

Four Color Screen Printing Press Plans.

from www.printingplans.com

Difficulty: Intermediate

Creators: Michael Phipps and Dan Mitchell

Plans Prepared by: Michael Phipps on July 8th, 2008

See shirts printed on this press at <http://phippart.etsy.com>

This four color, one station printing press was designed and built by Michael Phipps and Dan Mitchell. It is sturdy and very precise and can be built for less than \$150, which is quite a bit less than even the cheapest commercial presses. You can also add a second station to the press if you desire by using the instructions for the arm and duplicating it on a second side. ***Save time, gas and money and buy ALL the hardware in one package. Go to www.printingplans.com and click on the "buy hardware" link.**

Plan on a few days to finish the press as it is very involved. It is recommended to have a second person help out as several steps could use one person holding while the other person attaches.

A few notes before the main instructions: The sturdiness and precision of the press is important for the success of multi-color images, so it's important to be as accurate as possible in your measurements. It is also recommended that you use wood glue at each joint in addition to screws so that the press is as stable as possible. You may also want to predrill holes before putting in the screws to avoid splitting of the wood (use a bit that's slightly smaller than the screw). This table is designed for a six foot tall person. To alter it for someone of a different height, adjust parts N and O accordingly.

Tools You'll Need:

Power Drill/Screwdriver

Wood and Metal Bits

Miter Saw

Table Saw or Circular Saw

Electric Sander

Workbench Vise or Drill Press

Yardstick/Measuring Tape

Pencil

Level

Square

Clamps

Wood Glue

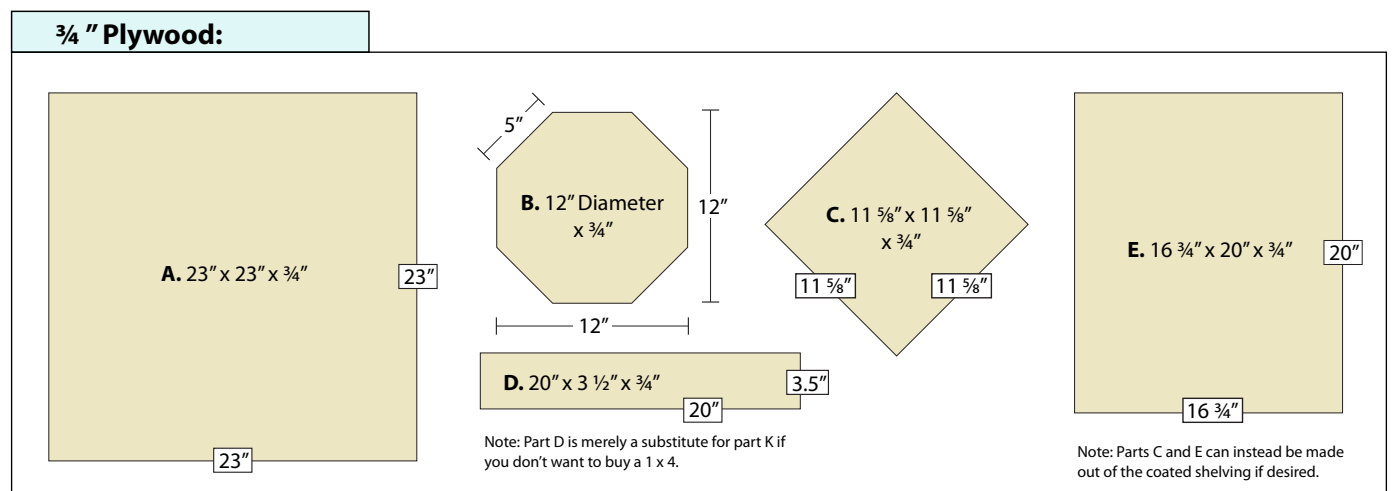
Welding Glue (or tools/materials for welding)

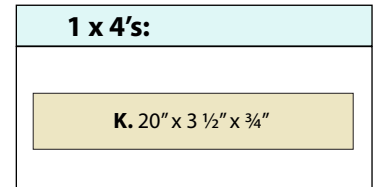
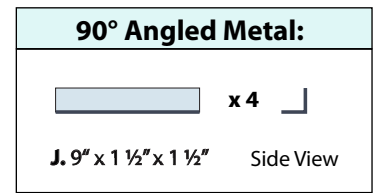
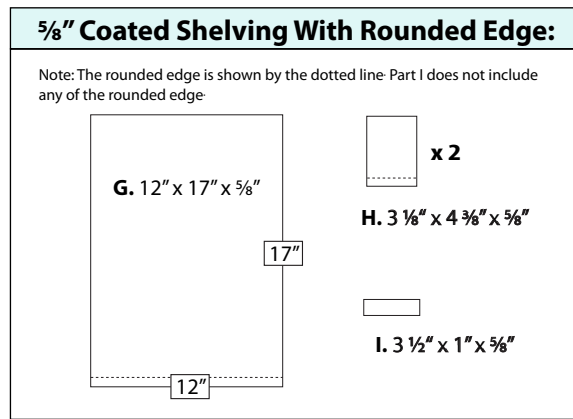
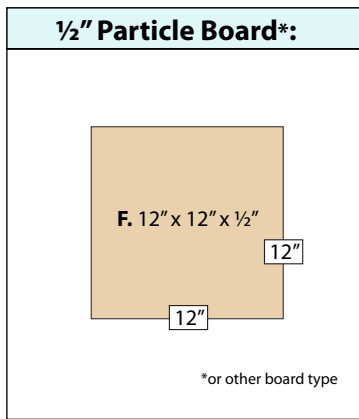
Paper or Card stock

Materials Needed:

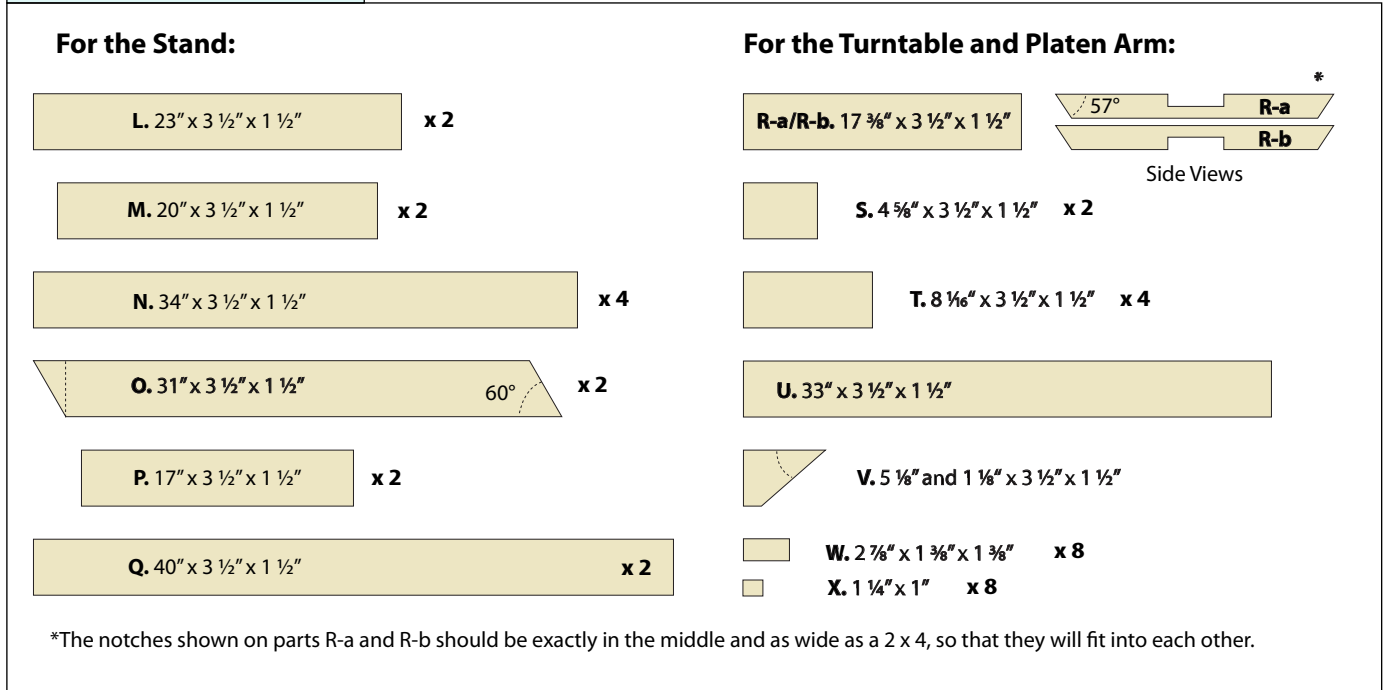
In the diagram below you'll find the dimensions of all the lumber you'll need. The particle board can be another type of wood as long as it is $\frac{1}{2}$ " thick. The most important thing regarding the thickness of your wood is that the sum of the width of pieces B, F and the lazy susan turntable is equal to the sum of the thickness of pieces I and U. This will help align everything so your screens float just the perfect height above your shirts for off-contact printing. You should be able to cut all your 2 x 4 pieces out of six 8-foot lengths, so I'd recommend buying seven to be safe. They should all be good, straight pieces, but it is especially important to find a perfectly straight piece for parts **T** and **U**.

Note: Part D below is not listed in the instructions. It is a substitute for part K if you choose not to buy a 1 x 4 and would prefer to use your existing plywood.





2 x 4's:



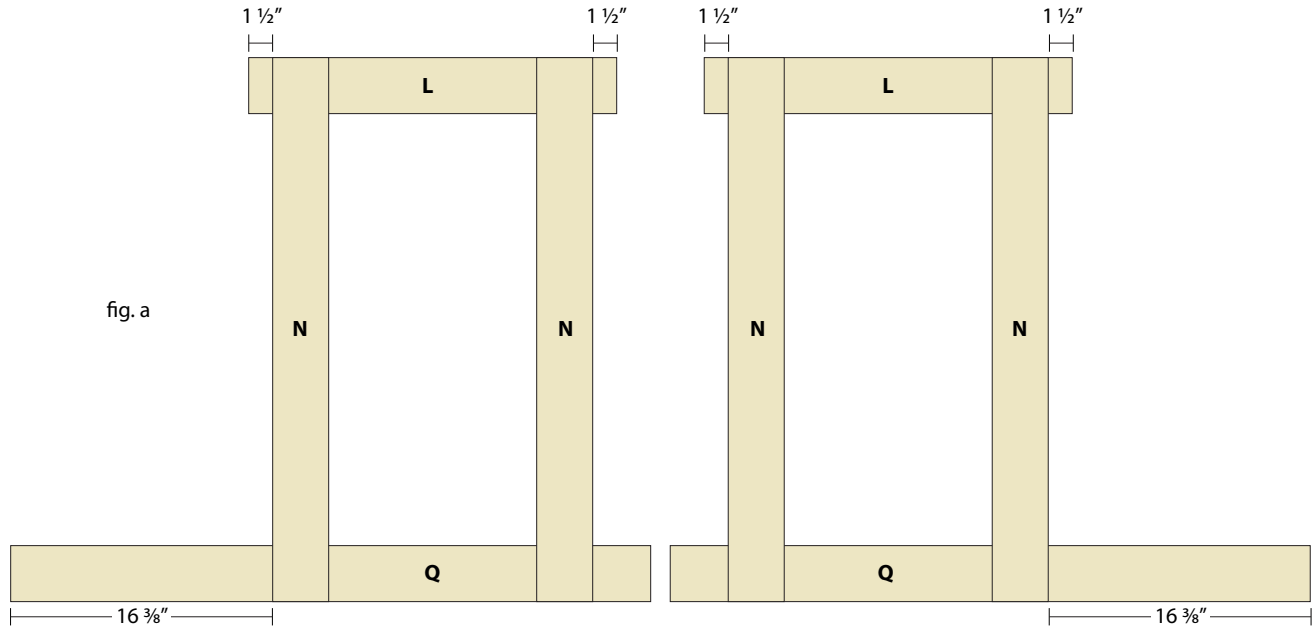
Hardware Needed:

*Save time, gas and money and buy ALL this hardware in one package. Go to www.printingplans.com and click on the "buy hardware" link.

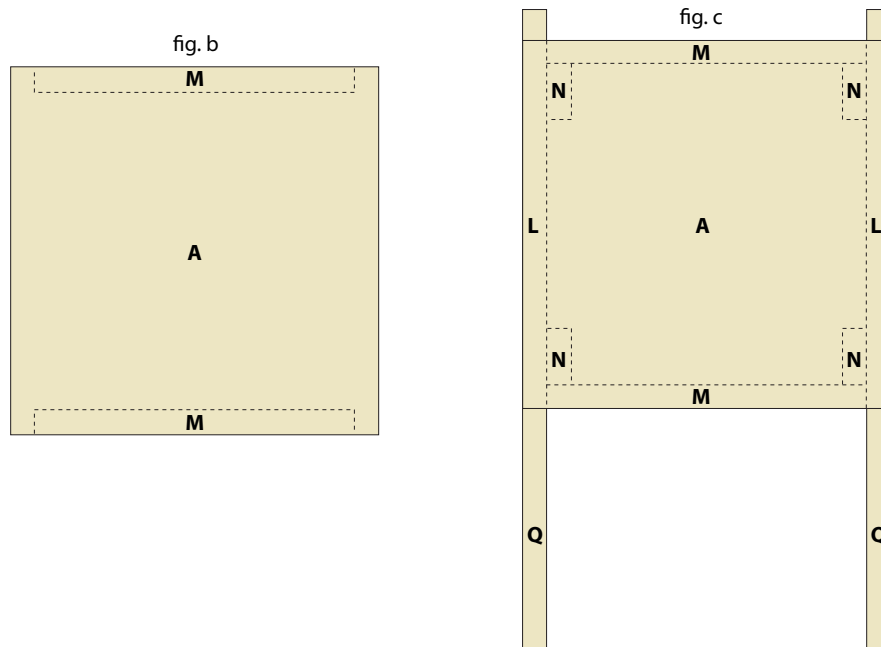
- approx. 1 # 2" Wood Screws (You can use 2.5" for most of these, but you'll need some 2" for the platen and other areas)
- 6 2.5" to 3" Wood Screws (Use these for diagonal screws in parts V and O)
 - 8 Metal C-Clamps, 2" x 1" (The first dimension is the max. clamping width, the second is the depth)
 - 4 Hinges with hardware (screws), 3 1/2" wide
 - 8 Hook & Eye Turnbuckles, 3/16" x 4 3/4"
 - 8 Springs, 5/8" x 3 1/4" x .072" (Resorte/Ressort brand has these exact measurements)
 - 8 Lag Eye Screws, 1/4" x 3 3/4"
 - 4 Lag Eye Screws, 3/16" x 1 3/8" or 2 1/16"
 - 4 Hex Cap Bolts, 1/4" x 1 1/4"
 - 4 Hex Cap Bolts, 1/4" x 1 3/4"
 - 2 Hex Cap Bolts, 3/8" x 6 3/4" or 7"
 - 2 Carriage Bolts, 3/8" x 3"
 - 8 Hex Nuts, 1/4"
 - 2 Hex Nuts, 3/8"
 - 4 Washers, 1/4"
 - 6 Washers, 3/8"
 - 8 Fender Washers (These need to be 1 1/4" diameter)
 - 2 Wingnuts, 3/8"
 - 1 Lazy Susan Turntable, 7" x 7" x 1" (This is the only item in this list you are not likely to find in a regular hardware store. You will need to go to a woodworking supply store as they stock these for rotating barstools. Don't skimp on this- it needs to be sturdy and have no slop.)

Making the table:

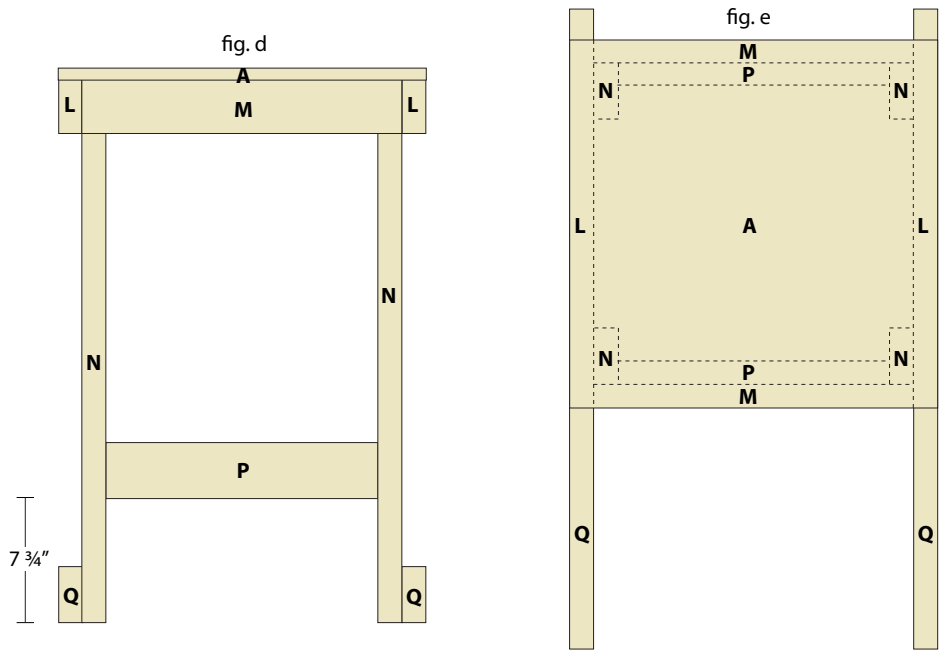
Step 1: Cut all your lumber, marking each piece with the appropriate letter to make assembly easier. We'll start by assembling the table itself. First, lay down parts **L** and **Q** and attach the legs (part **N**) as shown (fig. a). Make sure that your angles are perfectly square. Where parts **L** extend past the legs, use a piece of 2 x 4 to check that the bits that extend are exactly equal to the smaller width of the wood.



Step 2: Attach the thin sides of parts **M** to part **A** as shown in **fig. 2**. Use only glue and clamps for now. Again using only clamps and glue, set parts **A** and **M** on top of the two legs you built in Step 1, so that parts **L** and **M** form a square around the perimeter of **A**. This is shown from above in **fig. c**. (Dotted lines indicate parts beneath.) Once you feel comfortable with the fit, Go ahead and screw parts **L** into **M**, and **A** into both **L** & **M** from the top.



Step 3: Now you have a standing, albeit weak, table. Attach parts **P** to legs **N** as shown in **fig. d**. Do it in the front and back, both times keeping part **P** flush to the outside, as seen from above in **fig. e**. Note: Parts **P** act as a support beam and rests for a shelf (part **E**). It can be lowered or raised to suit your preference, and additional shelves may be added if desired.



Step 4: Attach part **O** to the outside of both sides of the table (**fig. f**). Make sure you orient them as shown for maximum support. Now secure shelf **E** onto crossbeams **P** to act as a shelf. Add part **K** to the back to help keep items from falling off. You are now finished with the table itself. It should be plenty sturdy with no give at all.

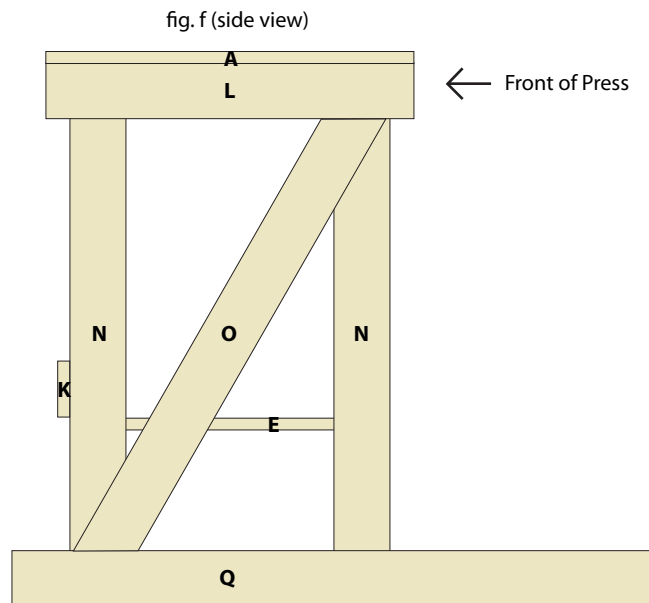
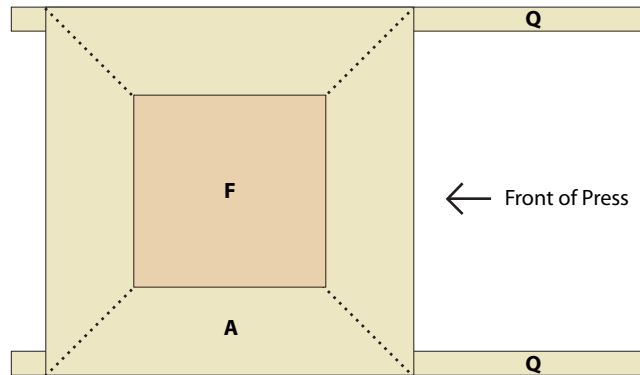


fig. g

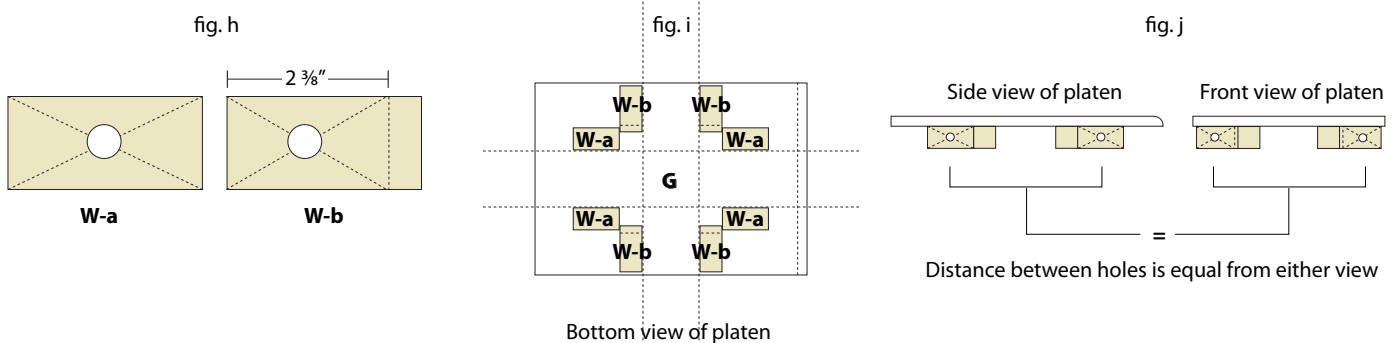
Building the Platen Arm and Platen:

Step 5: The platen arm is the board that extends from the table and on which a board (the platen) is placed, over which shirts are pulled and printed. First glue piece **F** in the exact middle of the top of the table (piece **A**). This can be done by drawing lines from opposite corners on piece **A**, (creating an "X"). Now by matching the corners of board **F** onto the newly drawn "X", you'll get it in the middle (see fig. g). Do not screw it in place at this time—use glue only.

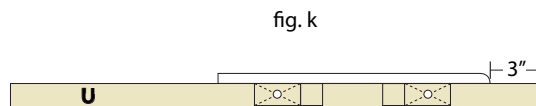


Step 6: Before continuing with the press itself, we're going to build the platen. The platen featured here is for adult T-shirts, so if you're interested in printing other types of items you'll need to build other platens of different sizes. This design is such that you can use the platen sideways for wide designs in addition to using it in its normal position. If that is not of interest to you, feel free to simplify the design.

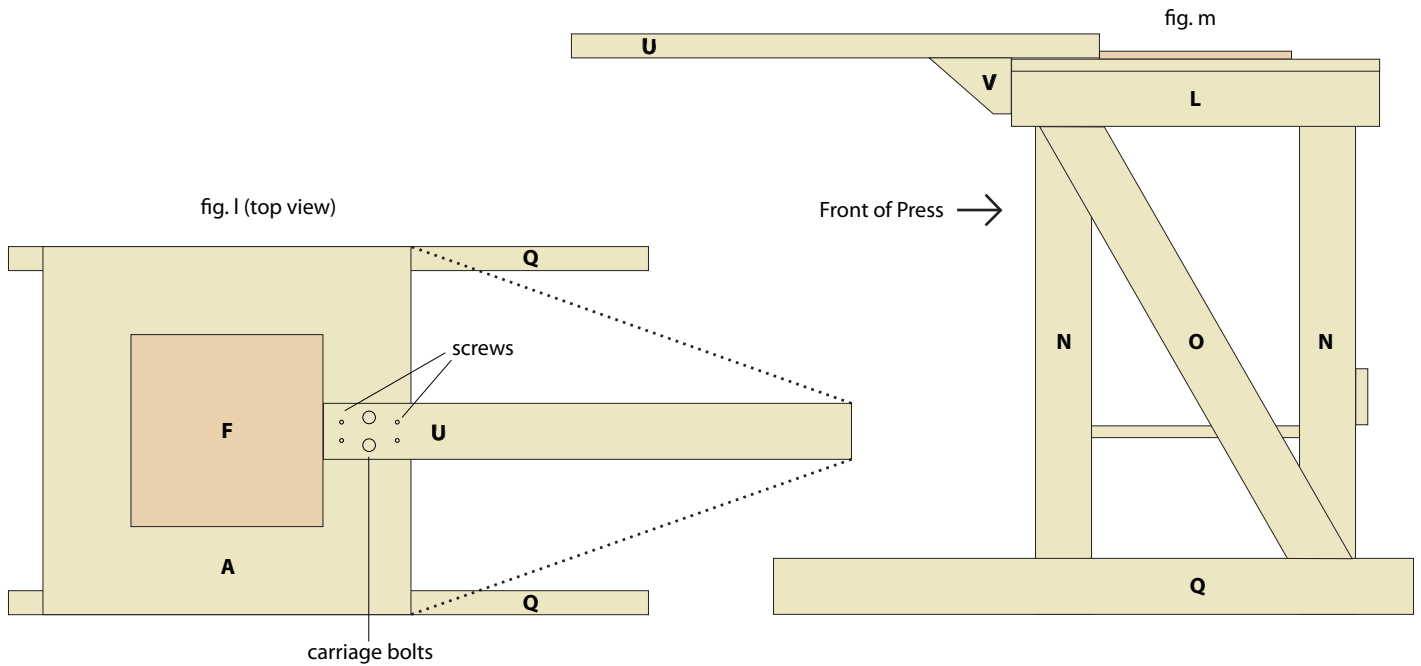
Using your drill press or workbench vise and drill, create half-inch holes in the middle of the largest side of 4 of your parts **W**. For the remaining 4, draw a line $2\frac{3}{8}$ " from the end and drill the holes in the new middle (see fig. h). Then attach them onto board **G** as shown in fig. i. Use a 2 x 4 to help you space the wood so the platen will fit snugly onto the platen arm when it's ready. Also make sure that the distance between the holes in one direction is the exact same distance as the holes going the other way (see fig. j). You'll definitely want to predrill your holes before attaching parts **W** or you'll have problems with splitting wood.



Step 7: Now that you have a finished platen, let's use it to determine where to drill holes in your platen arm (part **U**). Place the platen over the part **U** (it should fit snugly). The curved edge of the platen should be 3 " from the end of the platen arm. Mark the holes, remove the platen, then drill half-inch holes through the platen arm, making sure that they go straight through. You may also want to drill a second set of holes $2\frac{1}{4}$ " further in (to the left if looking at fig. k) for greater flexibility when printing.

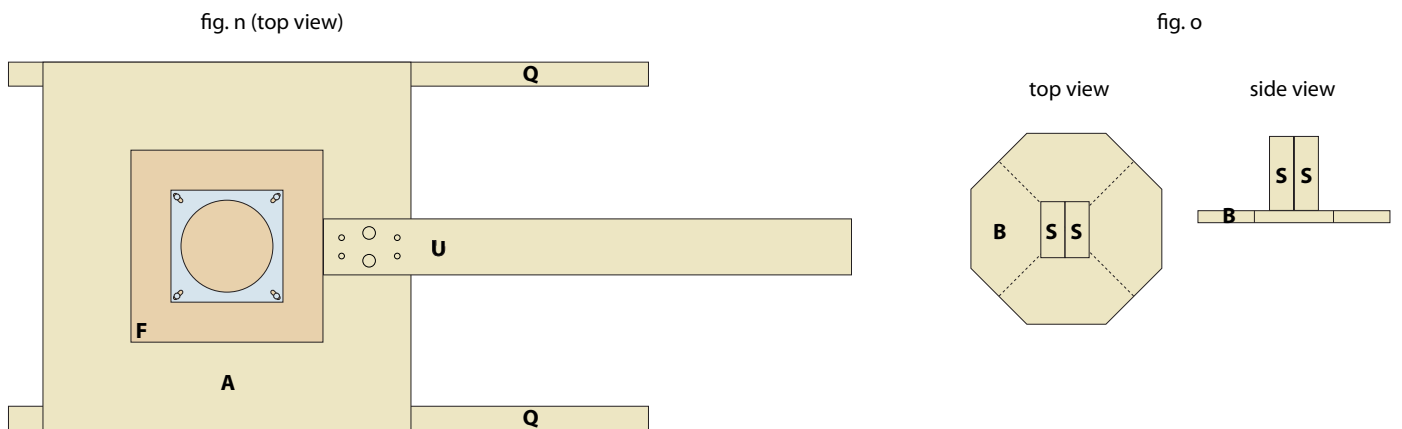


Step 8: Now that the holes are drilled in the platen arm, let's attach it to the table. Use your two carriage bolts with the appropriate washers and hex nuts to attach it and add four screws for added stability. See fig l for placement. The dotted lines indicate where to measure to insure your platen arm is straight (before securing). Attach part **V** as shown in fig. m so it's centered in the middle of part **U**. Make sure the screws go into the table AND the platen arm.



Building the Rotating Printing Press:

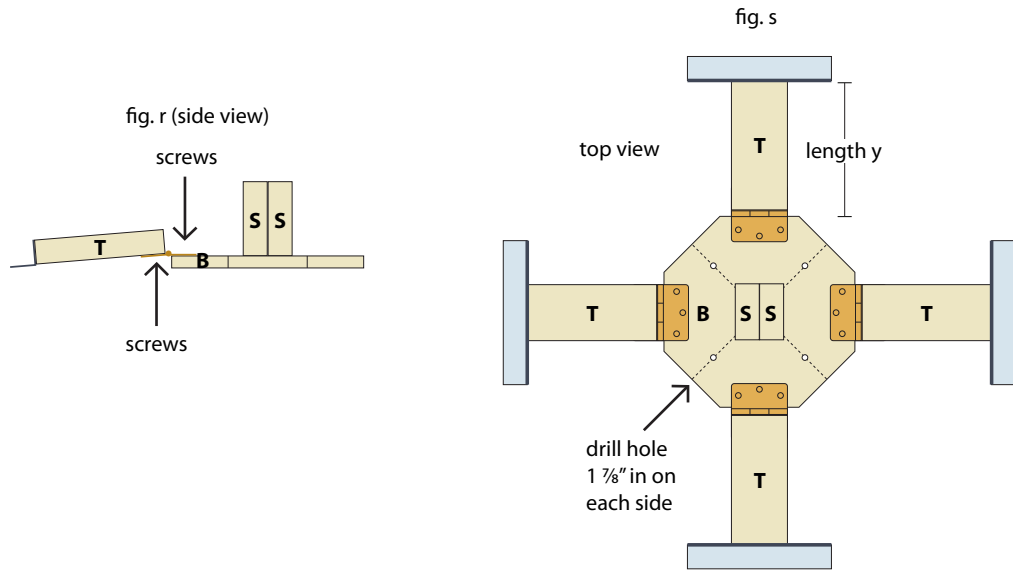
Step 9: Attach your “Lazy Susan Turntable” directly in the middle of part **F** using 4 of your 1 ¼" hex cap bolts. Drill holes directly through parts **F** and **A** to do this and use hex nuts to secure them underneath. **Fig. n** shows this as if the top part of the turntable is missing, just so you can see the orientation of the hex cap bolts. Draw an X onto part **B** by dividing it in half and in half again. Make sure this is exactly in the center. You'll be using this later. Next glue both parts **S** back to back and attach the end of the resulting block to the middle of part **B**. See **fig. o** for two views of this.



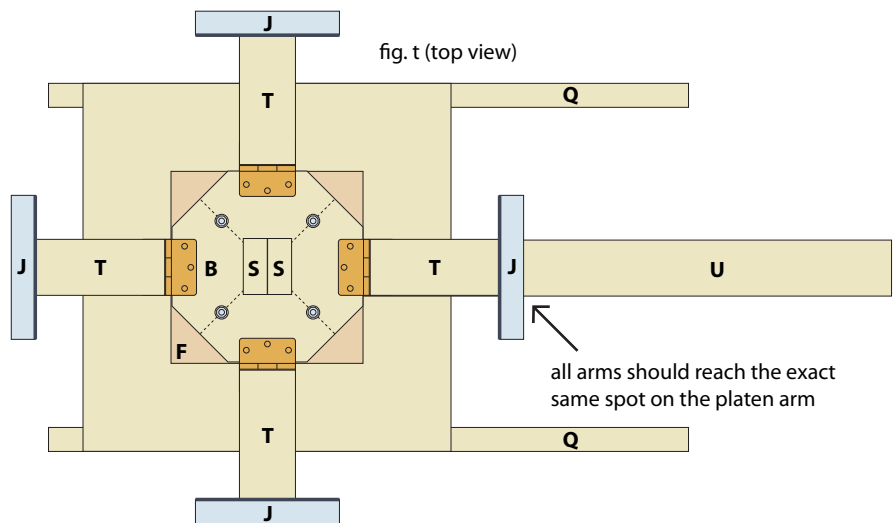
Step 10: Your accuracy in the following steps is vital to the success of your finished product, so measure carefully! Drill holes in each of your metal brackets as shown in **fig. p**. Now use a larger bit equal to the size of your screw heads and drill in each of your holes, so that when you screw the bracket on, the screw heads will be flush. Attach each bracket to the end of a part **T**, making sure it's in the exact middle from side to side. The bottom of the bracket should extend below the wood about the thickness of the hinges (so that when the arm is in the down position the bracket rests on part I). (**fig. q**). On the opposite end of each part **T**, screw in one of the hinges so that the edge of the cylindrical part of the hinge is flush with the edge of board **T**. Use the screws that came with the hinge. The hinge should be facing “up”, so that when you put in the screws from the bottom into the wood, it will be through the “wrong” end. In other words, the tapered part of the hole is now between the hinge and the wood, and the larger part of the cylindrical section of the hinge is facing up (**figs. q & r**).



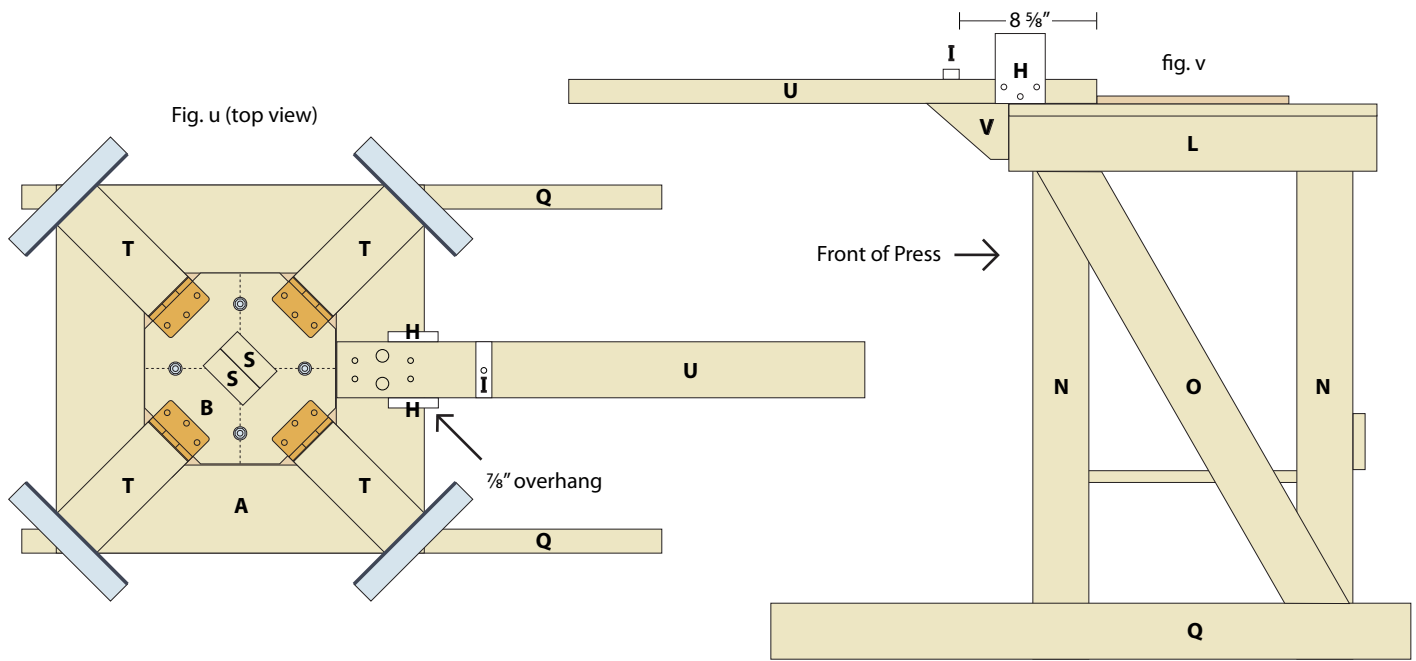
Step 11: Now attach each arm (part **T** with additions) to four sides of part **B** using the rest of the screws that came with the hinges (fig. s). Make sure that "length *x*" is the same for all arms. Using the "X" you drew onto part **B** in step 9, measure in $1\frac{7}{8}$ " from each side and drill a hole big enough for your $\frac{3}{16}$ " hex cap bolts.



Step 12: Bolt the piece you just built in step 11 to the lazy susan turntable using $\frac{1}{4}$ " hex cap bolts from underneath and the appropriate nuts and washers. Make sure all four arms reach the exact same spot on the platen arm (as shown in fig. t). You can probably move the whole top part slightly until this is the case, and then tighten the nuts. If you can't seem to get each arm to the same spot on part **U**, tighten the nuts when you've done the best you can. You still need to get the arms the same length, so mark the shortest one, remove part **J** from any arm that is longer, and sand part **T** until it's the appropriate length. Now reattach any part **J** that was removed. This may seem like a lot of extra work, but it will be well worth it once you start printing multi-color shirts.



Step 13: Twist the top mechanism 45° to get it out of the way (this will become easier when we add the springs so the arms will be out of the way). Attach part **I** onto the platen arm (**U**) using a single screw (otherwise it would probably split). It should be right where part **J** lands when you lay an arm onto part **U**, or about $8\frac{5}{8}$ " in from the inner end of part **U** (see figs. **u** and **v**). Next attach parts **H** to the platen arm (part **U**) so that the curved part of the board is on top and faces in, and so that parts **H** overhang $\frac{7}{8}$ " over the side of part **A**. Make sure to predrill holes for the screws (slightly small than the screws) to make this easier. See figs. **u**, **v** and **w** for different views of this.



Step 13 (continued): Fig. w shows boards H with the curved parts facing in. The reason for this is that as you lower an arm into place, the curved edges will help it fall easily into place. Try doing this now to make sure there is the correct width between the two parts H. The arm (T) should fit VERY snugly, but still be able to go into place without excessive force. Remember that when you have a screen connected to the arm it will become even easier to do this because of leverage. Getting parts H to be the perfect distance apart was one of the most difficult parts of building my own press. At first it was too tight and required some adjustment. To make these fine adjustments, loosen the screws and use pieces of card stock as shims in between parts H and U. Then retighten the screws. Add more shims as necessary until you have the perfect width. If you take the time to do this, your press will be ultra-accurate.

fig. w (top view)



Step 14: Now that you've secured the brackets (H), you can use them to hold each arm (T) in place while you do the next step. On each arm, draw a line $1 \frac{5}{16}$ " in from the outer edge of part T (see fig. x). Using these as guides, screw in each of your $\frac{1}{4}$ " lag eye screws into parts T until they only stick out about $2 \frac{1}{4}$ " from the board. Next screw in your set of four smaller lag eye screws into part B, halfway between the bolts that are already on the dotted line and parts S. See fig. x for the proper orientation of the lag eye screws. Now gather all your springs and turnbuckles. You're now going to connect one spring to the closed end of each turnbuckle. If the ends of the springs are closed instead of hooks, clamp one pair of vise grips onto the end of a spring as indicated by the red bar in fig. y. Next use your other pair of vise grips and grasp the same end of the spring as indicated by the blue bar. Now as you bring the two pairs of vise grips together it will widen the opening. Once the opening is wide enough, remove the vise grips and attach the spring to the eye end of the turnbuckle. Now use a single pair of vise grips to squeeze the openings on the end of the springs closed. Do this to all 8 sets of springs and turnbuckles (see fig. Y).

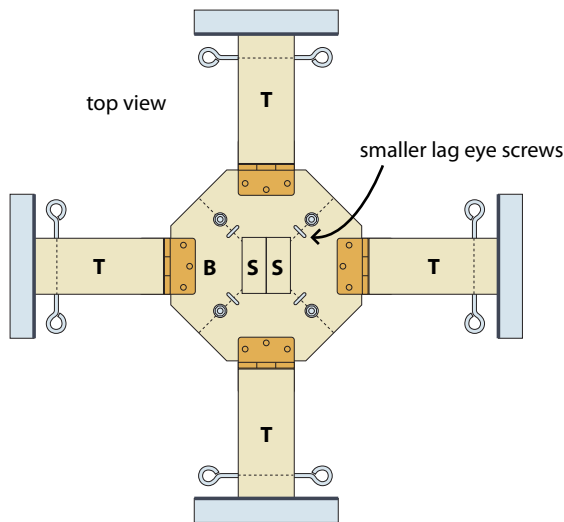
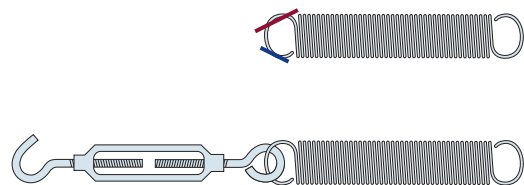
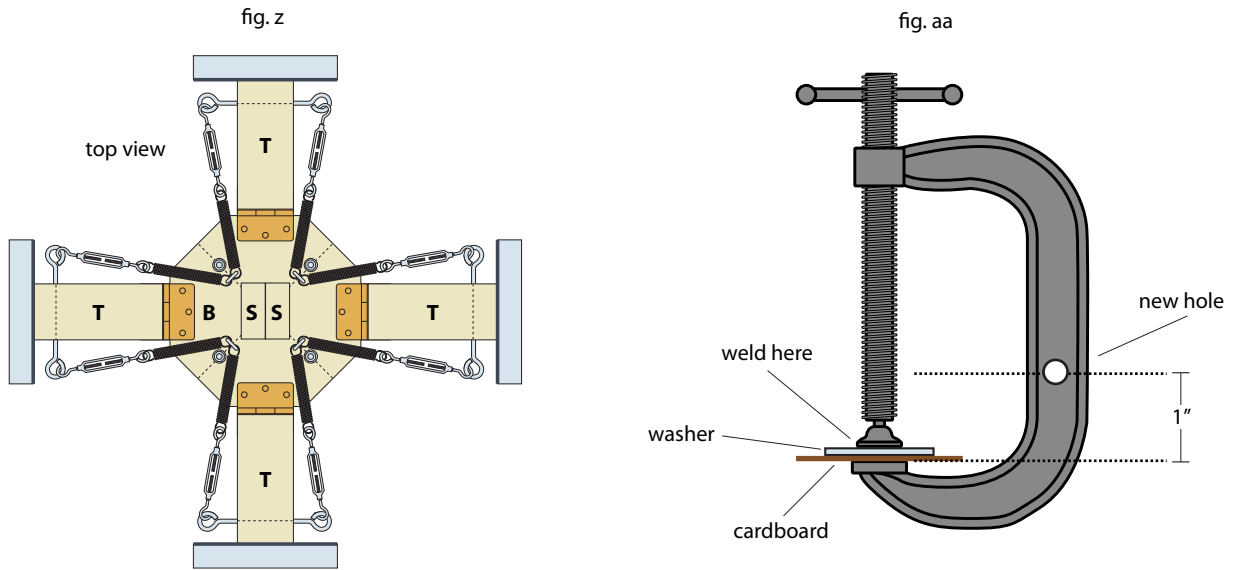


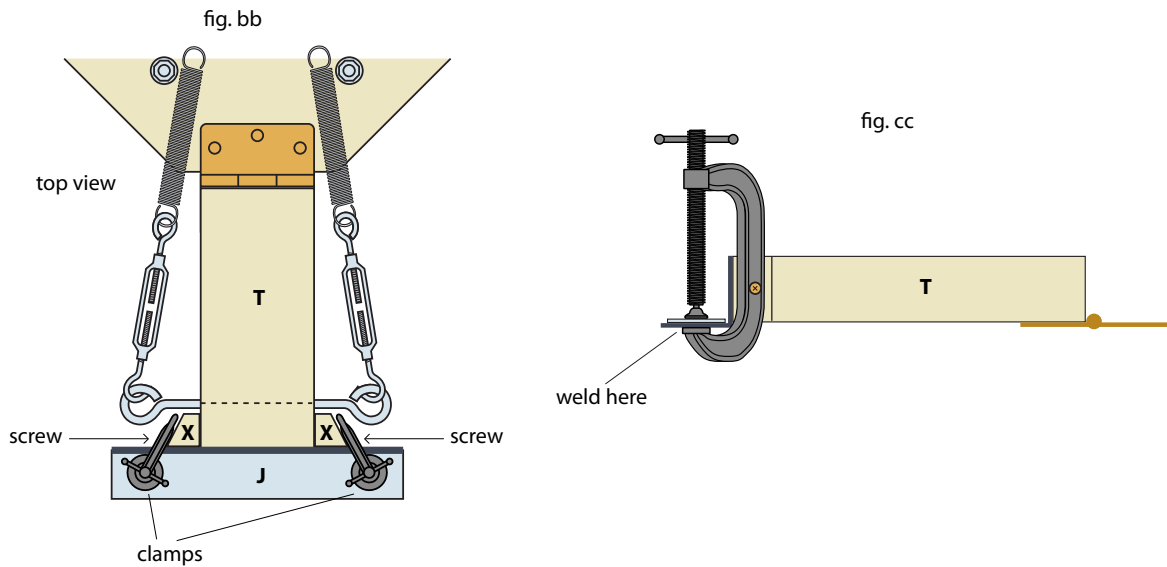
fig. y



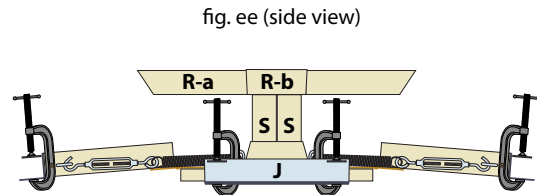
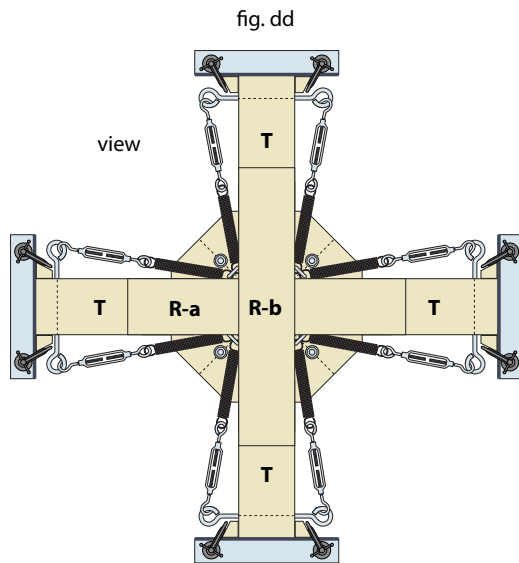
Step 15: Now attach each of your turnbuckle/spring combos to the top rotating mechanism. The hooks will attach to the large lag eye screws at ends of the arms, and the loose ends of the springs will attach to the lag eye screws sticking out of the octagonal part **B** (two springs per lag screw). You'll need to use the vise grips to attach the springs as before. We'll adjust the tension of the turnbuckles later on. You can push each arm down so it touches the table to keep it out of the way while you work. Now take each of your C-clamps and drill a hole in the main arm 1" up from the point shown in **fig. aa**. [Clamp shown is a 2.5" clamp. You can use 2" clamps just as effectively.] This hole should be just slightly smaller than one of your screw heads. After you've done this to all eight, weld your 1" or 1 1/4" diameter washers to the mobile part of the clamp as shown. Welding glue will work just fine. Put cardboard in between the washer and the adjacent part of the clamp to avoid bonding there. The purpose of these washers is to create a greater surface area on the clamp so as to avoid denting your screen frames.



Step 16: [Important Note: **fig. bb** shows how to place 2.5" clamps onto the press with altered parts **X**. You can use 2" clamps just as effectively by creating parts **X** as show in the materials section (1 1/4" x 1"), and then placing your clamps **perpendicular** to parts **J** instead of at an angle.] Once the welding glue dries, and using **figs. bb** and **cc** as your guide, screw your altered C-clamps through parts **X** into part **T**. (You'll want to have parts **X** glued and clamped to make this easier.) The washers that you welded onto the C-clamps need to clear the side of the vertical part of bracket **J**. The bottom of the C-clamps should be welded (glued) underneath brackets **J** as shown in **fig cc**. Tighten the clamps all the way while you work and while it glues to help hold them in place. Not only will your C-clamps hold your screens firmly in place, but they will also act as a place to rest your squeegees when your screens are in an upright position.



Step 17: Part **R-a** has a notch on the top, part **R-b** has a notch on the bottom. Glue part **R-b** onto part **R-a** so the notches intersect, forming an "X". Attach this "X" onto the top of parts **S** so that it is centered, as shown in figs. **dd** and **ee**.



Step 18: Next attach shelf **C** onto the top so that the corners are each in the middle of parts **R** (see **fig. ff**). Now sand off the corners protruding from parts **Q** and **U**. Not only will this save you some potential pain as you print, but the smooth end of the platen arm will help shirts slide on more easily.

20" x 24" frames work best with this press. Attach a frame to each arm (one at a time) and place a squeegee on it. Now that you've got it at its operation weight, it's time to adjust the turnbuckles so it will gently return back to the upright position in between pulls (if released about half way up). For each arm, make sure you adjust the two turnbuckles equally until you are happy with the tension. If your press squeaks when the arms are lowered, use a little WD40 on the insides of parts **H**. That's it. You're done! Happy printing!

