Micro Compound Lever Briquette Press

Parts List, Notes, Drawings & Assembly

Designed for North American lumber size
1½" x 3½" (38 mm x 89 mm)
English & Metric Dimensions

Easy BioPress

This small press is suggested for single-family use, classroom demonstrations, or a small village operation where a small footprint, low cost, and easy to build press using hand tools are required.

The press has a low build cost (about $18.00 U.S. dollars), is easy to build using hand tools, is light weight at 26 pounds (12 kg) and can create a force far in excess of that required to make a high quality briquette (typically in excess of 4,000 pounds or 1,800 kg). Briquettes can be produced at a rate of about twelve in ten minutes depending of type of mold used.

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INTRODUCTION

The Design:
The Micro Compound Lever Press has been designed and improved for use in developing countries where it is important to consider the ease of construction from a low cost local building material. Wood easily satisfies both requirements whereas metal may require a higher skill level, be in limited supply, or be cost prohibitive by comparison. The press can be constructed with a minimal skill level using power tools or hand tools.

The press is capable of creating a force far in excess of that required to make a high quality biomass briquette. For example, with 70 pounds (32kg) of force on the handle, the force on the briquette located 4 inches (100 mm) from the end pivot point, will be 4,000 lb (1,800kg). Based on a typical biomass pressing requirement of 145 lb/in^2 (65 kg/in^2) of force, the required pressure on a 3 inch (75 mm) briquette with a 1 inch (25 mm) hole would be 900 lb (400kg). A 4 inch (100 mm) square briquette with no hole requires about 2,300 lb (1,040kg). A 6 inch (150 mm) diameter briquette with no hole requires about 4,000 lb (1,800kg) of force. The press can easily exceed these force requirements.

Two versions of the press are configured to satisfy different skill levels and construction methods.
Both versions require bracing for support, one version uses an actual brace while the other version accomplishes bracing from notches. The braced version is easier to build while the notched version eliminates the brace but requires a higher skill level. Both versions can create an equal amount of press force, use the same amount of lumber, weigh the same 26 pounds (12kg), and cost the same ($18.00). Both use three, 8' (2,440 mm) long sections of standard dimensioned lumber 1½" X 3½" 38 mm x 89 mm) plus standard dimension hardware. We recommend the brace version because it requires the least skill level and performs exceptionally well.

Type of Wood: Soft wood can be used for both versions, however, if available, we recommend hardwood for the high pressure lever arm (Part C) to increase durability. Select wood with straight grain and no knots for parts C, E, G and H.

Water resistant coating, if available, apply polyurethane, paint, thinned motor oil, or whatever the local area can provide. Store in a dry and sun free location during periods of nonuse.

Bolts & Nuts: Not all locations of the world have a ready supply of bolts & nuts. Previous builders have had good success using metal pipe or metal rods pined with roll-pins or even nails.

Modifications: preserving and recycling the water used for the biomass mixture can be accomplished a number of ways. If the clearance below the press is inadequate for your container, adjust the length of the legs, A & B below the base D to accommodate. You may wish to tilt the press forward allowing water to drain to the end and into a tray. Groves in the base can assist that drainage. See step 15 for a suggested reduction is weight and wood usage.

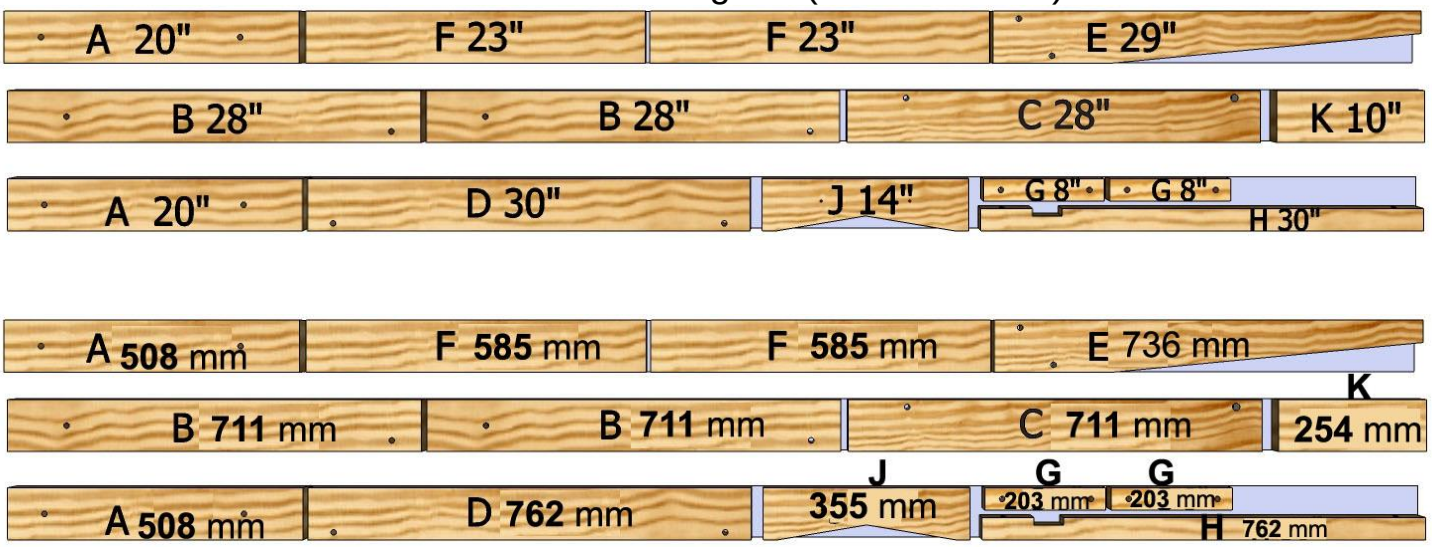
Briquette Molds:
The press has a compression range from 12½" (300 mm) to 7½" (190 mm) and can be used for briquettes made from Biomass, BioChar or Charcoal Fines. See the document "Easy BioMold - Your Choice" for a wide variety of mold designs suitable for this press.

Cost: is based on material purchased from Home Depot, March, 2012, USA. If you have questions regarding the construction of this press please contact us through the web site below.

Note: Nominal dimensions are 1½" x 3½" (38 mm x 89 mm) and the performance characteristics are based on these standard dimensions. The builder may need to adjust the plan dimensions accordingly to compensate for the lumber found in the country where the press is being built. There is also a press version based on lumber size 40 mm x 100 mm. You can download the plans from the web site.

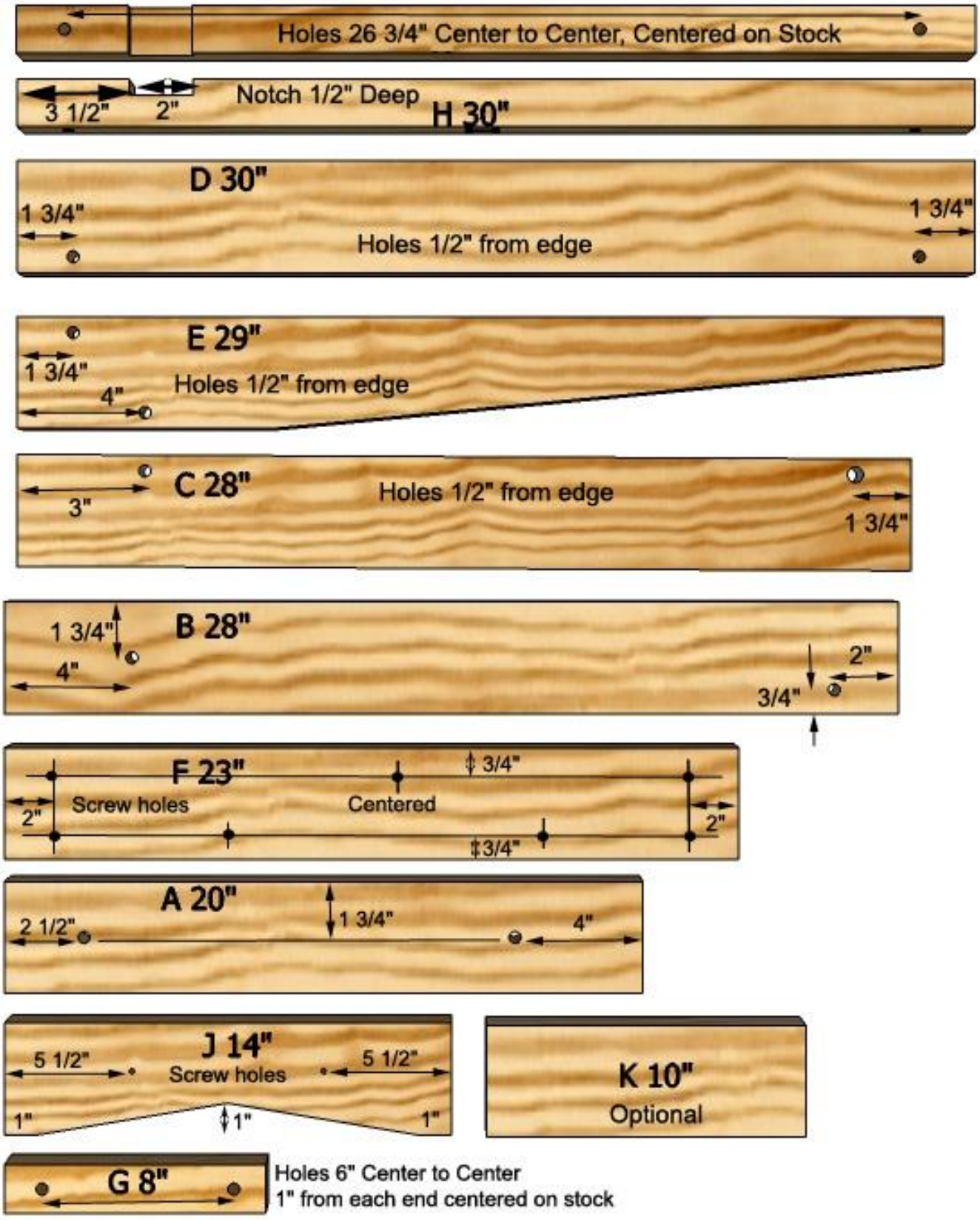
Micro Compound Lever Press (Brace Version)

Material Cut-Out Diagram (Brace Version)



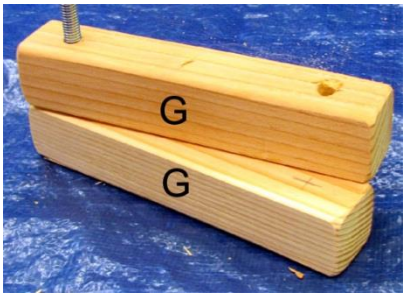
PART	PCS	Length	Stock Size	Description	See drawing for details and for hole locations
A	2	20” 508 mm	1½” X 3½” 38 mm x 89 mm	Front Legs	3/8” holes, 2 ½” from top and 4” from bottom, centered on stock. 10 mm holes, 65 mm from top and 100 mm from bottom, centered on stock
B	2	28” 711 mm	1½” X 3½” 38 mm x 89 mm	Rear Legs	3/8” holes, 4” from bottom, centered on stock and 2” from top, ¾” from front face. 10 mm holes, 100 mm from bottom, centered on stock and 50 mm from top, 20 mm from front face.
C	1	28” 711 mm	1½” X 3½” 38 mm x 89 mm	Lever Arm	3/8” holes, 3” from left side and 1 ¾” from right side, ½” from top. Can use hardwood if available. 10mm holes, 75 mm from left side and 4 5 mm from right side, 13 mm from top.
D	1	30” 762 mm	1½” X 3½” 38 mm x 89 mm	Base Beam	3/8” holes, 1 ¾” from each, ½” from bottom. 10 mm holes, 45 mm from each, 13 mm from bottom.
E	1	29” 736 mm	1½” X 3½” 38 mm x 89 mm	Handle	3/8” holes, 1 ¾” from left, ½” from top and 4” from left, ½” from bottom. Tapper to 1 ½” beginning at 9” 10 mm holes, 45 mm from left, 13 mm from top and 100 mm from left, 13 mm from bottom. Tapper to 38 mm beginning at 228 mm.
F	2	23” 585 mm	1½” X 3½” 38 mm x 89 mm	Beam Sides	Fasten with nails or screws
G	2	8” 203 mm	1½” X 1½” 38 mm x 38 mm	Arms	3/8” holes, 1" from each end centered on stock. Position to be against the grain, not with the grain. 10 mm holes, 25 mm from each end centered on stock.
H	1	30” 762 mm	1½” X 1½” 38 mm x 38 mm	Brace	Two 3/8” holes, 26 ¾” center to center, 1 5/8" from each end centered on stock. Notch 2” wide, ½” deep, begins 3½” from end. If carriage bolts are used the notch can be ¼” deep. Two 10 mm holes, 680 mm center to center, 40 mm from each end centered on stock. Notch 50 mm wide, 13 mm deep, begins 90 mm from end. If carriage bolts are used the notch can be 6 mm deep.
J	1	14” 355 mm	1½” X 3½” 38 mm x 89 mm	Foot	Notch begins 1” from each end, 1” deep Notch begins 25 mm from each end, 25 mm deep
K	1	10” 254 mm	1½” X 3½” 38 mm x 89 mm	Foot	Stabilization Foot (Optional)
	4	5½ 140 mm	3/8” 10 mm	Hex Bolt	3/8” x 5½” Hex or Carriage Bolt/Nut (builders choice) 10 mm x 140 mm Hex or Carriage Bolt/Nut (builders choice)
	2	6½ 165 mm	3/8” 10 mm	Hex Bolt	3/8” x 6½” Hex or Carriage Bolt/Nut (builders choice) Some locations may not have available a 6½” hex bolt but may have available a 6½” carriage bolt. 10 mm x 165 mm Hex or Carriage Bolt/Nut (builders choice)
	20		3/8” 10 mm	Washer	Use four washers for each movable joint (inside and outside)
	12	2 ½" 64 mm	#10	Fasteners	Wood Screws to fasten beam sides, 2 ½" long, 64 mm

Hole Locations (Brace Version)

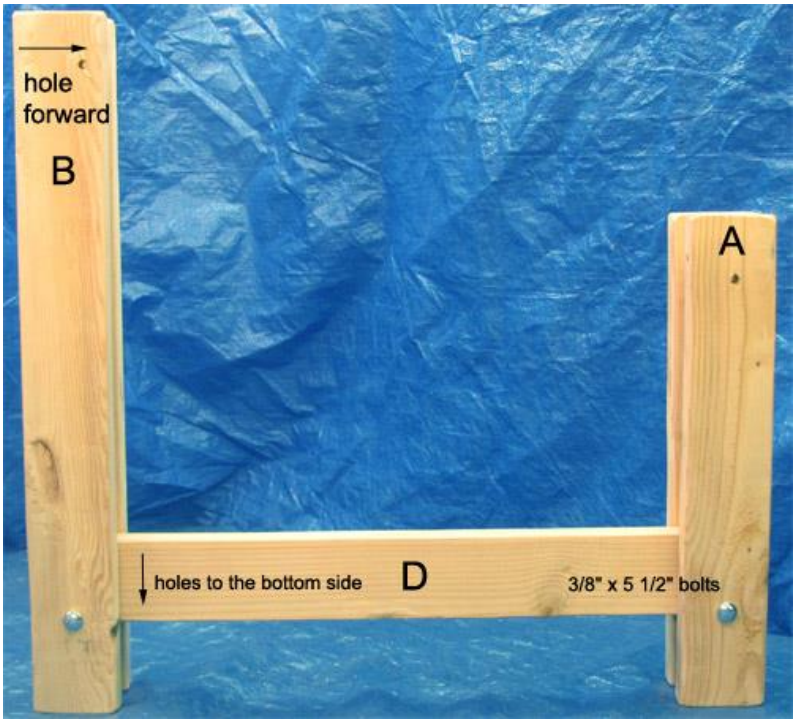


Construction & Assembly (Brace Version)

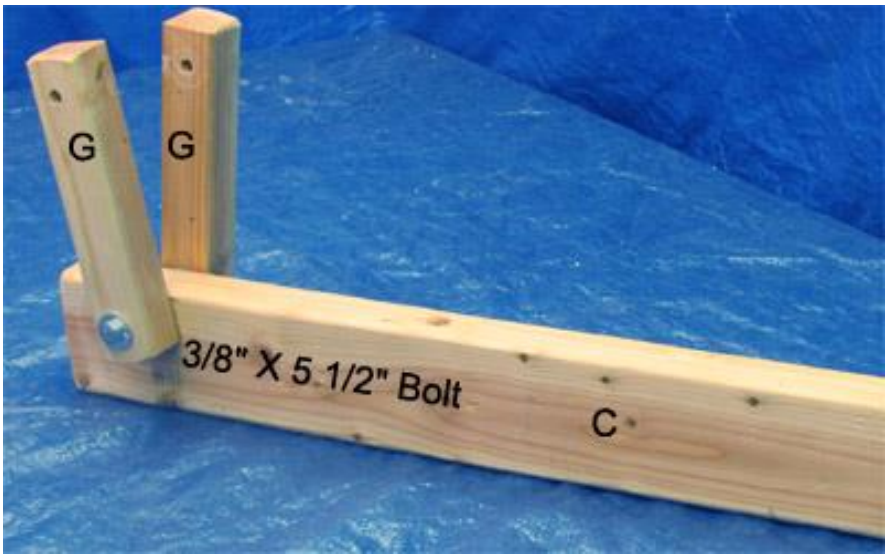
1. Select wood with straight grain and few knots if possible. If hardwood is plentiful and inexpensive, use hardwood for part C, otherwise, softwood will be okay
2. Cut material per the parts list using the cutout diagram as a guide for efficient use of lumber.
3. Sand and smooth edges to remove splinters.
4. Drill 3/8” (10 mm) bolt holes per the dimensioned parts diagram.
5. Holes in the lower section of parts A & B are 4” (100 mm) from the bottom and centered on the stock. . Drill one hole accurately in part A and use it as a guide to drill the other A and the two B’s. Clamp as necessary.

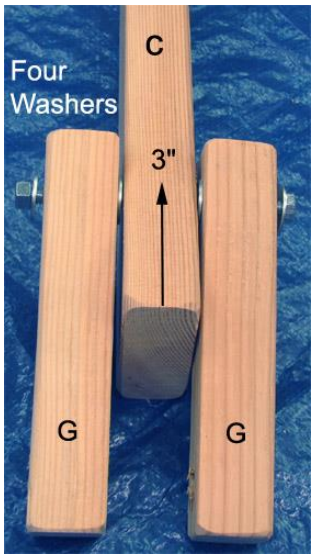


6. Part G should be drilled using one as a guide for the other. Drill the two holes in one piece of Part G and one hole in the second G. Using a 3/8” (10 mm) bolt to pin the two together as a guide to drill the second hole in the remaining G. Drill across the grain for maximum strength

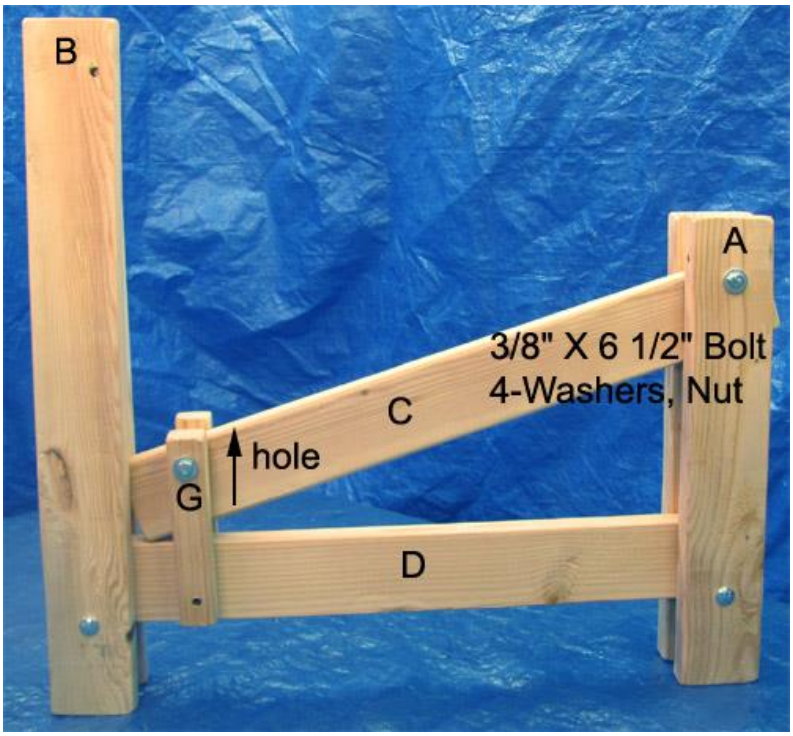


7. Bolt Legs A & B to part D using (2) 3/8” (10 mm) x 5½” (140 mm) bolts. Position part D to locate the holes to the bottom side as shown. Hand tighten all bolts until final assembly is complete.

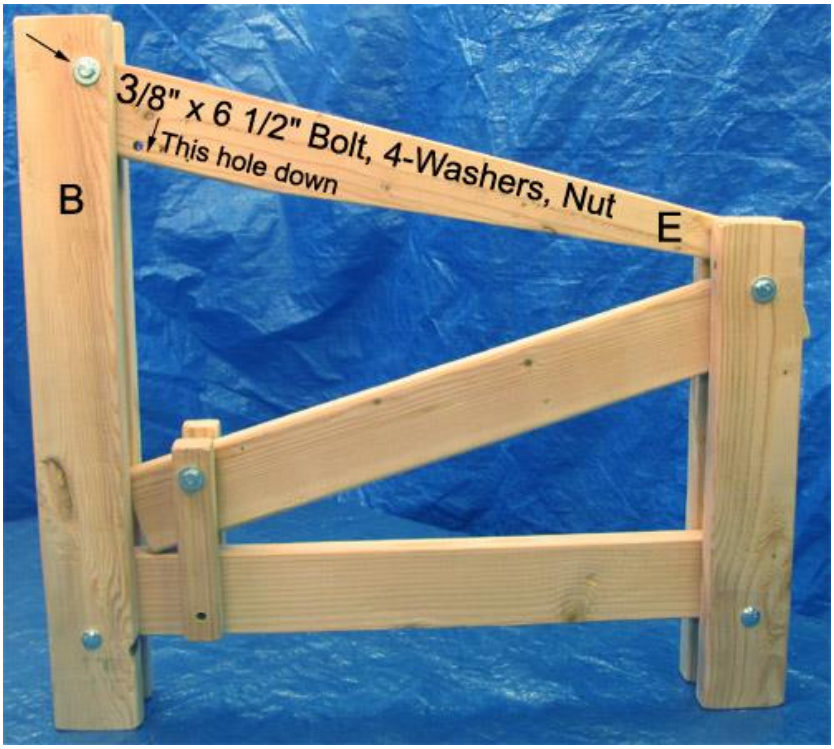




8. Assemble arms G to C as shown using a 3/8” (10 mm) x 5½” (140 mm) bolt, 4-washers and a nut.

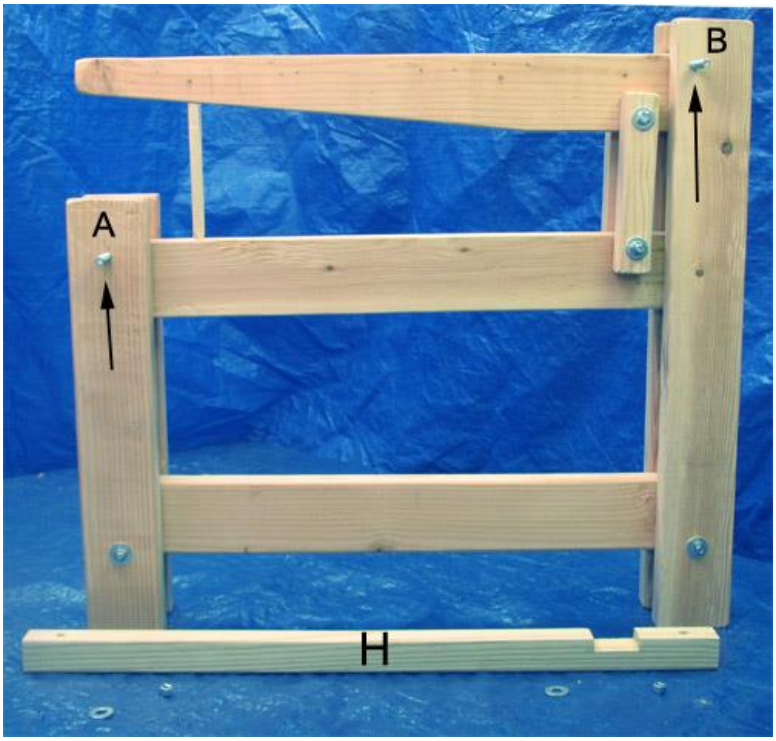


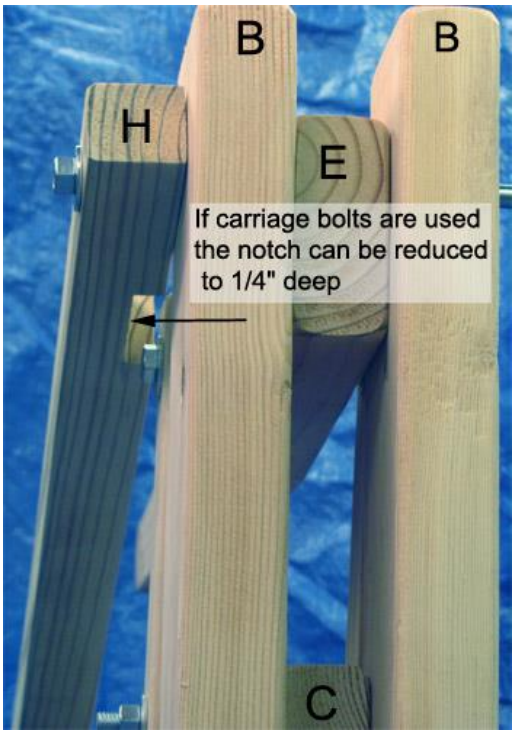
9. Connect the C G assembly to part A using a 3/8” (10 mm) x 6½” (170 mm) bolt, 4-washers and a nut. Position part C to locate the hole for part G to the top side as shown.

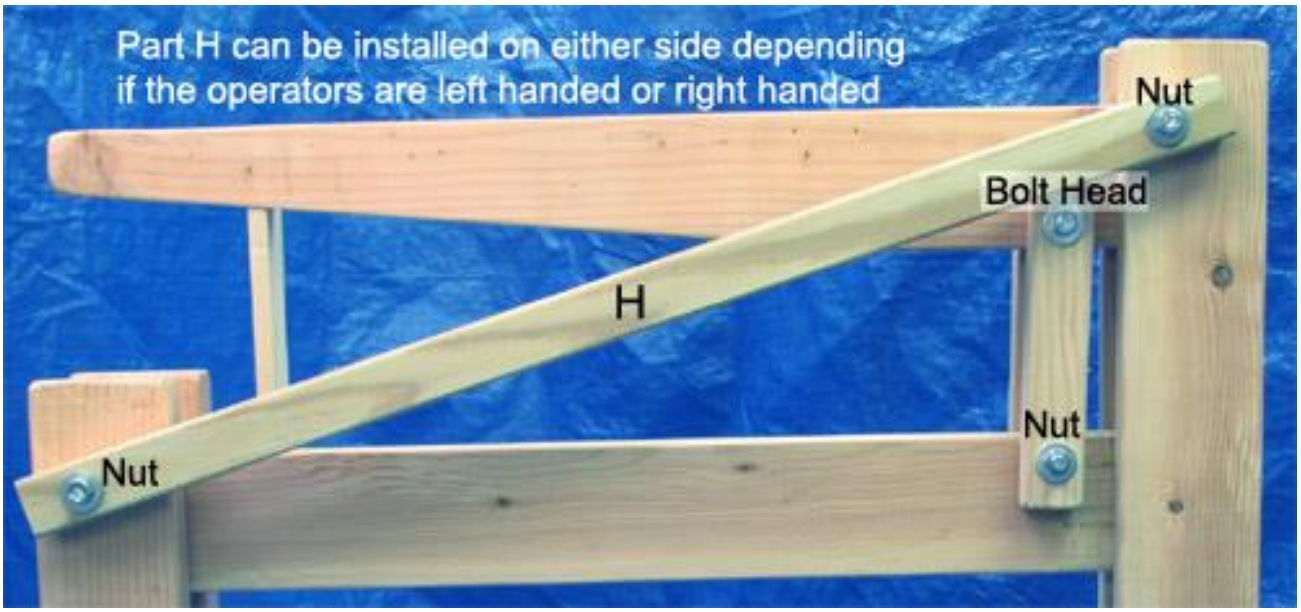


10. Connect part E to leg B using a 3/8” (10 mm) x 6½” (170 mm) bolt, 4-washers and a nut.

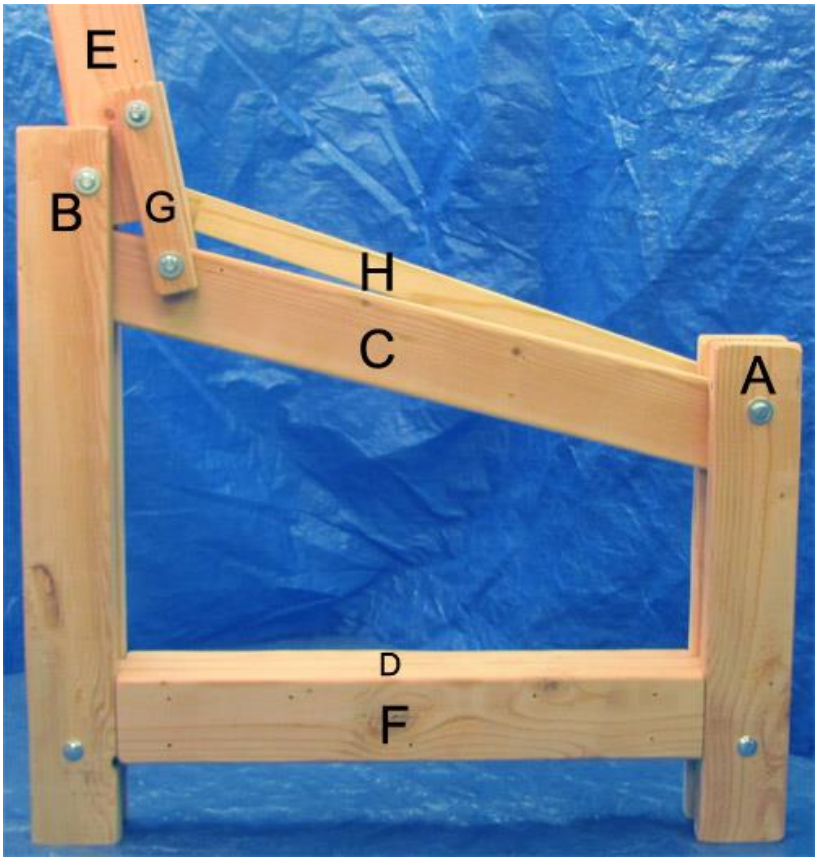
11. Raise part G and connect to handle E using a 3/8” (10 mm) x 5½” (140 mm)bolt, 4-washers and a nut.



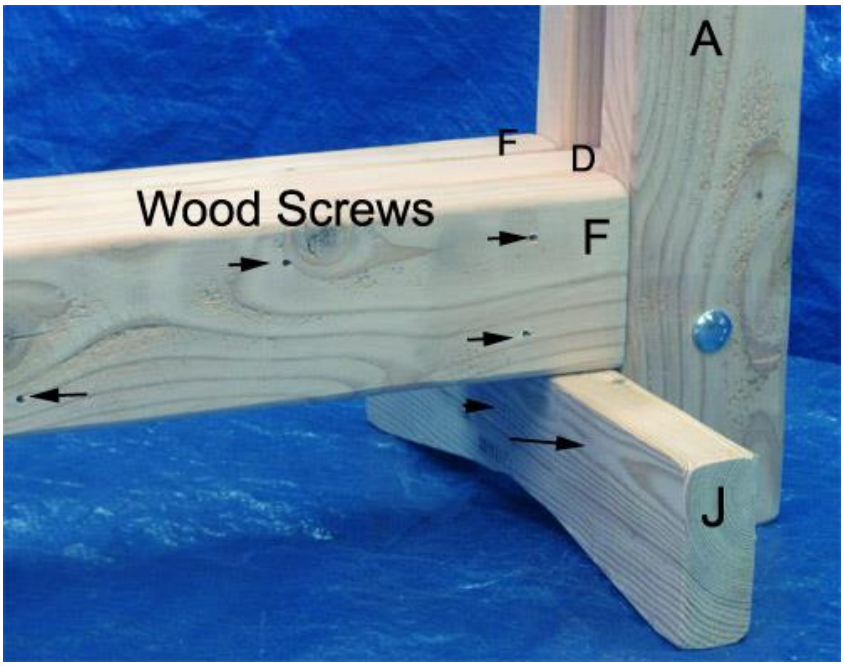




12. Connect part H to the existing bolts in legs A & B. Make certain the bolt for part G under the notch is installed with the head end showing and not the nut end. Part H can be installed on either side depending if the operators are right handed or left handed. (Right hand version shown)

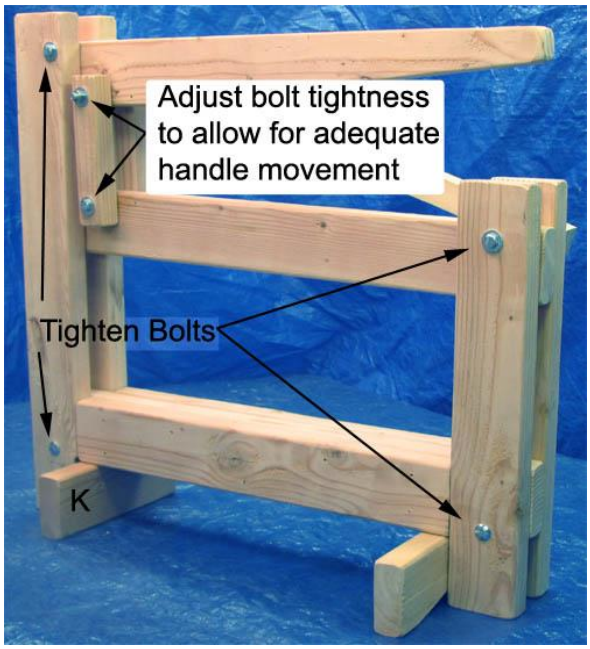


13. Handle E should open to this position.



14. Attach part F, F & J using 2½” (65 mm) wood screws or 3” (75 mm) nails

15. If you want minimize the weight and wood usage you can eliminate one of the two parts “F” and attach F to the top side of Part D as shown above. This will reduce the opening between F and C by 1 ½” 89 mm. If you need to maintain the 7 ½” opening between F and C, extend the length of legs A & B by 1 ½” 89 mm.



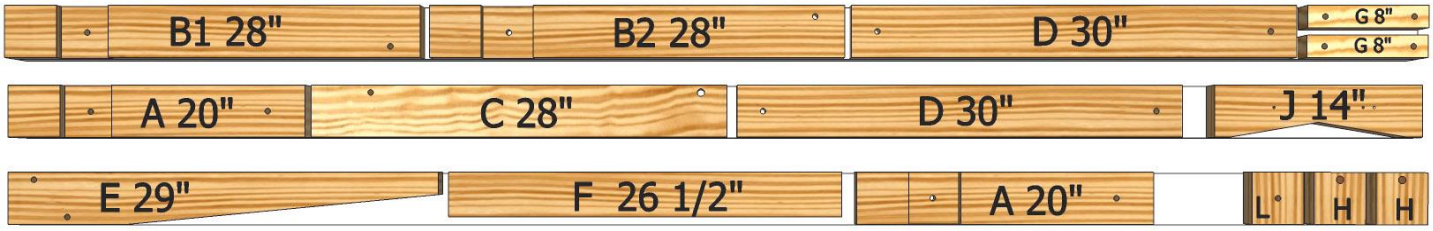
16. Adjust the bolt tightness for Part G to allow for adequate handle movement. Completely tighten the other four bolts. Part K can be used for extra stability if the press sets in soil or on a rocky surface.

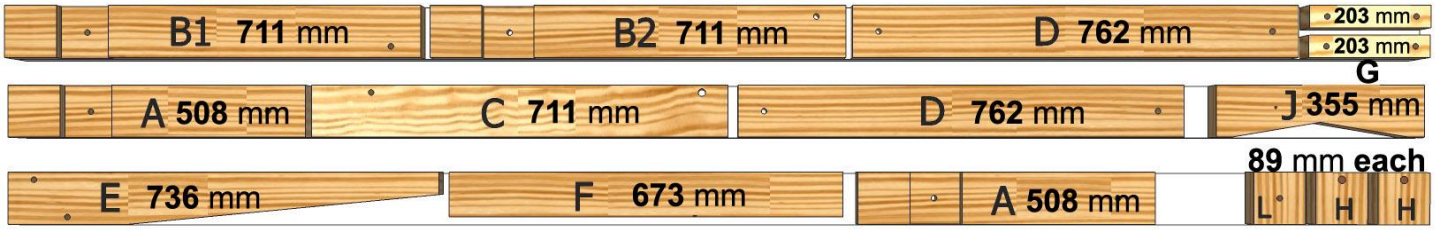
17. If available, coat the press with a water resistant finish like paint, polyurethane, used motor oil, lard or grease. If the finish is in limited supply it is best to at least coat parts D, F, J and the lower part of legs A & B.

    When motor oil is used it helps to thin the first coat. Allow time for the wood to absorb the oil then apply a second coat using regular strength oil.

Micro Compound Lever Press (Notch Version)

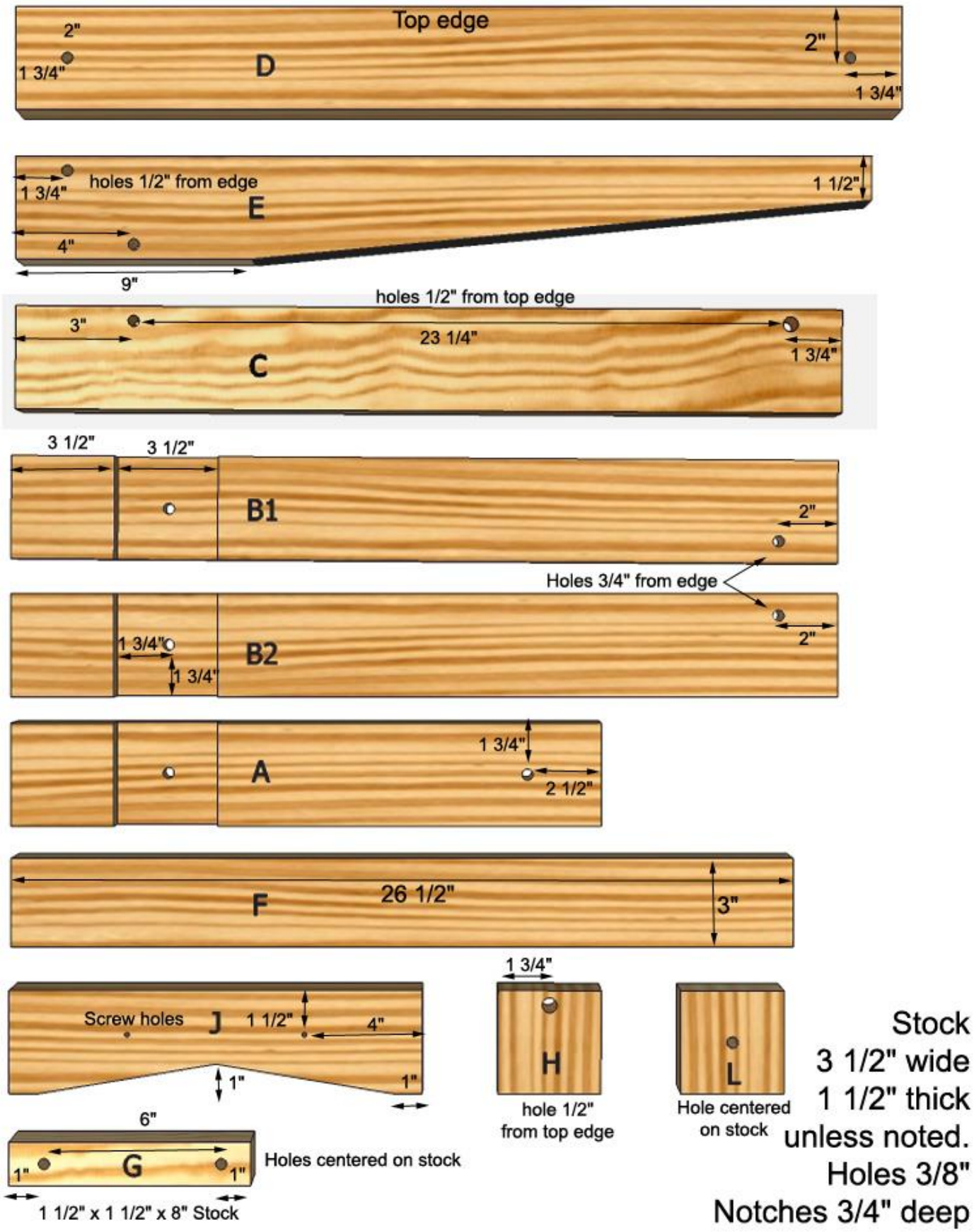
Material Cut-Out Diagram (Notch Version)





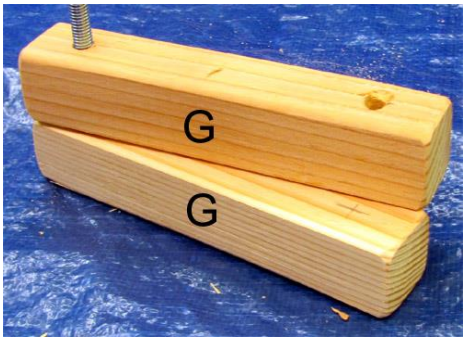
PART	PCS	Length	Stock Size	Description	See drawing for details and for hole locations
A	2	20” 508 mm	1½” X 3½” 38 mm x 89 mm	Front Legs	3/8” holes, 2½” from top and 5¼” from bottom, centered on stock. Notch 3½” wide begins 3½” from end. 10 mm holes, 65 mm from top and 135 mm from bottom, centered on stock. Notch 89 mm wide begins 89 mm from end.
B1 B2	1 1	28” 711 mm	1½” X 3½” 38 mm x 89 mm	Rear Legs	3/8” hole, 5¼” from bottom, centered on stock, and 3/8” hole 2” from top, ¾” from front face. Note top holes on opposite edge. 10 mm hole, 135 mm from bottom, centered on stock and 10 mm, hole 50 mm from top, 20 mm from front face. Notch 89 mm wide begins 89 mm from end.
C	1	28” 711 mm	1½” X 3½” 38 mm x 89 mm	Lever Arm	3/8” holes, 3” from left side and 1 ¾” from right side, ½” from top. Can use hardwood if available. 10 mm holes, 75 mm from left side and 45 mm from right side, 13 mm from top.
D	2	30” 762 mm	1½” X 3½” 38 mm x 89 mm	Beam Sides	3/8” holes, 1 ¾” from each end, centered on stock 10 mm holes, 44.5 mm from each end, centered on stock
E	1	29” 736 mm	1½” X 3½” 38 mm x 89 mm	Handle	3/8” holes, 1 ¾” from left, ½” from top and 4” from left, ½” from bottom. Tapper to 1 ½” beginning at 9” 10 mm holes, 45 mm from left, 13 mm from top and 100 mm from left, 13 mm from bottom. Tapper to 38 mm beginning at 228 mm.
F	1	26 ½” 673 mm	1½” X 3” 38 mm x 76 mm	Beam Base	Fasten with nails or screws (screws recommended)
G	2	8” 203 mm	1½” X 1½” 38 mm x 38 mm	Arms	3/8” holes, 1" from each end centered on stock. Position to be against the grain, not with the grain. 10 mm holes, 25 mm from each end centered on stock.
H	2	3½” 89 mm	1½” X 3½” 38 mm x 89 mm	Spacers	3/8” hole, ½” from top centered on stock 10 mm hole, 13 mm from top centered on stock
J	1	14” 355 mm	1½” X 3½” 38 mm x 89 mm	Foot	Notch begins 1” from each end, 1” deep Notch begins 25 mm from each end, 25 mm deep
L	2	3½” 89 mm	1½” X 3½” 38 mm x 89 mm	Spacer	3/8” hole, ½” from top centered on stock 10 mm hole, 13 mm from top centered on stock
	3	5½” 140 mm	3/8” 	Hex Bolt	3/8” x 5 ½” Hex or Carriage Bolt/Nut (builders choice)
	1	6 ½” 165 mm	3/8” 10 mm	Hex Bolt	3/8” x 6½” Hex or Carriage Bolt/Nut (builders choice) Some locations may not have available a 6½” Hex Bolt but may have available a 6½” carriage bolt.
	2	8” 203 mm	3/8” 10 mm	Hex Bolt	3/8” x 8” Hex or Carriage Bolt/Nut (builders choice)
	20		3/8” 10mm	Washer	Use four washers for each movable joint (inside and outside)
	10	2 ½" 63.5 mm	#10	Fasteners	Wood screws 2½" long

Hole Locations (Notch Version)

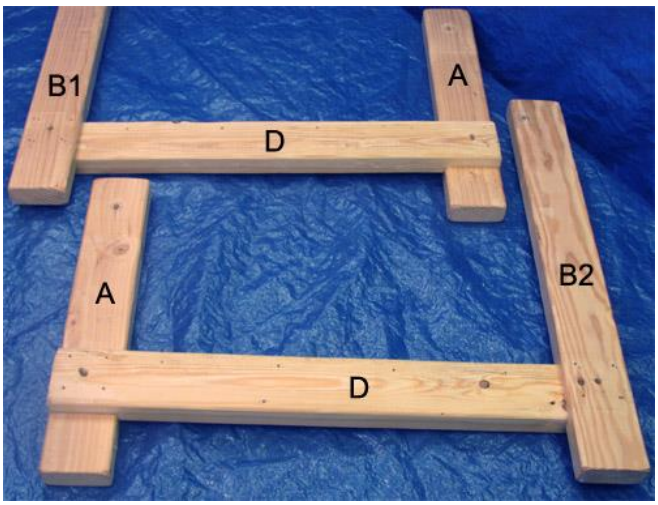


Construction & Assembly (Notch Version)

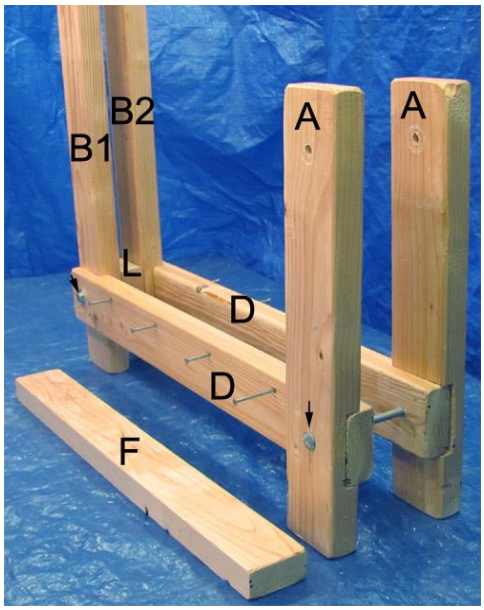
1. Select wood with straight grain and few knots if possible. If hardwood is plentiful and inexpensive, use hardwood for Part C, otherwise, softwood will be okay
2. Cut material per the parts list using the cutout diagram as a guide for efficient use of lumber.
3. Sand and smooth edges to remove splinters.
4. Drill 3/8” (10 mm) bolt holes per the dimensioned parts diagram.
5. Holes in the lower part of parts A & B are 4” (100 mm) from the bottom and centered on the stock. . Drill one hole accurately in part A and use it as a guide to drill the other A and the two B’s. Clamp as necessary.
6. Accurately cut notches in parts A, B and D as shown in the dimensions diagram. Careful attention to crafting a tight joint will enhance the press operation.



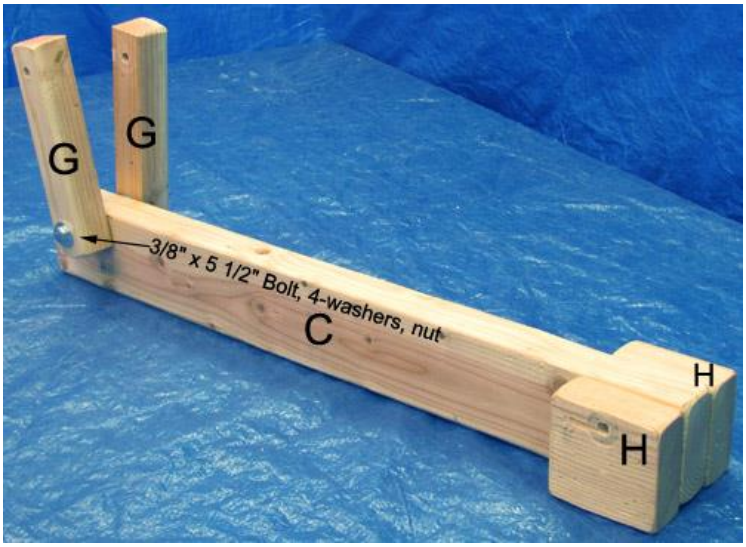
7. Part G should be drilled using one part as a guide for the other. Drill the two holes in one Part G and one hole in the second G. Using a 3/8” (10 mm) bolt to pin the two together as a guide to drill the second hole in the remaining G. Drill across the grain for maximum strength

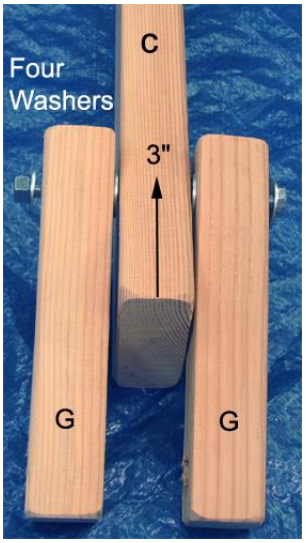


8. Lay out Legs A, B1 & B2 and insert into the notch for part D as shown



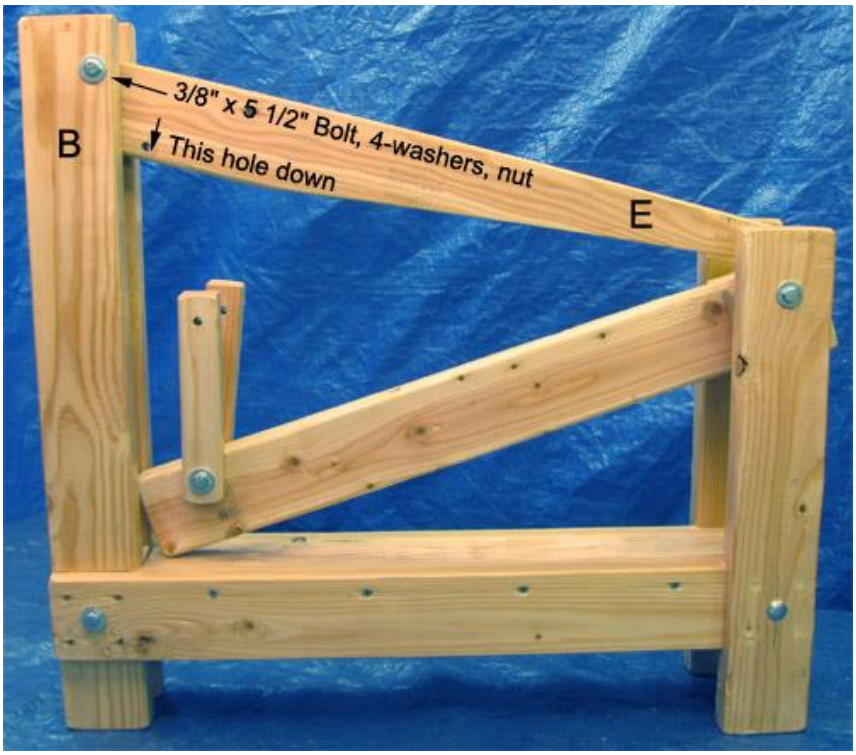
9. Stand the two assemblies upright as shown. Insert a 3/8” (10 mm) x 6½” (165 mm) bolt thru B1, thru spacer L and into B2. Insert a 3/8” (10 mm) x 8” (200 mm) bolt thru the A end as shown. Position plate F between the two side rails D, level and secure using 2½” (65 mm) wood screws. Hand tighten all bolts until final assembly is complete.



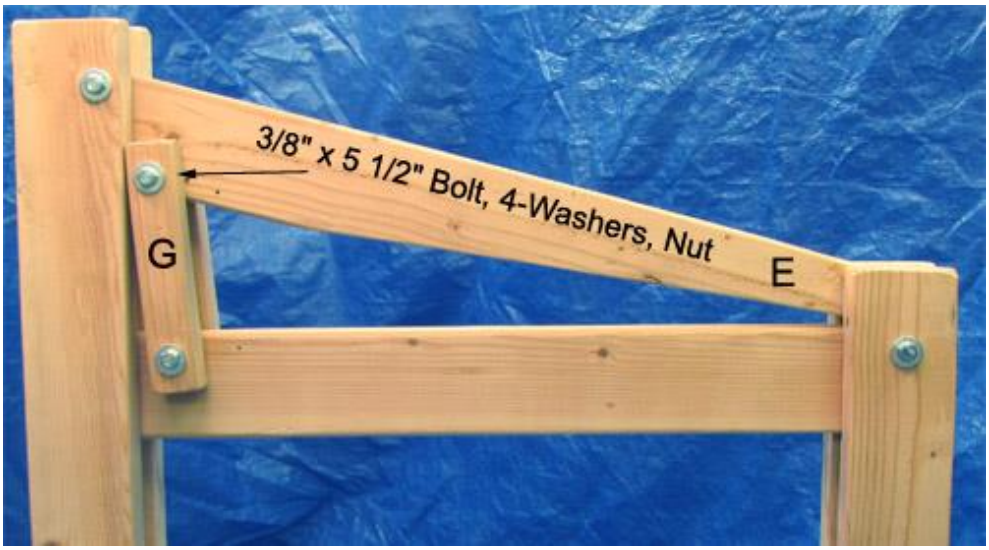


10. Assemble arms G to C as shown using a 3/8” (10 mm) x 5½” (140 mm) bolt, 4-washers and a nut.

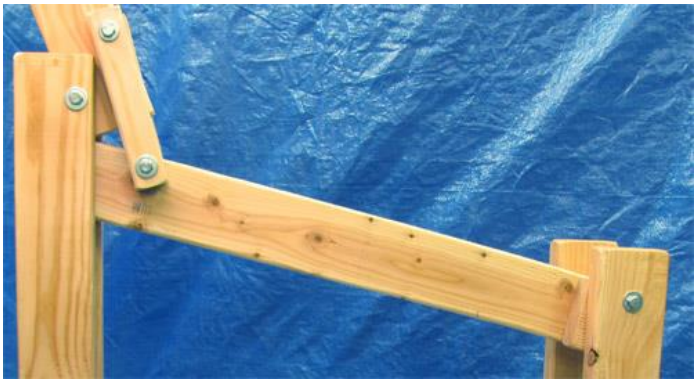
11. Connect the C G assembly to part A using a 3/8” (10 mm) x 8” (200 mm) bolt, 4-washers and a nut. Position part C to locate the holes for part G to the top side.



12. Connect handle E to leg B using a 3/8” (10 mm) x 5½” (140 mm) bolt, 4-washers and a nut.

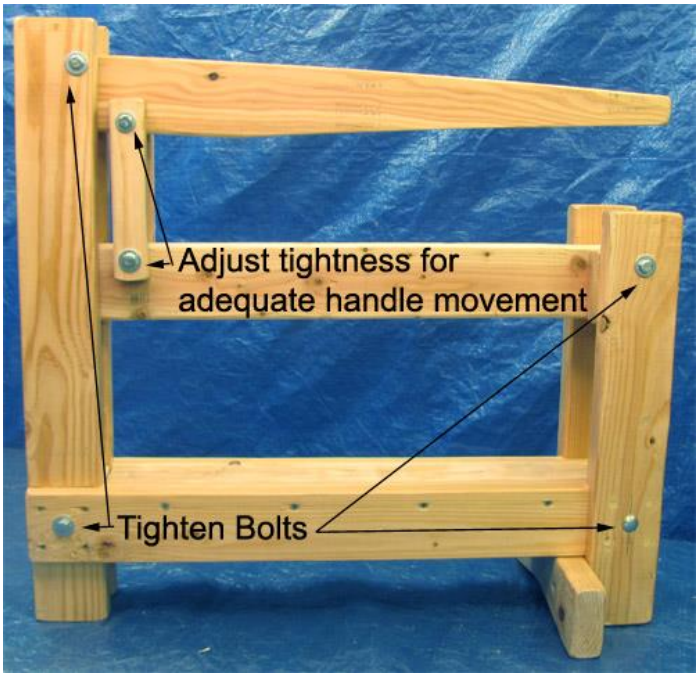


13. Raise part G and connect to handle E using a 3/8” (10 mm) x 5½”” bolt, 4-washers and a nut.



14. Handle E should open to this position.

15. Attach J using 2½” wood screws or 3” nails



16. Adjust the bolt tightness for Part G to allow for adequate handle movement. Completely tighten the other four bolts.

17. If available, coat the press with a water resistant finish like paint, polyurethane, used motor oil, lard or grease. If the finish is in limited supply it is best to at least coat parts D, F, J and the lower part of legs A & B.

    When motor oil is used it helps to thin the first coat. Allow time for the wood to absorb the oil then apply a second coat using regular strength oil.