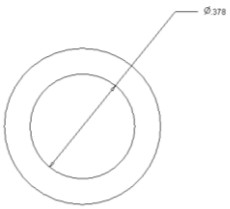


A ¼-20 bolt threads through to clamp the shaft. I put a nylon lined lock nut on the outside. The three relief cuts are needed to weaken the bar enough to clamp the shaft.

Bronze Bearing
quantity: 2



These bearings press into the aluminum plates with the lip to the inside.



Acknowledgments

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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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