

Clamping and Gluing Up Stock

If a project is small or made of plywood, you probably won't need clamps and glue until you assemble it. However, for larger projects you will have to glue pieces together as you go. For example, you might have to glue stock edge to edge to make the top for a table or chair. Stock may have to be glued face to face to make legs. Parts must also be glued in final assembly. Fig. 32-1.

TOOLS AND MATERIALS

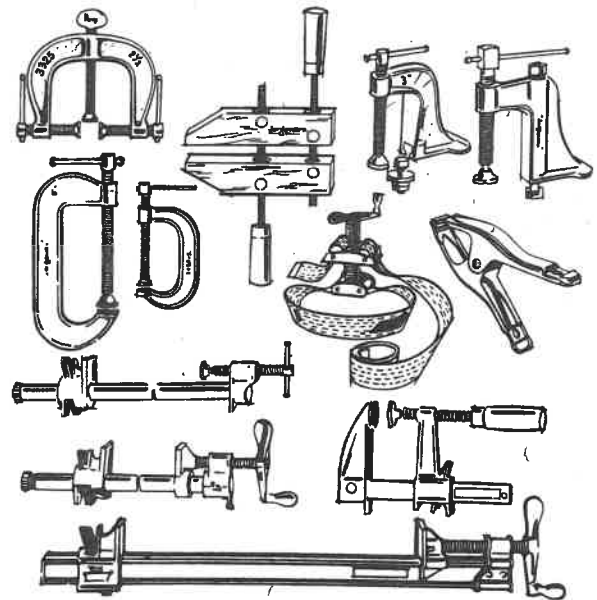
Clamps are used to hold pieces together:

- To find out how they fit.
- To hold them as the glue dries.
- For installing nails or screws.
- To do chiseling or planing on them. Fig. 32-2.

Hand screws are used for gluing face to face, for clamping small parts, and for holding work as



32-1. This footstool has glued joints.



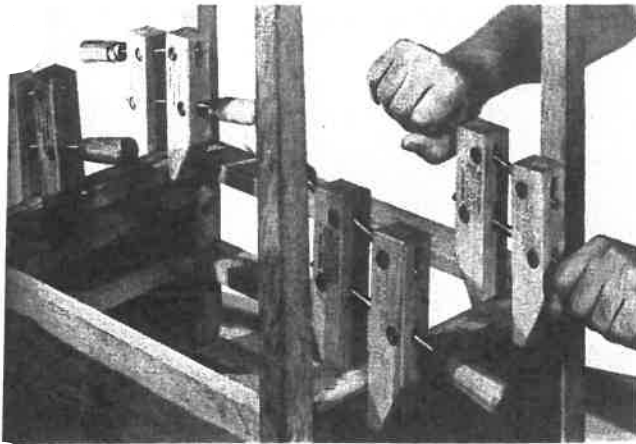
32-2. A variety of clamps is used in woodworking.

it is cut or formed. This clamp can be used on finished surfaces without clamp blocks. The best size has a jaw length of 8 to 12 inches. Fig. 32-3.

The *C-clamp* is used for clamping face to face, for repair work, and for holding parts together. The 6- to 10-inch size is for general use. Fig. 32-4.

The *bar clamp* is used for large work such as gluing stock edge to edge or assembling projects. The common lengths are 3 to 5 feet. Fig. 32-5.

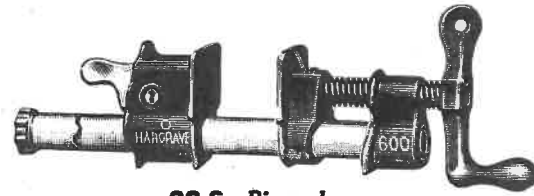
The *pipe clamp* is similar to the bar clamp except that the clamping devices attach to steel



32-3. Using hand screws in assembling a project.

various jobs. The table in Fig. 32-10 describes the common types of glue. A very good all-purpose glue is liquid resin. It comes in tubes, squeeze bottles, and cans. The squeeze bottle is best for most projects because it is neat and there is little waste. This glue dries fast.

Clamp blocks are small pieces of scrap wood used with bar, pipe, and C-clamps to protect the finished parts of a project.



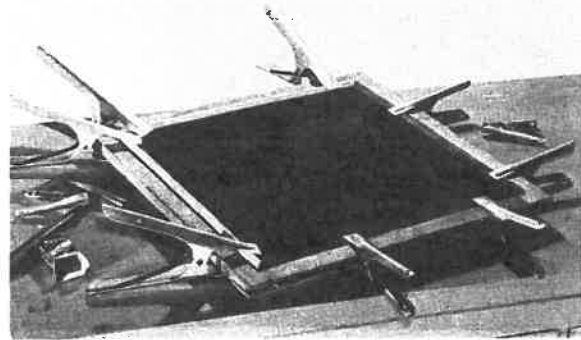
32-6. Pipe clamp.



32-4. C-clamp.



32-5. Bar clamp.



32-7. Spring clamps are useful when making repairs.

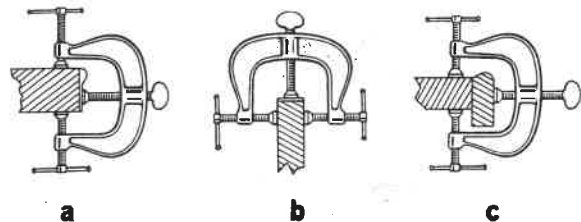
pipe. This tool can be made as long as needed by using different lengths of pipe. Fig. 32-6.

Spring clamps can be applied quickly without turning a handle. Some spring clamps have plastic tips to protect the wood from the metal. Fig. 32-7.

Three-way edging clamps apply "right-angle" pressure to the edge or side of work. Fig. 32-8.

A *rubber or wooden mallet* is used to strike the wood when assembling projects.

Glues are used to fasten pieces permanently. Figure 32-9 shows the best kinds of glue for



32-8. Some ways of using three-way edging clamps: (a) With the right-angle screw off-center. (b) With the right-angle screw centered. (c) Clamping around an edge.

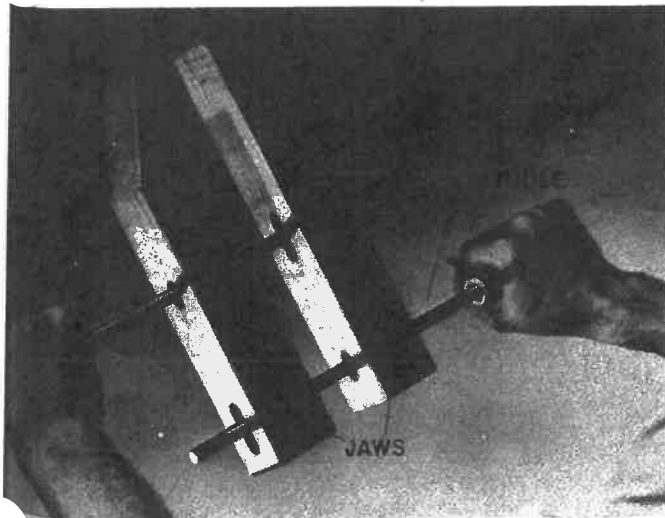
WHICH GLUE FOR THE JOB?

| | Liquid Hide Glue | White (Polyvinyl) Liquid Resin Glue | Resorcinol | Powdered Resin | Powdered Casein | Flake Animal |
|----------------------|---|--|---|--|---|--|
| Especially good for: | First choice for furniture work and wherever a tough, lasting wood-to-wood bond is needed. A favorite for cabinetwork and general wood gluing. | A fine all-around household glue for mending and furniture making and repair. Excellent for model work, paper, leather, and small assemblies. | This is the glue for any work that may be exposed to soaking: outdoor furniture, boats, wooden sinks. | Use it for woodworking and general gluing where considerable moisture resistance is wanted. | Will do most woodworking jobs and is especially desirable with oily woods: teak, lemon, yew. | Good for quantity woodworking jobs that justify the time and trouble of mixing and heating the glue. |
| Not so good for: | Because it is not waterproof, do not use it for outdoor furniture or for boat building. | Not sufficiently moisture-resistant for anything to be exposed to weather. Not so strong and lasting as liquid hide glue for fine furniture work. | Not good for work that must be done at temperatures below 70°F. Because of dark color and mixing, not often used unless waterproof quality is needed. | Do not use with oily woods or with joints that are not closely fitted and tightly clamped. Must be mixed for each use. | Not moisture-resistant enough for outdoor furniture. Will stain acid woods such as redwood. Must be mixed for each use. | Too much trouble to use for small jobs or most home shop work. Not waterproof. |
| Advantages: | Very strong because it is rawhide-tough and does not become brittle. It is easy to use, light in color, resists heat and mold. It has good filling qualities, so gives strength even in poorly fitted joints. | Always ready to use at any temperature. Non-staining, clean, and white. Quick-setting qualities recommend it for work where good clamping is not possible. | Very strong, as well as <u>waterproof</u> . It works better with poor joints than many glues do. | Very strong, although brittle if joint fits poorly. Light-colored, <u>almost waterproof</u> . | Strong, <u>fairly water-resistant</u> , works in cool locations, fills poor joints well. | Same advantages as liquid hide glue but must be mixed, heated, kept hot, used at high temperatures. |
| Source: | From animal hides and bones. | From chemicals. | From chemicals. | From chemicals. | From milk curd. | From animal hides and bones. |

32-9. *The type of glue to use depends on the project. Here are some guidelines for choosing the right glue.*

FASTENING WOOD WITH ALL TYPES OF GLUE

| Glue Type | Room Temperature | How to Prepare | How to Apply | 70°F Clamping Time | |
|---------------------------|---|--|--|--------------------|----------|
| | | | | Hardwood | Softwood |
| Liquid Hide | Sets best above 70°F. Can be used in colder room if glue is warmer. | Ready to use. | Apply thin coat on both surfaces; let get tacky before joining. | 2 hours | 3 hours |
| White Liquid Resin | Any temperature above 60°F, but the warmer the better. | Ready to use. | Spread on and clamp at once. | 1 hour | 1½ hours |
| Resorcinol | Must be 70°F or warmer. Will set faster at 90°F. | Mix 3 parts powder to 4 parts liquid catalyst. | Apply thin coat to both surfaces. Use within 8 hours after mixing. | 16 hours | 16 hours |
| Powdered Resin | Must be 70°F or warmer. Will set faster at 90°F. | Mix 2 parts powder with ½ to 1 part water. | Apply thin coat to both surfaces. Use within 4 hours after mixing. | 16 hours | 16 hours |
| Powdered Casein | Any temperature above freezing, but the warmer the better. | Stir together equal parts by volume glue and water. Wait 10–15 minutes and stir again. | Apply thin coat to both surfaces. Use within 8 hours after mixing. | 2 hours | 3 hours |
| Flaked or Powdered Animal | Must be 70° or warmer. Keep work warm. | For each ounce glue add 1½ ounces water (softwood) or 2 ounces water (hardwood). | Apply heavy coat at 140°F to both surfaces. Assemble rapidly. | 1 hour | 1½ hours |

32-10. This table tells how to prepare and apply common types of glue.**32-11.** Parts of a hand screw.**CLAMPING****Using Hand Screws**

The parts of a hand screw are shown in Fig. 32-11. To adjust a hand screw, grasp the handle of the middle spindle in one hand and the handle of the end spindle in the other. Revolve the spindles at the same time—in one direction to open and in the other to close. If the jaws aren't parallel, adjust one spindle until they are. Always tighten the middle spindle first and then the end spindle. Reverse to remove.



32-12. When gluing end grain it is a good idea to apply a thin coat of glue first. The end grain will absorb the glue. When applying glue to the rest of the joint, apply a second coat to the end grain. Notice that a brush is used to apply the liquid glue.

Tips on Clamping

- Dry-clamp all pieces before gluing to make sure that the joints fit properly and that you have enough clamps to do the job.
- For easy and accurate assembly, mark all pieces before gluing.
- Use small pieces of scrap wood or plastic to protect the wood from metal clamp jaws.
- Don't apply too much pressure. This would force the glue out of the joints, causing a weak, "starved" joint.

GLUING

Mixing Powdered Resin or Casein Glues

1. Follow directions on the can carefully. Never mix more glue than you can use at one time.
2. Many powdered glues are mixed with an equal amount of water.
3. Stir the glue briskly. Then allow it to stand about 10 to 15 minutes.
4. Mix again for about one minute. The glue should be about as thick as whipping cream.
5. Apply the glue with a brush or stick.

Mixing Resorcinol Glue

1. This glue comes in two separate cans. One contains the liquid resin and the other the

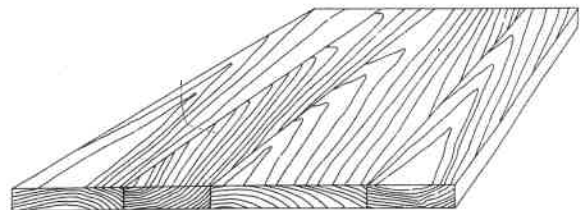
powdered catalyst. The catalyst makes the glue work better and helps it to harden.

2. Mix the liquid and the powder in the exact amounts stated on the label. Never mix more than you need for one job.

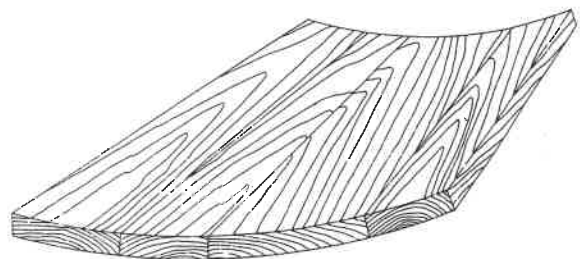
Applying Glue

Follow these tips in applying all glues:

- Work at correct temperature.
- Apply two coats of glue to end grain. End grain tends to soak up glue. Fig. 32-12.
- Find the most convenient way to apply the glue (tube, squeeze bottle, etc.).
- Cover surfaces evenly.



CORRECT

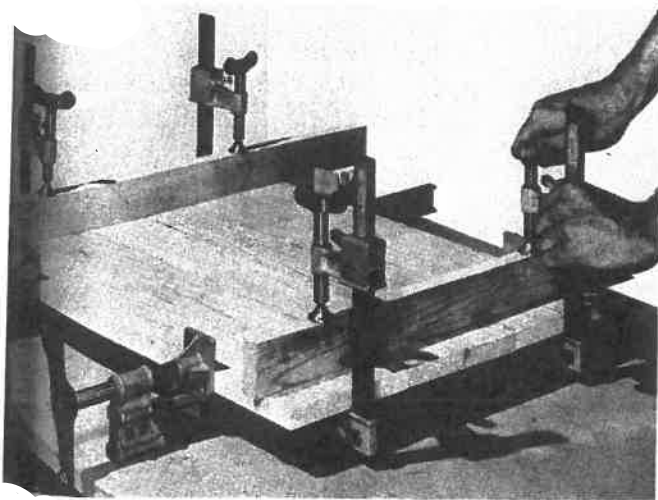


INCORRECT

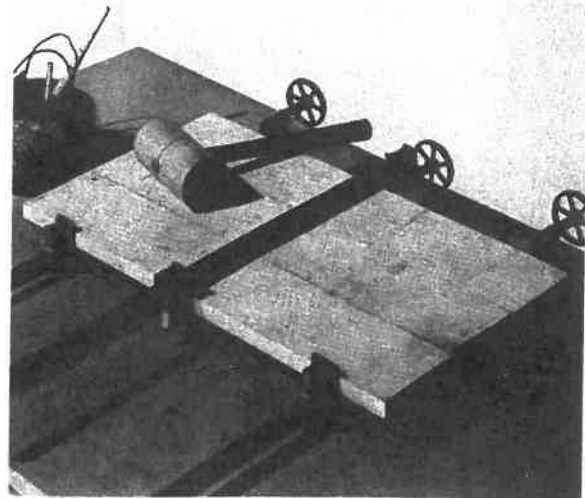
32-13. Correct and incorrect way to assemble stock edge to edge. If assembled with growth rings all in same direction, the piece is more likely to warp.

Gluing Stock Edge to Edge

1. Choose the number of pieces needed to make the larger surface. Use pieces not more than 5 to 6 inches wide.
2. Square up each piece.
3. Arrange the pieces so that:
 - The grain matches.
 - The grain runs in the same direction.
 - The growth rings at the ends of boards are in opposite directions. Fig. 32-13.
4. Mark the matching joints 1-1, 2-2, etc.
5. Test the edge joints to make sure the ends are tight. On long pieces the edges are planed so that there is a little opening (about the thickness of paper) near the center.
6. Add dowels or splines if you want a stronger joint.
7. Choose at least three bar clamps to hold the parts together. There should be a clamp every 10 to 12 inches along the assembly.
8. If the outer edges must be protected, use clamp blocks.
9. If the assembly is wide, put cleats across the ends to keep the surface level. Fig. 32-14.
10. Make a trial assembly to see that everything is all right. Open the bar clamps slightly



32-14. Cleats can be placed across the assembly to keep it level.



32-15. Note that the clamps are fastened from opposite sides.

11. Take the assembly apart.
12. Apply glue to the edges and dowels or splines. Cover the edges but do not put on so much glue that it will squeeze out.
13. Put the joints together quickly.
14. Tighten the clamps a little at a time. If necessary, force the parts together with a rubber mallet.
15. If necessary put cleats across the ends. Wax paper under the cleats will keep them from sticking.

Gluing Stock Face to Face

1. Choose pieces to make the correct thickness. For most furniture legs, two pieces glued together are enough.
2. Square up the stock to rough size. This is done so that you can see the grain and know how to match the parts.
3. Assemble with the growth rings in opposite directions. Check to make sure the grain match-

BEGINNING WOODWORK

32-16. *When gluing face to face with C-clamps, always use clamp blocks.*

es. Don't put a very light and a very dark piece side by side.

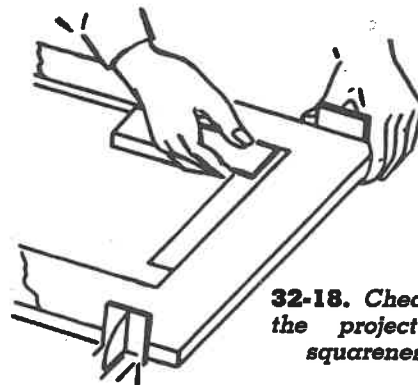
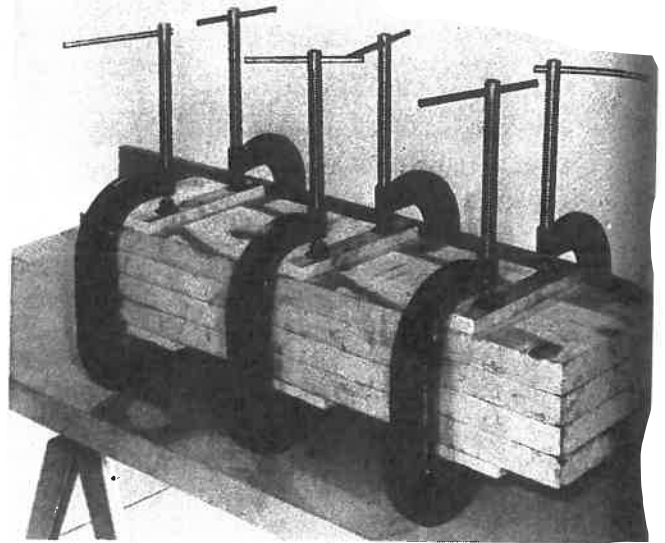
4. Use glue blocks and C-clamps or hand screws to hold the parts together. Fig. 32-16.

5. Apply the glue evenly over the surfaces. Clamp together.

ASSEMBLING A PROJECT

The steps in gluing up a project depend on how difficult it is. For a simple project of two or three pieces, all the gluing is done at the same time. For a more advanced project, such as a small table, the assembling is done in the following stages:

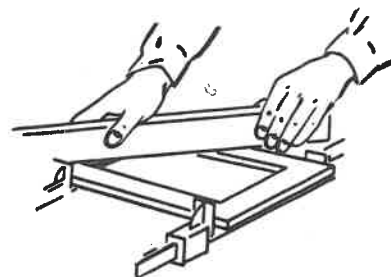
1. Get all the parts together and check to see that everything is complete.
2. Decide on how the project is to be assembled. Some projects of this kind have four legs



32-18. *Checking the project for squareness.*



32-17. *Gluing up a frame may be one step in making a larger project.*



32-19. *Checking the project for levelness.*

and four rails. The best way is to glue the ends together first and then the complete project. Fig. 32-17.

3. Cut clamp blocks to protect the finished wood surface.

4. Select the correct kind and number of clamps.

5. Clamp the parts together to see if they fit. Make sure the parts are square and level. Figs. 32-18 and 32-19. Then take the project apart.

6. Mix the correct kind and amount of glue.

7. Apply the glue with a brush or squeeze

bottle. Don't put on too much. Put a little extra glue on end grain.

8. Assemble the first part of the project. Clamp lightly. Then recheck to make sure the parts are square and level. Sometimes you have to shift a clamp or strike a joint with a rubber mallet to bring it into place.

9. Remove excess glue before it gets dry.

10. Allow the first section to dry.

11. Follow these steps for each section. Then assemble the complete project.

QUESTIONS

1. Name six kinds of clamps.
2. Is it necessary to use small pieces of scrap wood with hand screws?
3. Which glues are waterproof?
4. Why is liquid resin a good all-around glue to use in a school shop?
5. What three things must you check for when gluing stock edge to edge?
6. What can be used on the edge of stock to make a stronger joint?
7. Should a small table be glued up all at once? Explain.