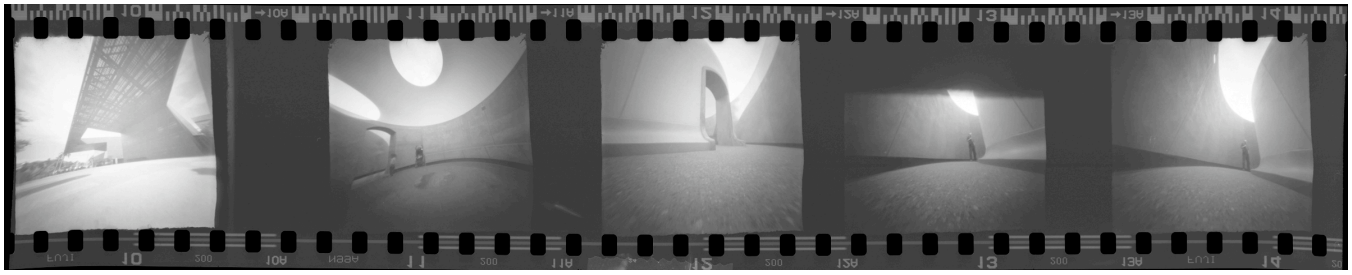


Make a Matchbox Pinhole Camera*

web site: http://judithhoffman.net/
blog: http://www.judithhoffman.net/blog/
email: art@judithhoffman.net

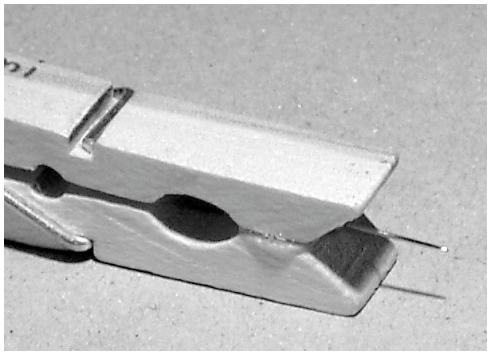
Materials you need:

- spring clothes pin
- #10 sewing needle. I used demi-longs and found them in the quilting supplies at JoAnn's. (They were the smallest size I could find.)
- 5 minute epoxy
- small matchbox. They come in packs of 8 at the grocery store.
- sharpie magic marker or black acrylic paint
- A thin piece of metal. Brass shim, .004 gauge, which is .102 mm, or a piece of a soft drink can, or a piece of an aluminum pie plate. The brass makes a smoother hole.
- #600 grit wet-or-dry sandpaper
- ruler
- mat knife
- empty 35 mm film canister with a little tab of film sticking out. You can get these wherever film is developed.
- roll of 35 mm film, ASA 100 or 200
- scotch tape
- gaffer's tape - I got this at OSH in the plumbing supply section or PVC electrical tape. Gaffer's tape will allow some light leaks, electrical tape should seal the camera better.
- Aluminum foil tape – also available at OSH
- giant paper clip – mine are 1 15/16 inches long
- a small piece of foam, about 3/8 inch square – window insulation works well
- a scanner that will scan film or slides – one that does medium format is the handiest, OR:
- An alternative to the scanner would be to take a photo of your negative with a digital camera.
- Photoshop or Photoshop Elements is very handy for corrections. I usually need to correct the color and the contrast.

*These instructions are also on my flickr page (make a matchbox pinhole camera set)
http://www.flickr.com/photos/judithhoffman/sets/72157594316133954/

Make a pinhole drill

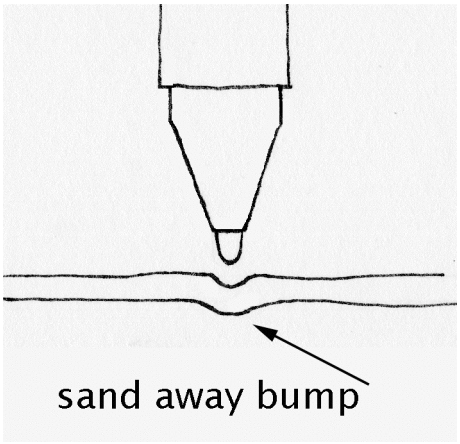
Right: You need the spring clothespin, the #10 sewing needle and 5 minute epoxy. Put a blob of epoxy on the "mouth" of the clothespin. Put the needle into the mouth with about 1/4 inch sticking out. Make sure the needle is straight with the sides of the clothespin. A piece of cork is handy to protect the needle.



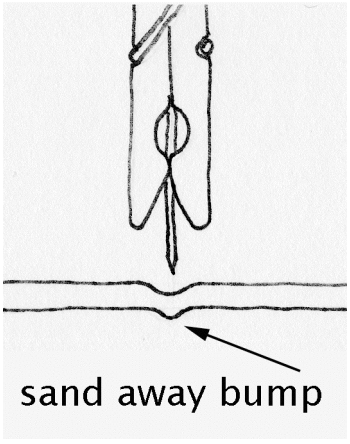
Make a pinhole

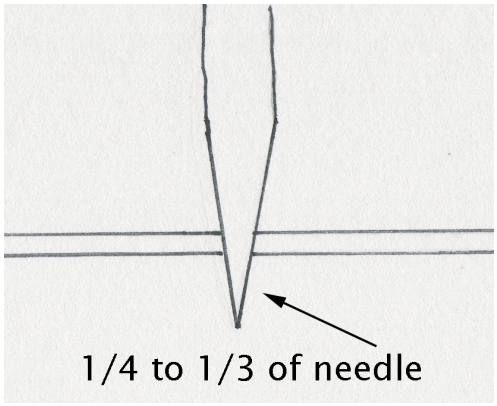
The imprecise method of making a pinhole: Poke a hole in the metal. Sand the burrs off. You hole won't be perfectly round, so your image may be more distorted in some way. You might like it a lot. The smaller your hole, the better the focus, but the longer the exposure time.

Here's the fairly precise method:
Right: Cut a piece of your metal about 1 and one half inches square. Size doesn't really matter but it's nice to have enough to hold on to. In the center of the piece of metal, make a shallow dent with a ballpoint pen. Don't use a lot of pressure, you want a slight bump on the back of the shim. Sand the bump on the back with 400 or 600 grit wet or dry sandpaper. This will thin the metal, but don't sand through the hole.

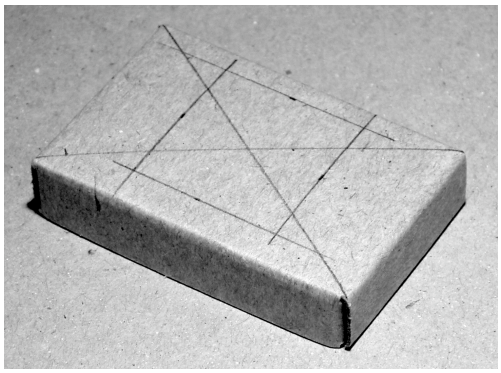


Right: Next you will drill the pinhole with the homemade drill. Every time you drill into the shim, use a twisting motion. Drill a small dent in the center of the dent made by the ballpoint pen. This makes a bump on the back side of the metal. Sand this down. Alternate making a bump and sanding until you see a tiny point of light through the metal. Turn the metal over and drill from the back, then sand the burr off.



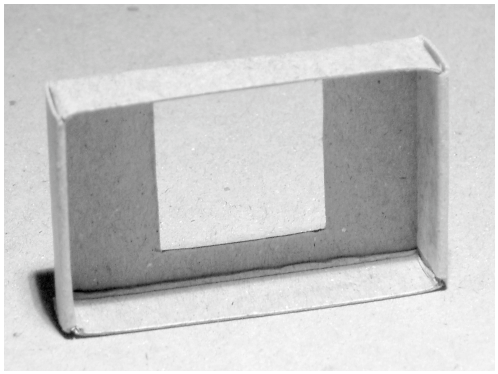


Left: Alternate drilling from the front and back until about one quarter to one third of the #10 needle comes out the back side of the shim. Sand both sides smooth each time you drill When you are done, you have a pinhole approximately .1 mm wide. This is a good size for the matchbox camera. Trim the piece of metal to fit easily inside the matchbox, and darken the back side with a magic marker.



Make the camera

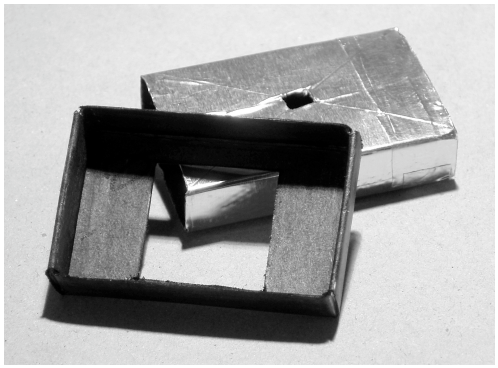
Left: Mark off a 24 mm square on the tray of a matchbox. (slightly less than 1 inch)



Left: Cut out the square with the mat knife.

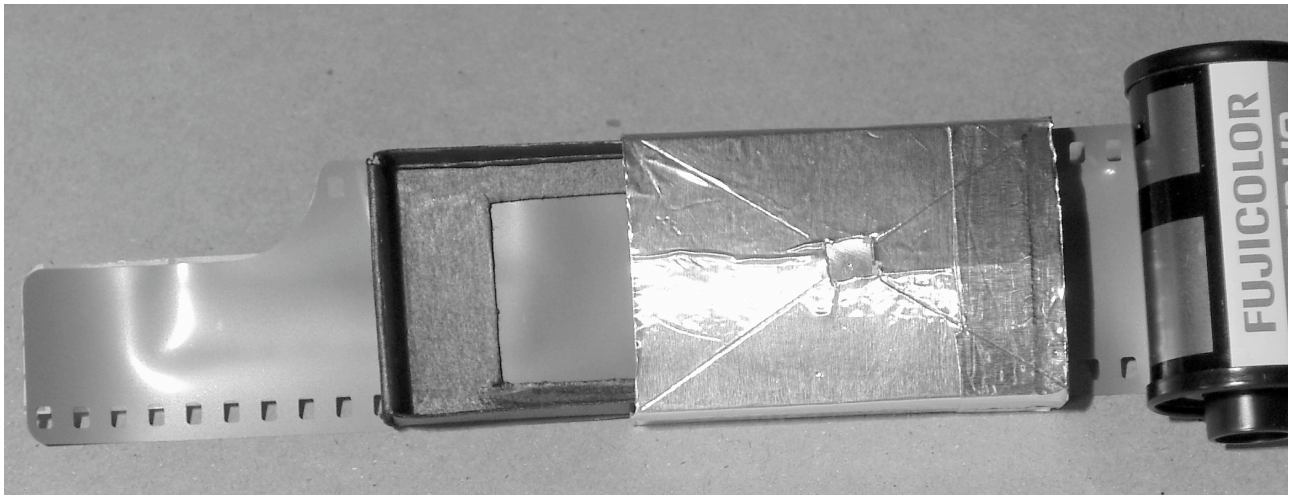
The next step is optional: Cover your matchbox with aluminum foil tape. It will hold together better. Otherwise, you'll need to make a new camera every time because the gaffer's tape will tear the box.

Left: Cut a small hole in the very center of the sliding cover. (I didn't cover mine with foil tape until after cutting the tiny hole. It's easier to put the foil tape on first.)



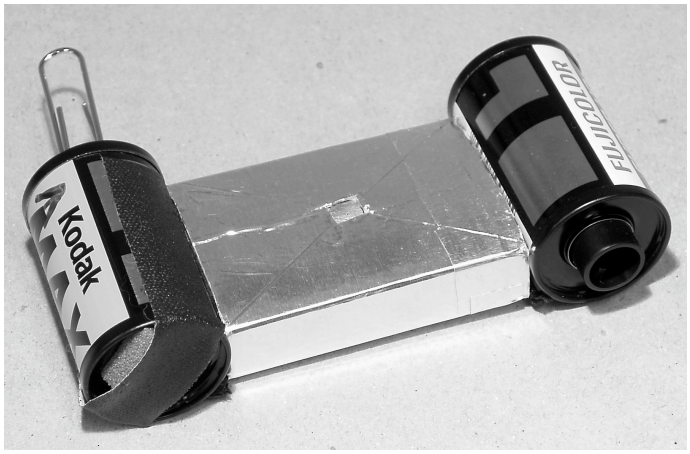
Left: Darken the inside of the tray and the inside of the cover with a sharpie or some black paint.

Trim excess metal away from your pinhole. The piece of metal should be about 1/2 inch across, with the pinhole in the center. Using gaffer's tape, tape your pinhole to the inside of the sliding cover.

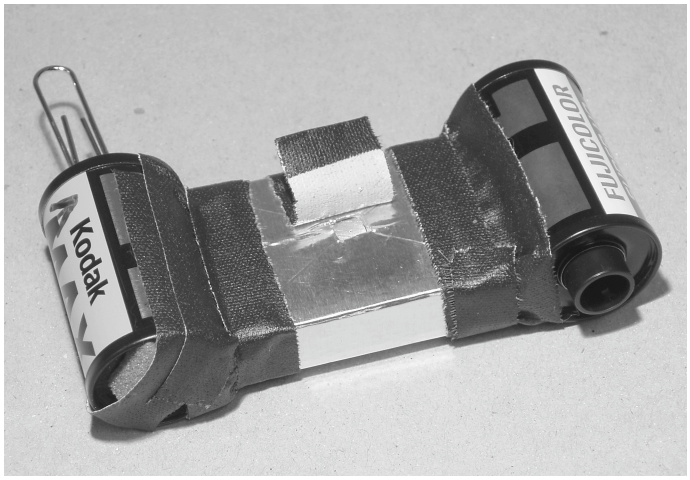


Above: Thread film through the matchbox, between the tray and the cover. The inside curve of the film goes toward you. The square you cut out of the tray will mask off an area where your photos will be exposed.

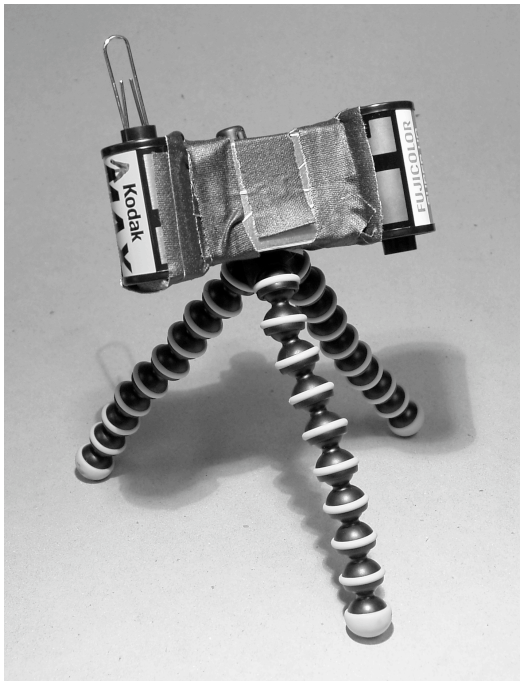
Left: Cut the irregular end off the film, so it is square. Using scotch tape, attach this end of your film to the little tab of film that sticks out of the empty film canister, lining up the edges. Put tape on both the front and the back.



Left: 1. Insert a large paperclip in the end of the empty canister to wind the film.
2. Draw an arrow on the empty take-up canister to indicate which way to wind the film. (on the left)
3. Tape a small piece of foam on the bottom of the empty canister. This keeps your film from springing back after it's wound. (on the left)
4. Take up just enough film to pull the two canisters to the sides of the matchbox.



Left: 1. Tape around the film canisters to seal the film. Use gaffers tape for some light leaks, and PVC electrical tape if you don't want them. Be sure the canisters are against the matchbox so you don't get any tape on the film.
2. Make a little tape flap for the shutter with gaffer's tape.
Note: There isn't a correct way to orient the camera. But if you tape your camera to a tripod, having the paper clip up is handy.

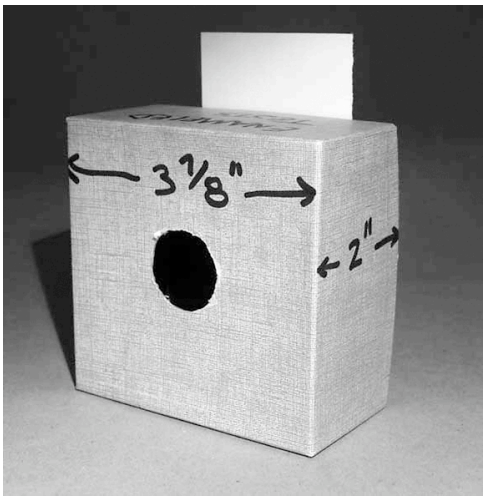


Take Photos

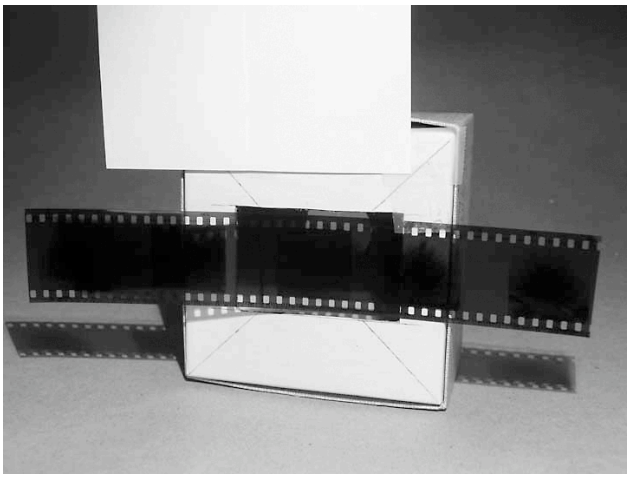
Here is my camera taped to the Joby Gorillapod. (see Tips section for details) Advance the film one or one and a half turns to start. Every time you expose, advance it 1/2 turn plus a little more. There are some exposure time suggestions in the Tips section. When the film won't advance any more, move the paper clip to the other canister and rewind the film. Remove the tape, open the camera, and cut the film. Be sure to remove all scotch tape before winding the film into the canister. Apparently it's a problem in developing machines. Ask for "develop only," you don't want your film cut. It's best to take the developed film home and scan it. Or photograph the film with a digital camera.

Taking Photographs of Negatives:

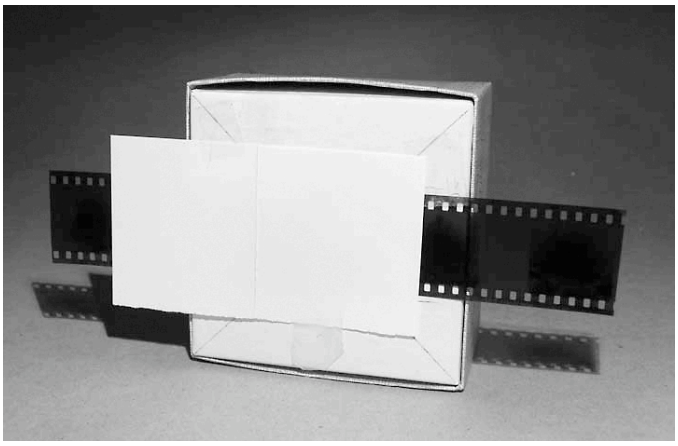
One alternative to scanning your pinhole negatives would be to take photos of them with a digital camera that has a macro mode. The next few photos show a very simple method. I use an old business card box. Anything that puts your film the right distance away from your camera would work. My camera has a super-macro mode, so 2 inches is a good distance. You could even hold the film up in front of your camera, with good backlight, and snap a picture.



I cut a window on the back of the box. The opening of the window is just slightly larger than one frame of 35 mm film. I wanted to include the sprocket holes in the film. I use a tiny piece of tape to attach my film to the window, lower the paper, aim the camera at a light source and take a photo of the film. The box keeps the film a set distance from the camera. You will need to figure out this distance for your camera. Use the macro mode if you have one, or hold the film further away.



If I put textured paper over the window, the photograph is atmospheric. Smooth paper is less apparent in the final photo. This works for strips of film and slides. You would have to reverse regular color film in Photoshop, unless you like the weird colors. A much cheaper, and very good version of Photoshop is Elements. Read the flickr "Photographs of negatives" group discussion for more ideas: http://www.flickr.com/groups/23586039@N00/



Tips

- You will get up to 30 shots on a roll of 24.
- You will need to either set the camera on a steady surface, or tape it to a tripod with something like gaffer's tape. I like the Joby Gorillapod, $22. at Amazon.
- In general, these cameras make very wide angle images. Get really close to your main subject.
- Pinhole photos are slightly out of focus. But it's consistent throughout the image, so there are no depth of field problems.
- A scanner that will do both slides and medium format film can include the sprocket holes.
- Accidental double exposures are common. If you do one on purpose, cut each exposure time approximately in half.
- Actual exposure time depends on the size of your pinhole, if it's large you will need a shorter exposure time. Take a variety of shots with a variety of exposure times for your first roll. Take notes.
- I have been using ASA 200 film. If you use ASA 100, the exposures will need to be a little longer. You'll have to experiment and take notes. Here are some approximate exposure times, organized from light to dark (these are my notes for shots I liked using ASA 200 film):
  1. Around 10:30 am in July full sun 4 to 5 seconds.
  2. Open shade, middle of the day, aimed to sky, 10 seconds.
  3. July, full sun 5:30 pm 20 seconds.
  4. Doing "quiet parlor of the fishes." It's in sunlight coming through the window, around 5 pm in July. 40 to 60 seconds. Flashlight on aquarium to boost the light makes it well lit, looks good. (you can see this photo in my flickr sets – it's basically an indoor shot)
  5. 7am in bathroom, sun coming in window, light bounces around in there - 45 seconds.
  6. Indoors, at night, overhead florescent lights, 120 sec.
  7. Nighttime, under 100 watt outside lights, 3-4 minutes is good. 2-3 min is good for one shot of a double exposure, (the second shot would also be 2-3 minutes).
- As the days get shorter, the sun is lower and weaker. I would try 5 or 6 sec for my pinhole in the middle of the day (October), and even longer exposures later in the afternoon.
- Madmolecule has a nice magnetic attachment to a tripod for a camera made in an empty mini-DVD cassette: http://www.flickr.com/photos/zeke_/234449127/
- Want clickable links? On my website under "links" you will find all the links mentioned in this pdf.

Resources

- Pinhole photography links on my web site: go to http://judithhoffman.net/ and click on "links."
- Check out my flickr sets. There is one on pinhole photography and one on making a matchbox pinhole camera. It has color photos with notes. http://www.flickr.com/photos/judithhoffman/
- There are lots of flickr groups that have pinhole photos. Go to my flickr page and look at my groups.
- Most of my matchbox pinhole information is from a blog called Alspix Stuff. He also has instructions for a clicker to advance your film. I didn't include it here because mine doesn't always work. http://www.matchboxpinhole.com/
- You will need to find a local place to take your film. Ask them to return it uncut.