

# *“In the Beekeeper’s Work Shop”*

## *10 Minute Projects: Queen Cell Protector Cage*

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## Queen Cell Protector Cage

Many beekeepers eventually take the step to raise their own queens by grafting (the transfer of 24-hour old larvae to prepared queen cell cups). There are many reasons why you should take up grafting queens, not the least of which is it is the most efficient and easiest method of raising queens under controlled conditions.

While initially the thought of grafting queens may be intimidating, the task is not that difficult. For me, I was totally intimidated before I took my first grafting class; after the class I was 50% intimidated. It took a second class before I figured out that grafting is, in fact, quite easy. Any apprehension I had was totally inside my head.

In fact, grafting your own queens is really fun! And as I become better at the job, new dimensions of beekeeping are unfolding.

Grafting and raising your own queens does require some specialized equipment. For me, however, this is a good thing as it presents new challenges and projects in the workshop. A queen cell protector cage, the topic of this article, is a case in point.

### **A Queen Cell Protector Cage**

The queen cell protector cage (Figure 1, below) is a simple tubular gadget made out of #8 hardware cloth. The cage is about the size and shape of a hair curler.

The cage is used on a grafting bar to protect the developing cells after the nurse bees have fully capped the queen cells (Figure 2, right). When the developing queens are en-

sconced inside a protector cage, they are easy to find after they emerge. More importantly, the queens will be protected from the first emerging queen, whose first task is to patrol the area and destroy (kill) her yet-to-emerge rivals.

I slip a protector cage over the queen cells a day or so before the queens emerge. A simple wire harness keeps the cages securely in place. After the queen emerges, I can remove the cage, queen and all, put her in a queen marking cup to mark her and transfer her to a mating hive or introduce her directly to a queenless hive as needed. All the time, the queen is securely and safely confined with no chance of flying off to her fate.

### **Basic Construction**

The queen cell protector cage is simple to make. All it takes is a small piece of #8 hardware cloth about 3 inches square. Thus, it is a great use for all those scrap pieces of hardware cloth that you have saved from other projects.

I use a 3/4-inch piece of conduit as a form to roll the mesh and form a tube. Other similarly sized forms would work just as well. A couple of small wire ties keeps the tube from unrolling while you finish the job with a couple spots of solder. Finally, the bottom is formed by cutting a series of vertical tabs in one end and bending them over.

Once you have made a couple of protector cages, the whole job will probably take less than 5 minutes. So time will not be an excuse to making your own queen cell protector cages.



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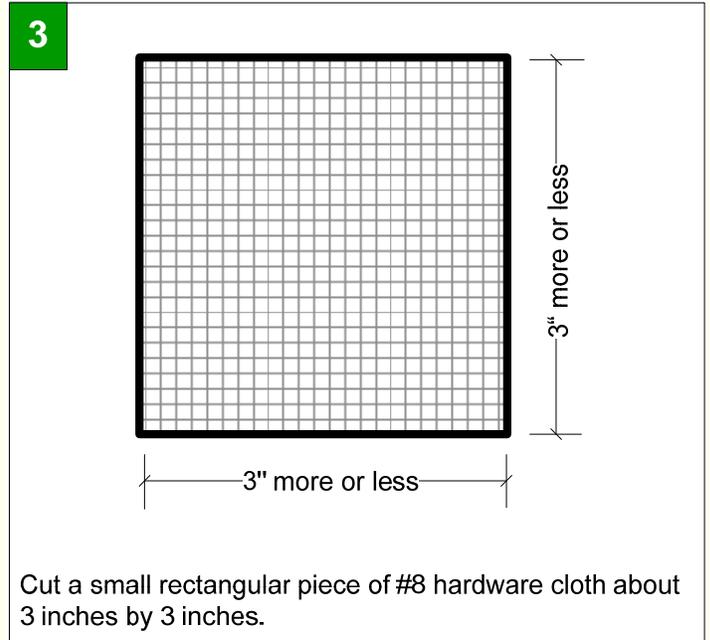
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### Construction Details

#### **Step 1. Cut the Hardware Cloth to Size**

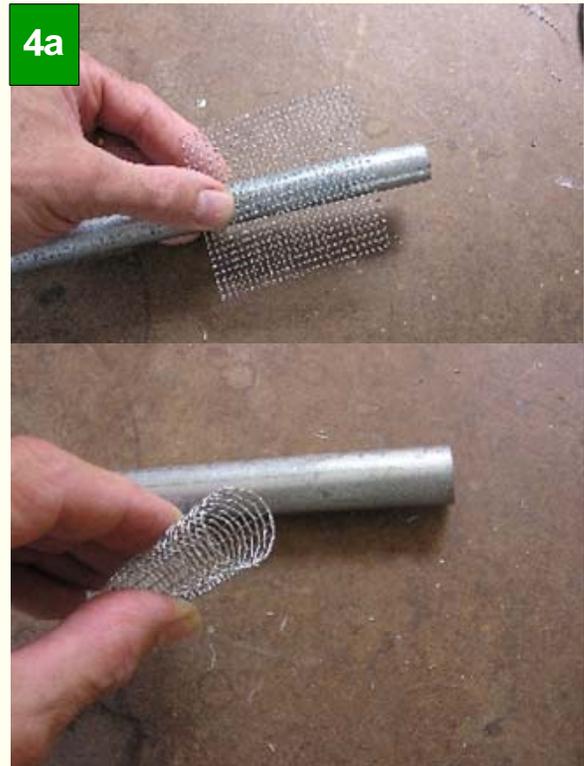
From a scrap piece of #8 hardware cloth, cut a rectangular piece about 3 inches by 3 inches (Figure 3). The size is not particularly important. You want enough material to overlap about a 3/8 inch (3 squares of the mesh) when you roll the screen around the form (see Step 2).



#### **Step 2. Bend the Mesh into Tube Shape**

I find it easiest to use some type of dowel, pipe or conduit as a form to wrap the hardware cloth and make it into a tube. In the photo in Figure 4a (top), I am using a 3/4-inch conduit. This is about the right size for the cage (Figure 4a, bottom).

After rolling, the mesh will tend to unroll. To keep this from happening until the cage can be soldered (done in Step 3), use a short piece of wire on both ends to clip through the wire and hold the tube shape together (Figure 4b). I use a very short piece of #18 aluminum wire, which is soft and easy to bend. Using a needle-nosed pliers, bend the wire into a "U" shape, slip it through the mesh and twist the tag ends together.



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### Construction Details

#### Step 3. Solder Mesh

Although the wire clips may hold the cage together, a couple of spots of solder does a much better job (Figure 5a). I usually put a drop of solder over each wire clip (from step 2) and one in the middle (Figure 5b).

Use leadless solder (available in any hardware store). Before soldering, put a dab of flux on the spot to be soldered. The flux will draw the solder into the mesh and bind the layers together. Without flux, the solder may bead up on the top and not join the mesh. Some solder has a flux core so you don't have to apply flux separately.

The trick with soldering is to allow your soldering iron to get good and hot. Touch the coil of solder to the iron to pick up a small drop of solder - it doesn't take much - and then touch the cage mesh where you have the flux. The solder should flow into the wires of the mesh. Check the inside of the cage to make sure that you have soldered both sides of the mesh together.



#### Step 4. Form Cage Bottom

To make the bottom, simply snip a series of cuts about 1/2-inch up (4 squares of the mesh) every 3/8 inch (Figure 6a). Then bend the strips together forming the bottom (Figure 6b). I take a short piece of 1/2-inch dowel (or the conduit used to form the tube) and tamp it down inside the cage to get a sharp bend on the bottom. It is not necessary to wire or solder the bottom though it doesn't hurt to do so.

If necessary, trim any sharp wires sticking up along the top rim of the cage.



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### **Step 5. Make Wire Harness**

When ready to put the protector cage over a queen cell on a cell bar, make a wire harness out of the same #18 gauge aluminum wire that you used to hold the cage together (Figure 7). Cut about a 2 to 2/12 inch piece of wire and bend a small hook on one end and a not-so-sharp hook - more of an "L" shape - on the other end.

After the cage is slipped over the queen cell, slip the hook end of the wire into the cage near the top. Pass the wire up and over the cell bar and bend the other end down to the cage. Use a needle-nosed pliers to grab the wire on top of the bar and give it a twist. This will tighten the two ends of the harness into the cage and keep it secure.

To remove the harness, simply pry one end loose from the cage or cut the wire on top. The soft aluminum wire of the harness is usually good for only one use, so I usually cut the harness off the cage.

### **Variations on the Theme**

The queen cell protector cage described in these plans is obviously used in a queen rearing operation on a cell bar to finish the grafted cells. But what if you want to protect a queen cell that the bees created themselves inside the hive?

If the queen cell is located in the middle of the frame, a simple queen introduction cage (push in cage) would most likely be the easiest way to go (see "Resources" on page 5).

If the queen cell is located along the bottom and hanging down below the frame then using a slightly modified protector cage might work (Figure 8). Instead of keeping the top of the cage open, close it up just like you did for the bottom. Use a small pair of wire cutters, cut an opening like that shown. The two tabs can be bent out, like little cabinet doors, and pushed into the comb on either side of the drawn queen cell. You might have to play around a bit with making the tabs so that you can slip the cage over the hanging queen cell and not have any space open that would allow the other bees, including the queen, to get in or out (Figure 9).

If needed, you can bend a short piece of steel wire into a "U" shaped harness and slip it through the cage (as shown in Figure 8). In the photo, I have also soldered this harness to the cage. The two ends of the harness can be pushed into the wax to help hold the protector cage in place.



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### List of Materials: Queen introduction Cage

#### **HARDWARE**

#8 hardware cloth (size not important, at least a 3" x 3" piece)  
fine wire (18-gauge aluminum)  
solder and soldering flux

## Resources

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A video of this project can be found on Youtube at...  
[www.youtube.com/user/beekeepersworkshop](http://www.youtube.com/user/beekeepersworkshop)

Dadant & Sons (1997). *The Hive and the Honey Bee*. Chapter 12.

"Building a Bee Hive" series. Published on-line at [www.michiganbees.org/beekeeping/in-the-beekeeper's-workshop](http://www.michiganbees.org/beekeeping/in-the-beekeeper's-workshop). For other beekeeper's workshop project plans, search for "workshop".

Other plans in the "10 Minute Projects" series include...

- \* Pocket Queen Cage
- \* Queen Introduction Cage
- \* Queen Marking Cup
- \* Hive Ventilation Screen

These plans can be found on the [michiganbees.org](http://michiganbees.org) web site referenced above.

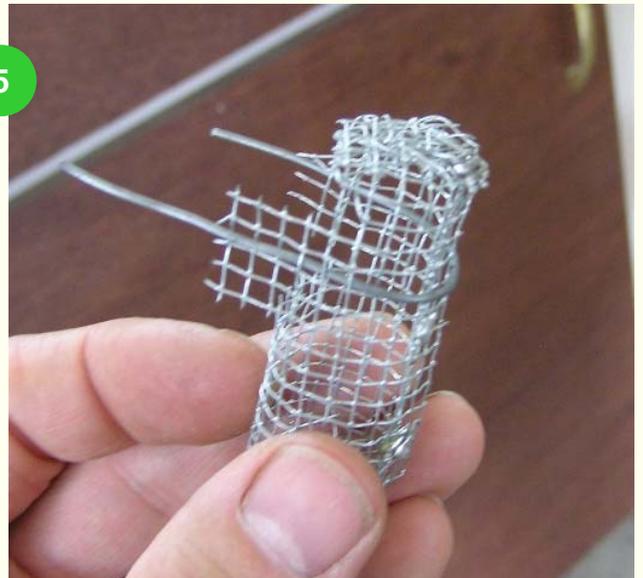
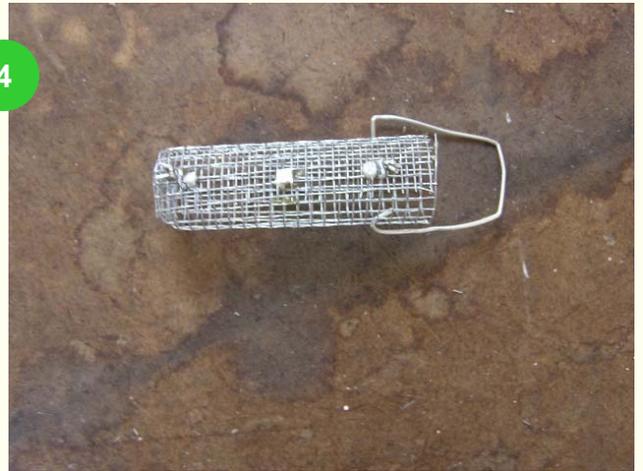
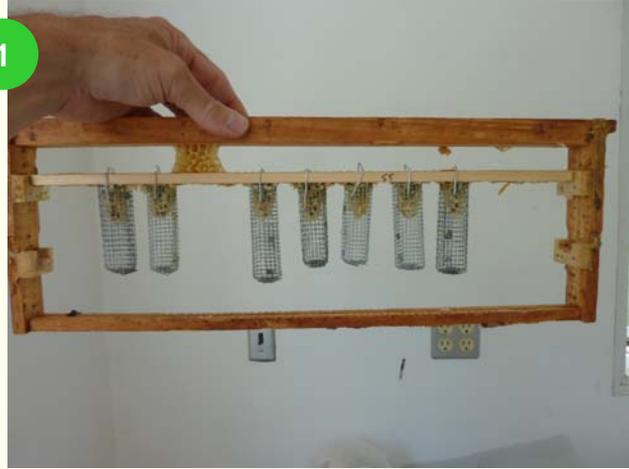
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### Photo Gallery...

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#### Photo Captions:

1. Queen cell protector cages installed on a bar or grafter queen cells.
2. Protector cages shown with wire mounting harness.
3. A queen that has emerged into a queen cell protector cage.
4. Wire harness on protector cage ready to go.
5. A variation of a queen cell protector cage used for queen cells drawn out at bottom of a frame. Note wire harness to help hold cage in place.