The setting must work as conceived by the scenic designer and director

It's the job of the technical director (TD) to see that it does

Technical Production

The broad field concerned with the processes and techniques used in taking design from conception to reality

Construction and painting of scenery and properties

The assembly of the set

The shifting of set(s) and props during production

The tools used to accomplish those tasks

Broadway Theatre

Personnel are hired for a single production

The designs are constructed and finished by independent professional scenic and property studios

When the scenery is finished, it is **moved from the studio to the theatre**

Single production concept is the exception, not the rule

Load-in

The moving of scenery and equipment into the theatre and positioning them onstage

Chapter 9: Scenic Production Techniques

Most theatre in the US is produced on a limited-run, multiple-production basis

Colleges, universities, community theatres, and regional professional theatre groups

Almost always working on more than one production at a time

Technical director is the primary organizer of the technical aspects of production

The TD must be able to effectively organize time and resources as well as manage people—especially if the TD is supervising more than one show at a time!

The TD cannot begin construction until the designer provides the plans for the production

Ground plan

Front elevations

Detail sheets

Functional models

Painter's elevations

The TD must then create a **construction calendar** to specify the amount of time scheduled for each project

Scenic Production Techniques

Some fairly standardized construction techniques are used to fabricate stage scenery

Woodworking

Welding

Soldering

Woodworking

Wood is used extensively in scenic construction

The most common wood joints in scenic and property construction

Butt Joint

Lap Joint

Battened Butt Joint

Miter Joint

Dado Joint

Halved Joint

Notched Joint

Scarf Joint

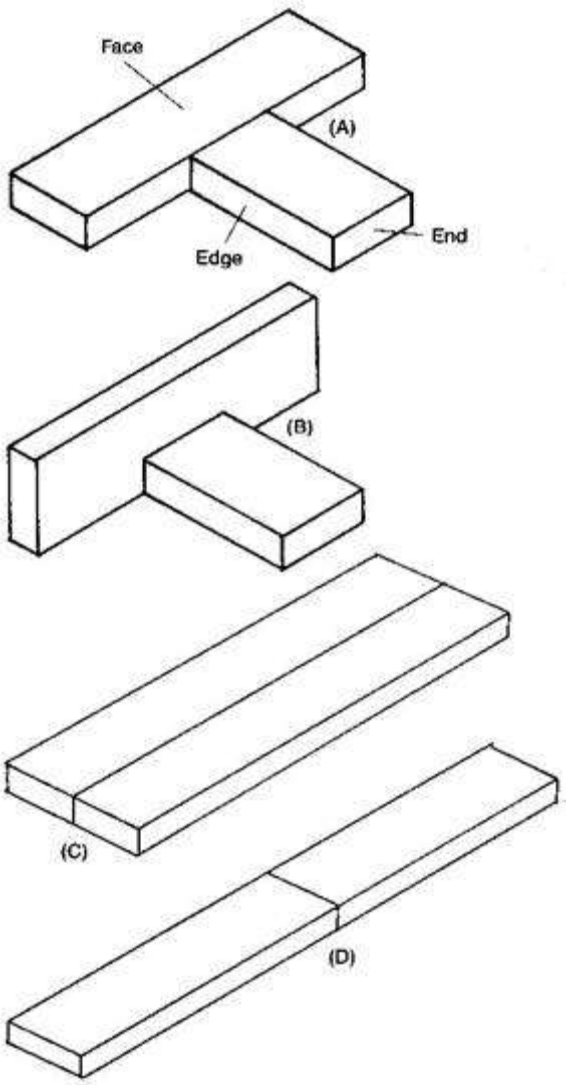
Mortise and Tenon Joint

Doweled Joint

Butt Joint

The butt joint is made when two pieces of wood are cut square at the end and fitted together

A butt joint is not very strong unless it is reinforced

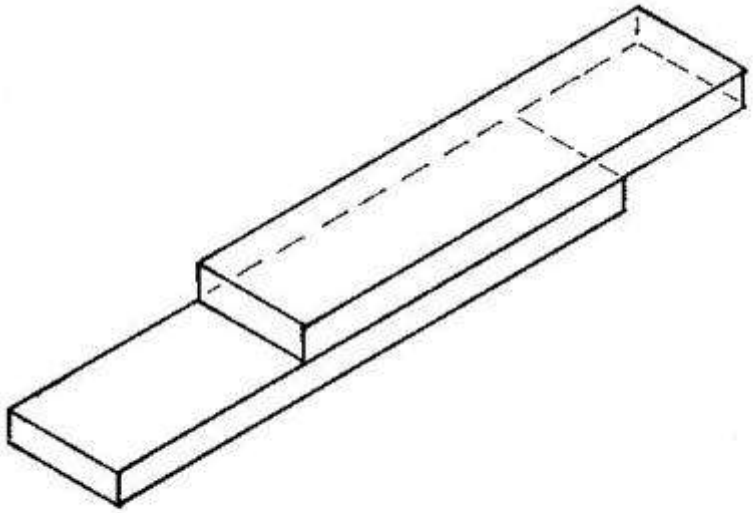


Lap Joint

A lap joint is probably the simplest of all joints

Two pieces of lumber are joined face to face and fastened together

This type of joint is used when attaching legs to platforms

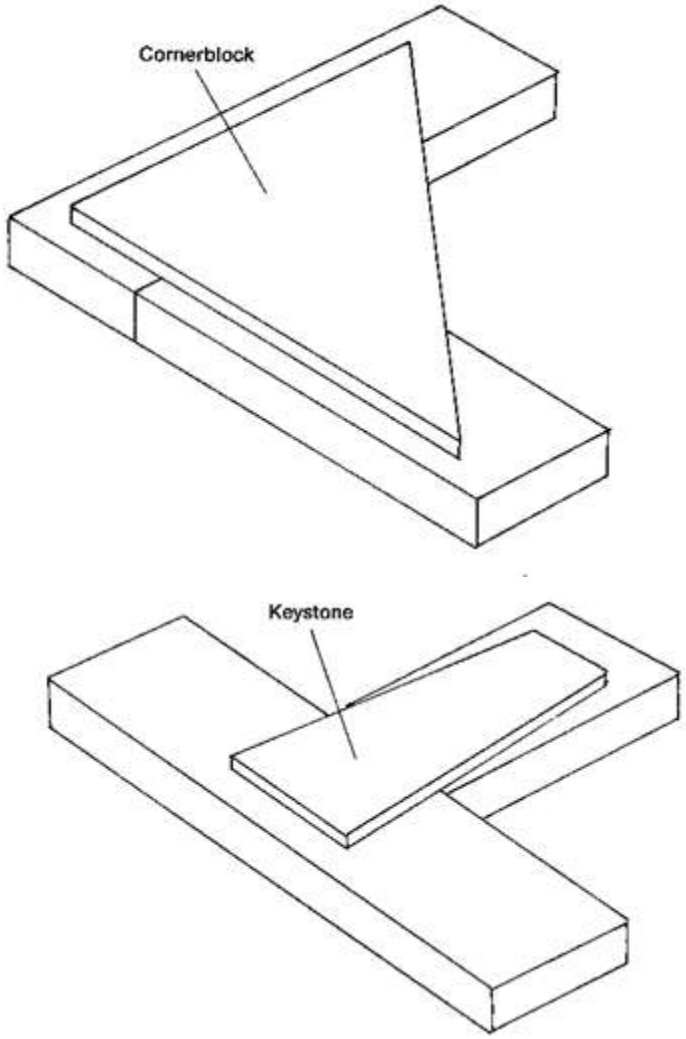


Battened Butt Joint

A battened butt joint is created when two pieces of stock lumber are butte end to end

An 18- to 24-inch piece of lumber is attached directly over the joint

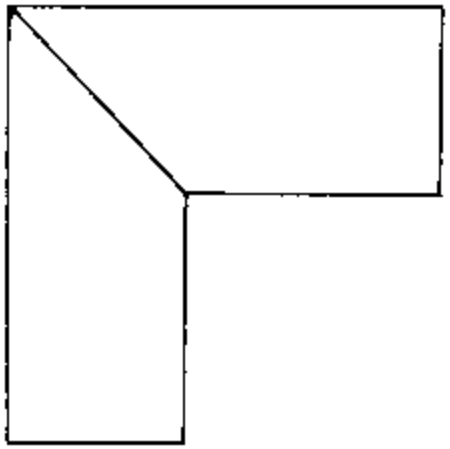
In flat construction, “cornerblocks” ar used to reinforce the butt joints at the corners and “keystones” are used to reinforce the butt joints on internal bracing



Miter Joint

A miter joint is a type of butt joint. The only difference is that the wood being joined is cut on an angle instead of square

Miter joints are used when making irregular flats or picture frames



"Irregular flat"

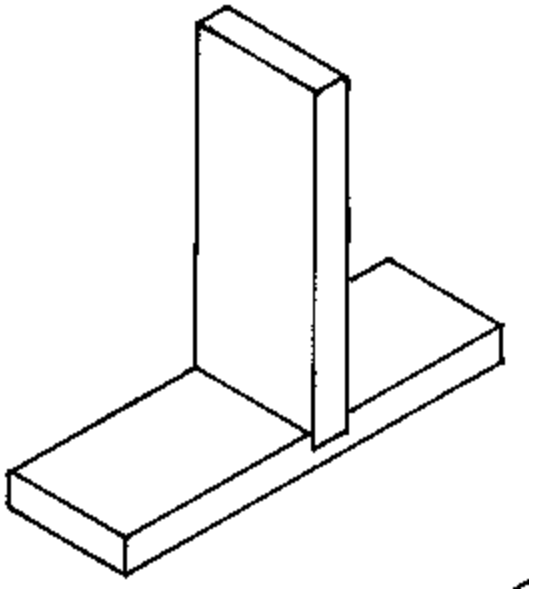
A flat that has nonsquare corners!

Dado Joint

A dado joint is made by cutting a slot across the face of one piece of lumber to receive the edge of another

The slot is cut only halfway through the depth of the lumber

Fastened with glue and nails, this joint is frequently used for shelving and the like

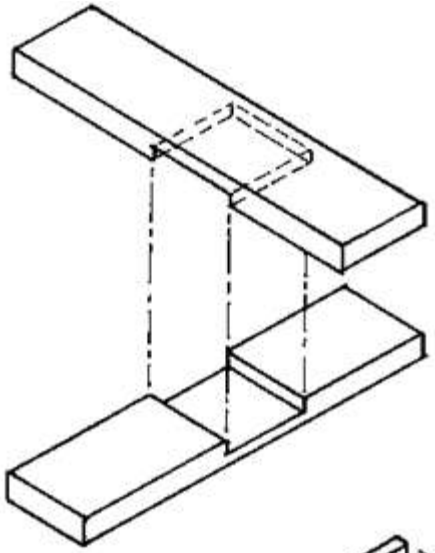


Halved Joint

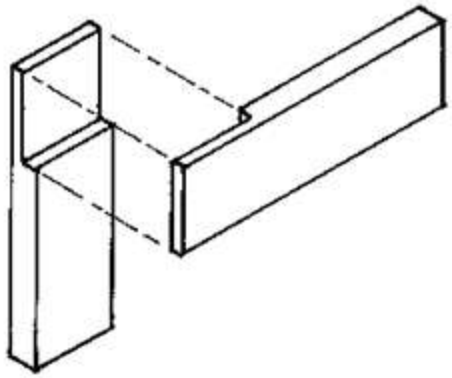
A halved joint is made by removing half of the thickness of each piece of lumber from the area to be joined

This assures that the thickness of the finished joint with be no greater than the stock from which it was made

A very strong joint, it is used in making "**muntins**" and "**mullions**" of windows and the like



Halved joint is also called a halved lap joint!



A **horizontal** crossbar in a window

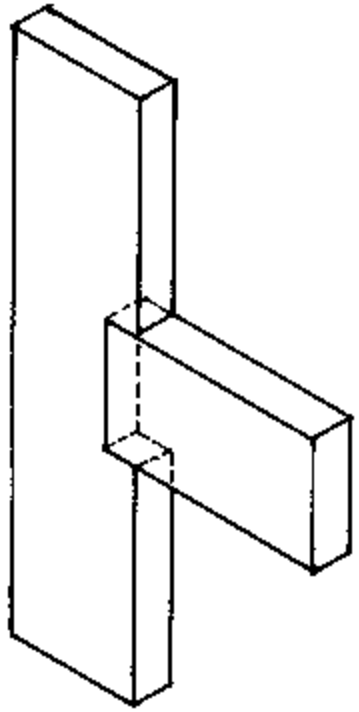
A **vertical** crossbar in a window

Notched Joint

A notched joint is created when the edge or face of one board is inserted into a notch cut in another

The size of the notch is determined by the width and thickness of the piece that the notch will receive

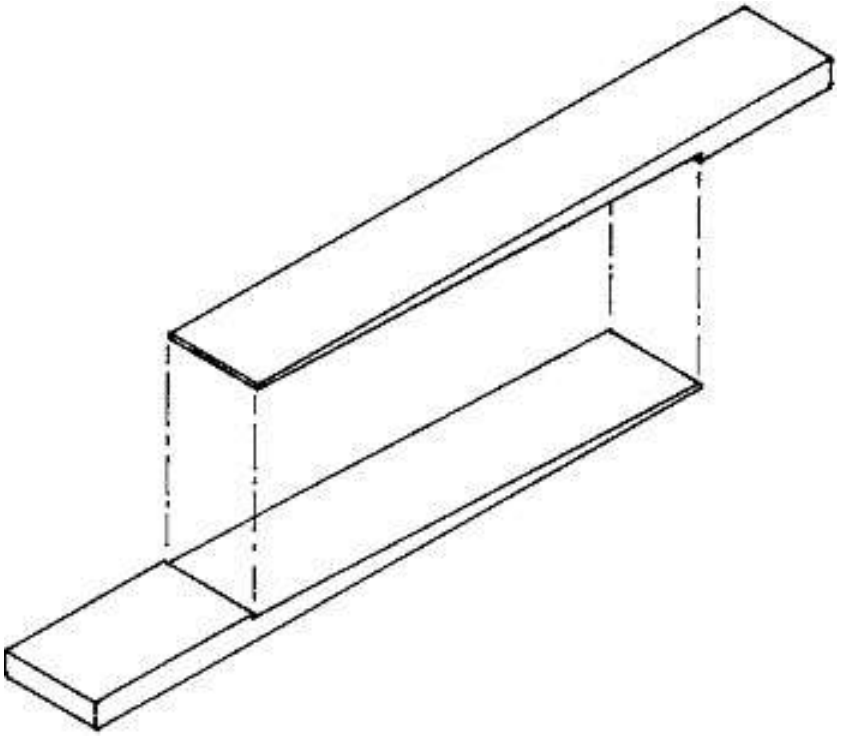
Used for shelving and the like



Scarf Joint

A scarf joint is used to make one long board from two short ones with no increase in the thickness of the lumber

The angled surface of the joint should be at least 18 inches long



Mortise and Tenon Joint

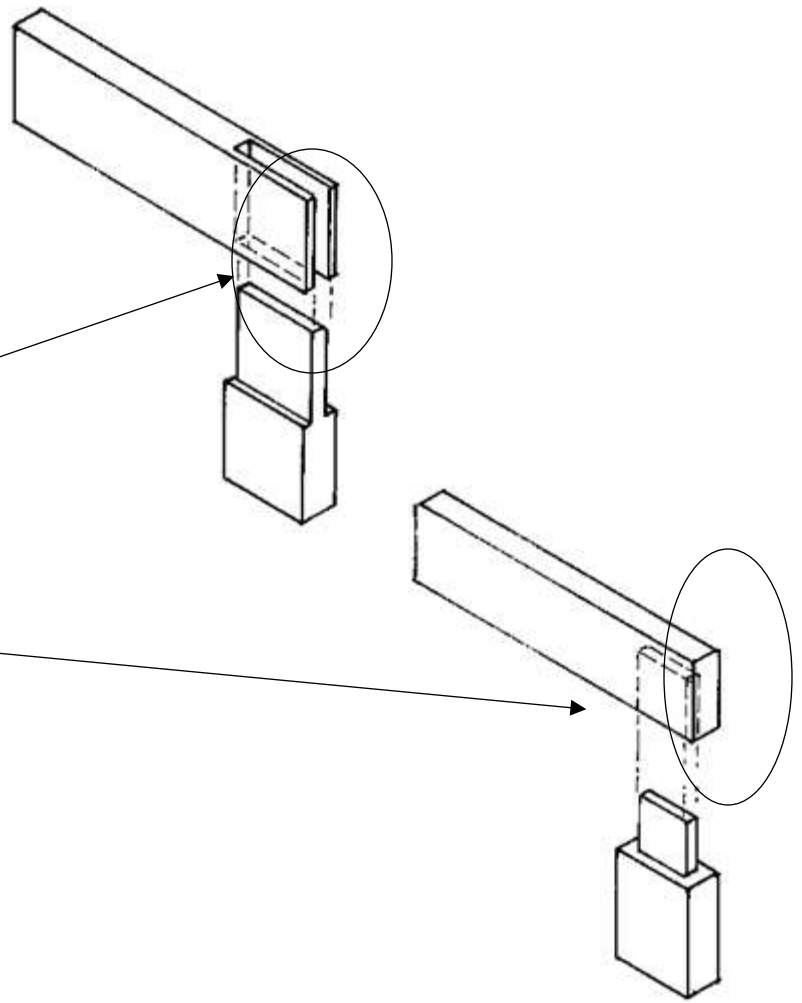
One piece of wood has the edges cut back (tenon) and must fit snuggly into a square hole (mortise) to create this type of joint

The joint is secured with glue

An **open mortise and tenon joint** has the tenon exposed

A **closed mortise and tenon joint** looks from the outside just like a butt joint

These strong joints are used extensively in furniture construction

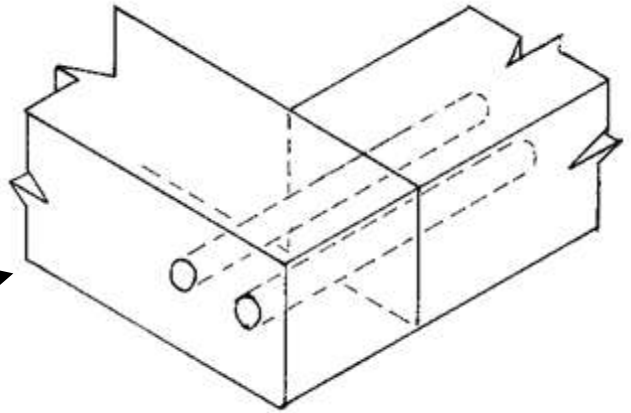


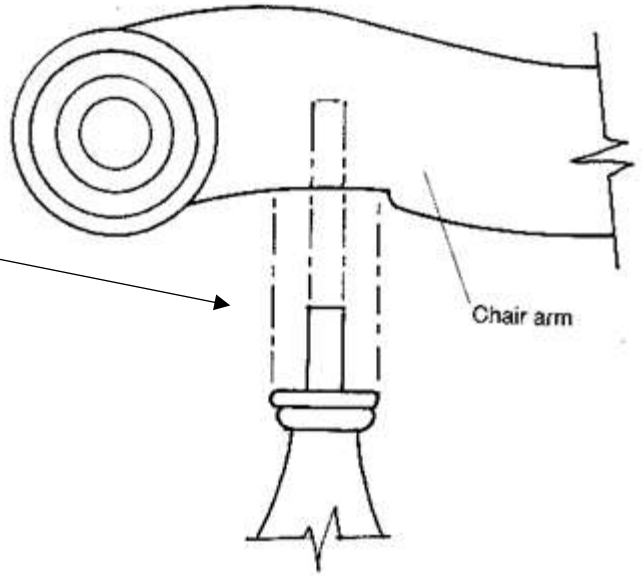
Doweled Joint

A doweled joint is a butt joint that is reinforced with small pieces of hardwood dowel

An **open doweled joint** has the end of the dowel exposed

A **closed doweled joint** shows no outside evidence of its existence





Welding

Welding is the process of fusing metal by heating the pieces being joined until they melt and inducing the metal to flow together before it cools

During the process, a certain amount of the metal is vaporized; the "filler rod" is used to replace the lost metal

Filler rod
Metal piece of same composition
as the material being welded
Used to replace metal
lost during welding or to fill
a hole or groove in the work

Welding

Before welding, the surface of the metal must be cleaned of all oil, grease, paint, rust, and any other contaminants

Several welding techniques have been developed to used with the various types of welders (discussed in Chapter 8)

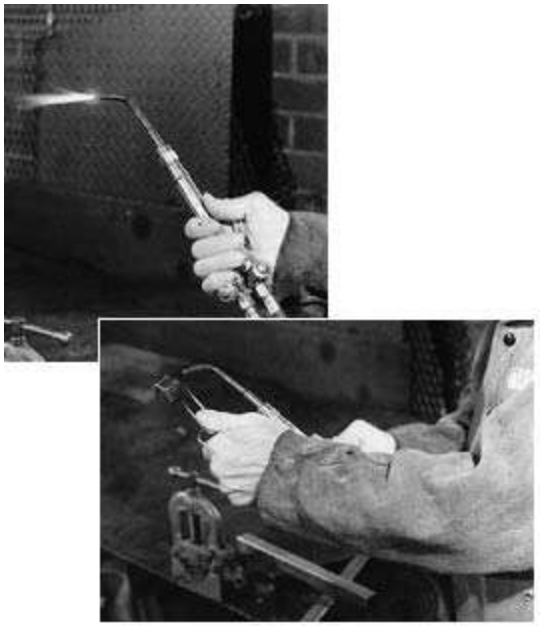
Oxyacetylene Welding

Arc Welding

Oxyacetylene Welding

This type of welding used the “two-handed welding” technique

The welder holds the torch or welding handle in one hand and the copper-clad filler rod in the other



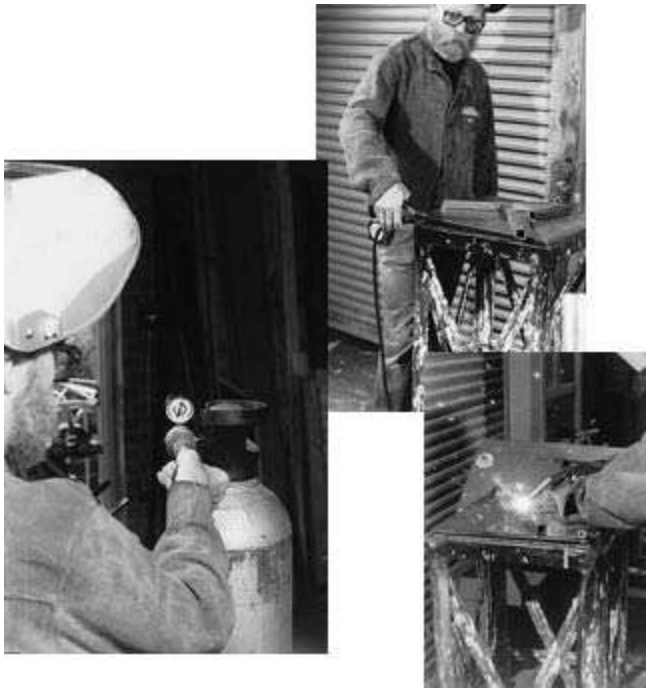
An “arc” is an electric current that leaps the gap between two closely placed electrodes

Arc Welding

The arc welder utilizes electricity to generate an “arc” that has a temperature of approximately 13,000ºF

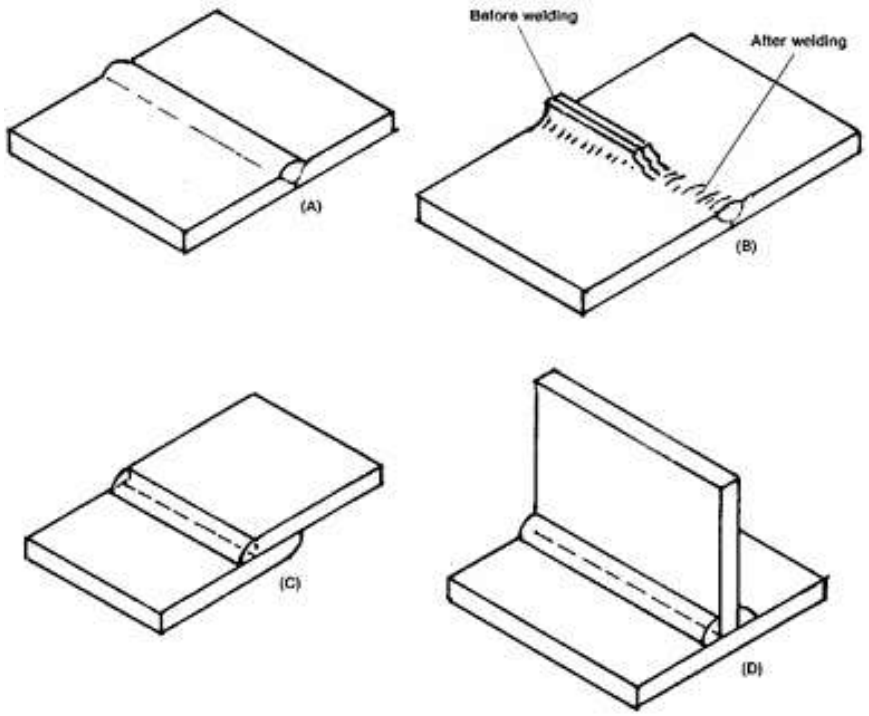
This extremely high heat almost instantly melts most types of metal

The welding handle is held with only one hand, therefore it is “single-hand welding”



Types of Welds

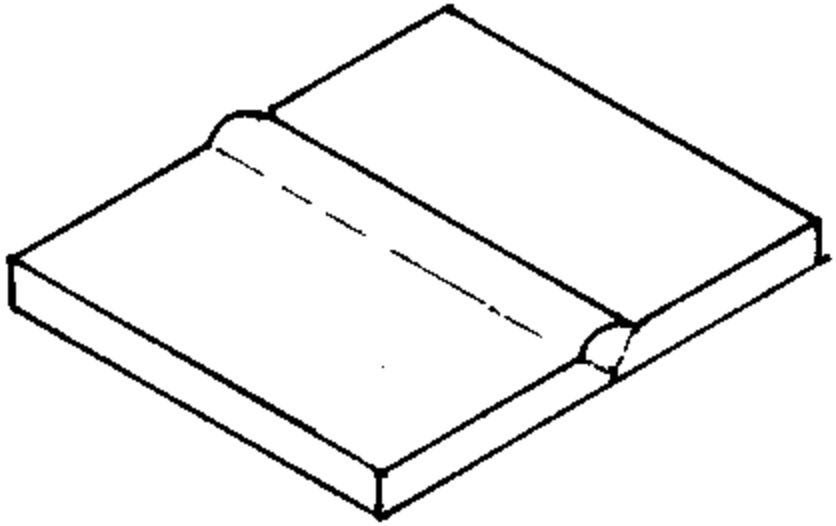
1. Butt Weld
2. Flange Weld
3. Lap Weld
4. Fillet Weld



Butt Weld

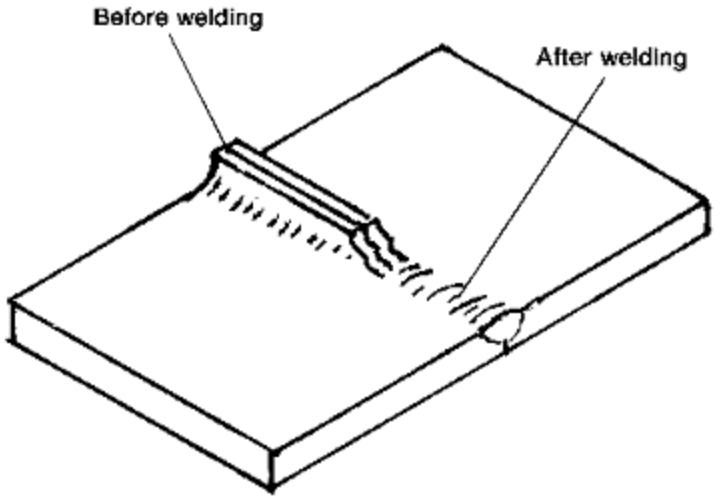
The butt weld is probably the most common and strongest type

The edges of the materials to be joined are clamped edge to edge with a narrow space between them



Flange Weld

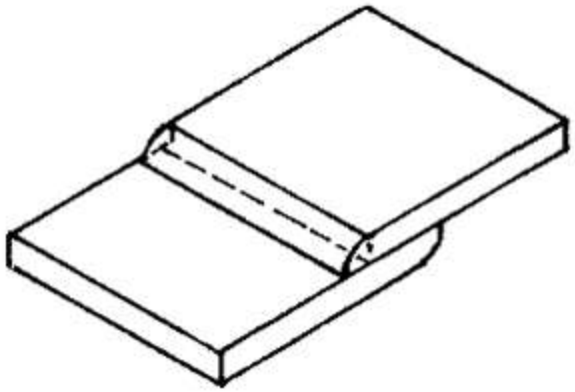
A flange weld is similar to a butt weld, except that the edges of the material being joined are bent up before the sheets are clamped into place



Lap Weld

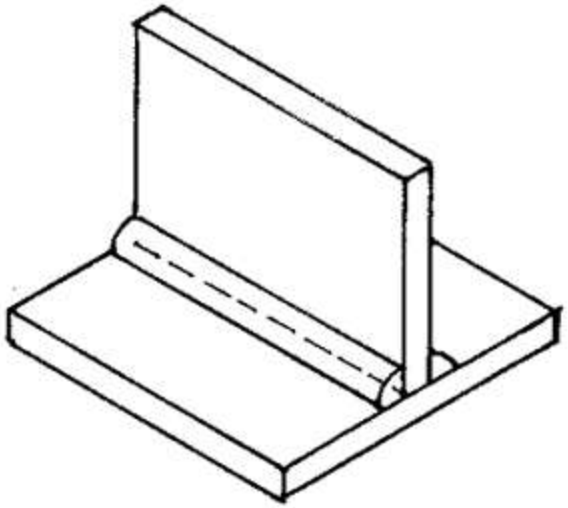
A lap weld is make when two pieces are overlapped

Both overlapped edges must be welded



Fillet Weld

A fillet weld is made when the edge of one piece is joined to the face of another



Soldering

Soldering is the process of heating metal until it is hot enough to melt “solder”

The **solder** flows over the surface of the metal and bonds the pieces together

A metal alloy of lead and tin

The types of metals usually used in soldering include lightweight steel, copper, or brass

DO NOW DO NOW DO NOW

- Get your Black Portfolio
- Write in the entry, "Cut Lists"
- Get ready for a Flat Construction Worksheet
  - To be completed alone and SILENTLY

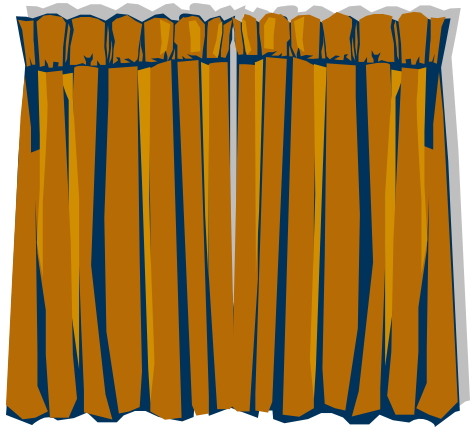
https://www.youtube.com/watch?v=JvOLBYA8JEE

Two-Dimensional Scenery

Two-dimensional scenery can be divided into two basic subgroups

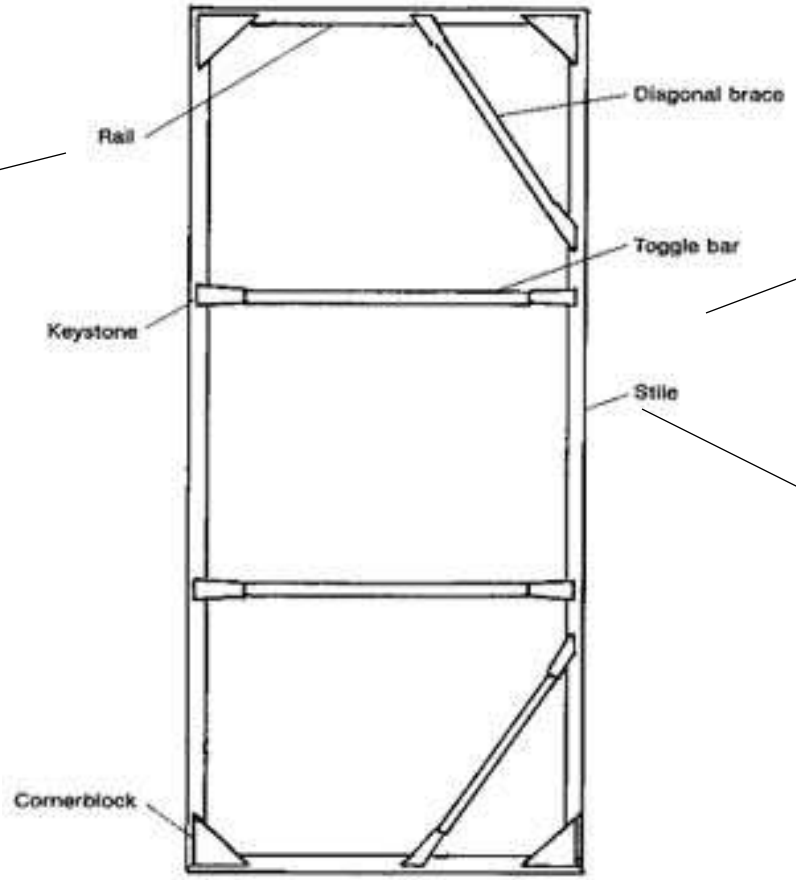
Hard scenery—Flats

Soft scenery—Unframed units such as drops and draperies



Flats

Rail—top or bottom framing member



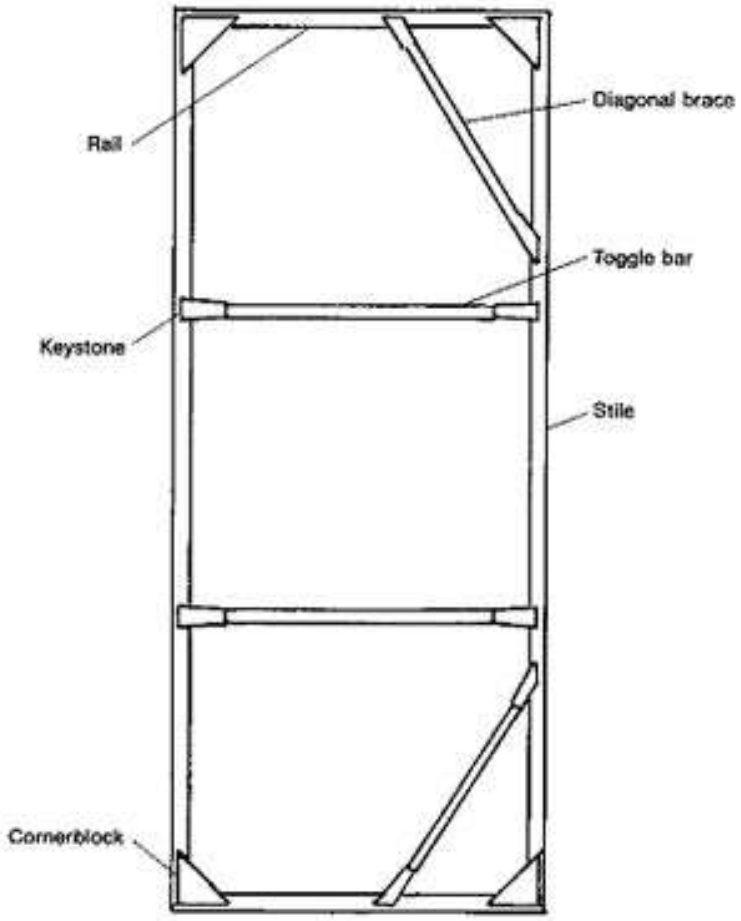
Toggle Bar—an interior horizontal framing member

Stile—a vertical side member

Hard Scenery—Flats

Flats are lightweight frames made of wood or steel tubing

They are normally covered with muslin but can be covered with plywood, Upson board, paper, Masonite, velour, or other fabrics



Rails -These are the top and bottom pieces of lumber that determine the width of the flat

Stiles - these are the side pieces of lumber that determine the height of the flat.

Toggles - these are the pieces of lumber that give support to soft cover flats. They should be placed every 3-4 feet.

Corner braces -these help keep a soft cover flat square.

Fasteners - corner blocks, for stile and rail joints

Half-straps, for fastening the corner braces to the rail and stile

Straps-for fastening the toggles to the stiles.

Stage Platforming

Platforms are used to create levels

There are several types of platforms

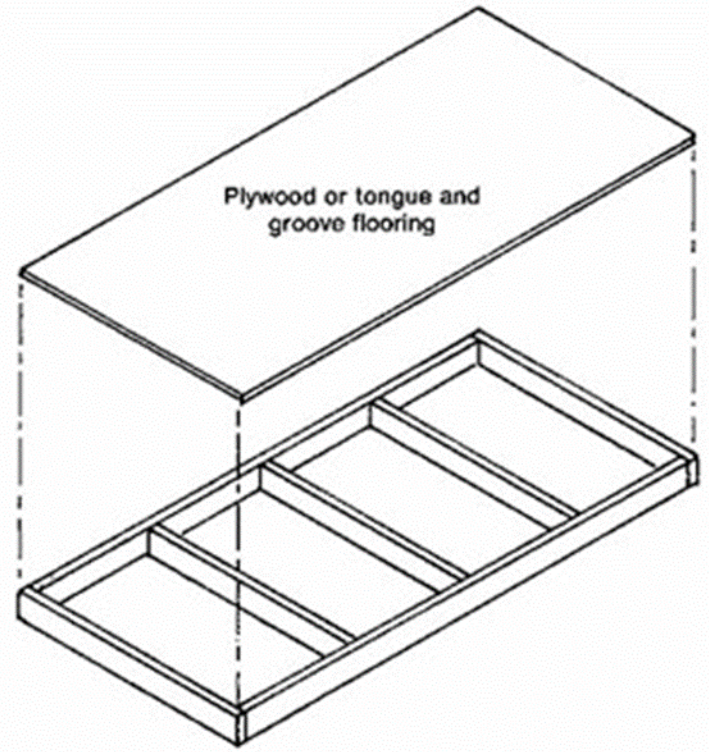
Rigid Wooden Platform

Rigid Steel-Tubing Platform

Stressed-Skin Platform

Honeycomb-Paper Lamination

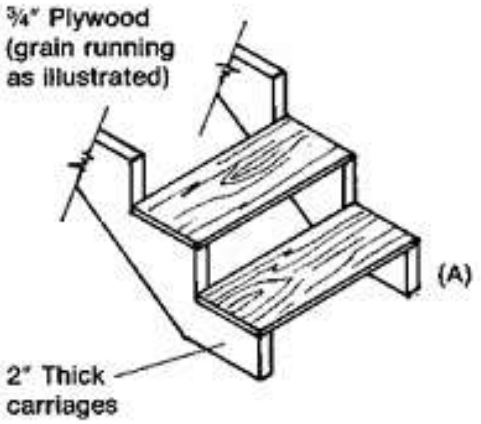
Parallels

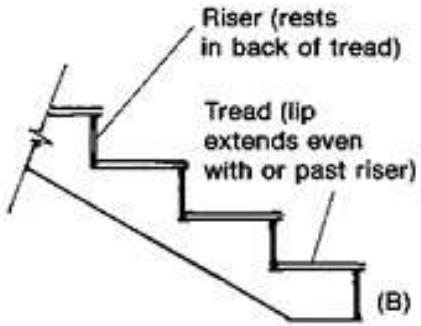


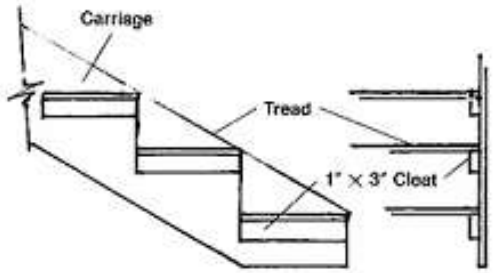
Stairs

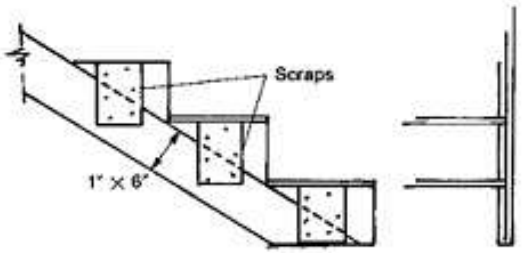
Carriage—the part of a stair unit that supports the tread and risers

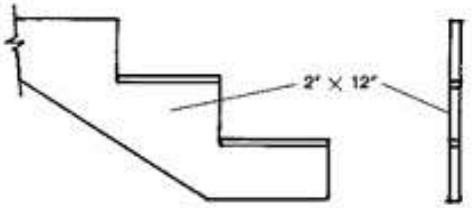
Tread—the horizontal surface of a stair











Riser—the vertical face of a stair unit

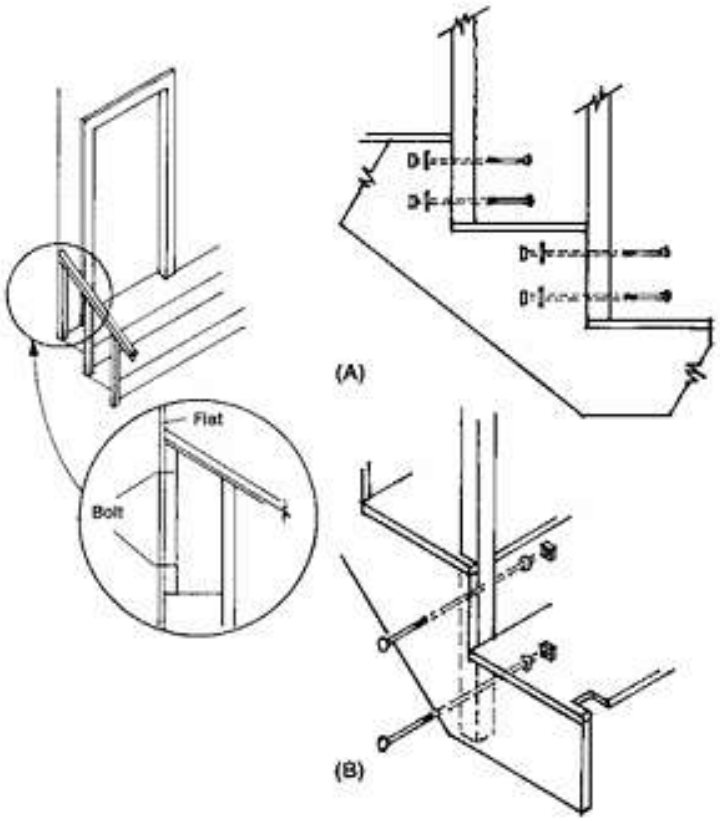
Staircase Railings

Newel post—the post at the bottom or top of a flight of stairs

The design of any staircase is the responsibility of the scenic designers

However, there are universal challenges encountered during construction

Unless “handrails”, “banisters”, and “newel posts” are firmly anchored to the stair unit, they will wiggle and become a distraction



Handrail—the part of the stair railing that is grabbed with the hand

Banister—the vertical member that supports the handrail of a staircase railing

Flats

Soft Flats—any flat covered with fabric

Studio Flats—also called Hollywood-style flats, are framed flats that are covered with hard materials, such as plywood. These flats place the framing wood on edge rather than flat for strength

Metal-Framed Flats—uses square metal tubing rather than lumber to frame the flat

Flats

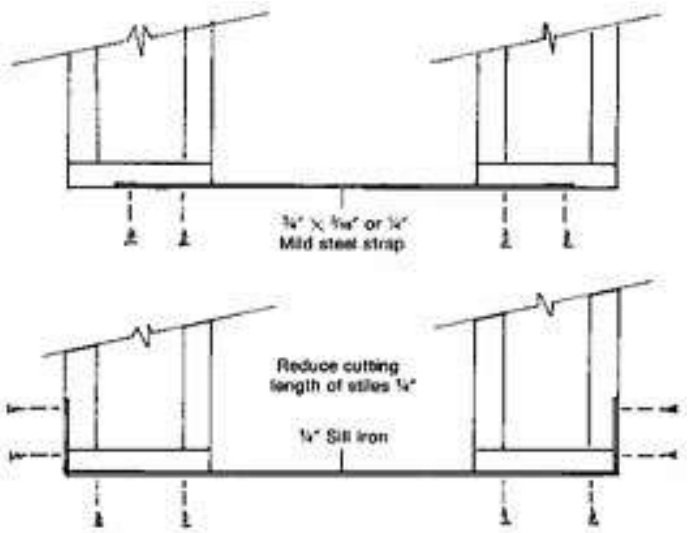
Door and Window Flats

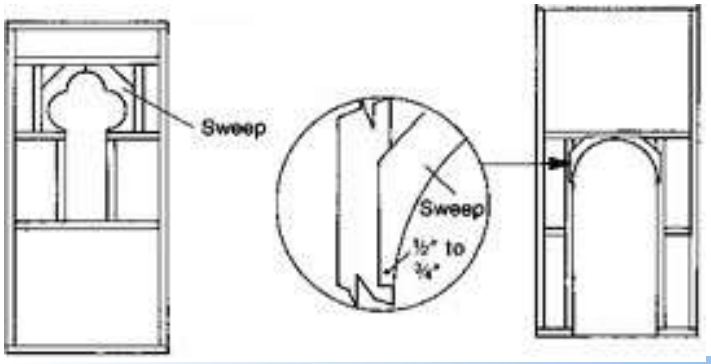
Door flats vary in construction in one important way—the bottom rail across the door opening is removed and replaced with a "**sill iron**"

Arches and irregular openings are made by insetting "**sweeps**" in regular door and window openings

Sill iron

A strap of mild steel attached to the bottom of a door flat to brace it





Sweep

wooden curvilinear form

Flats: Door and Window Flats

There are two types of stage windows and doors

Dependent—unit is fixed to the flat

Independent—unit is largely self-contained and can easily be attached to or removed from the flat

It is standard practice to design doors to pivot to their upstage side and swing offstage

Flats: Joining Flats

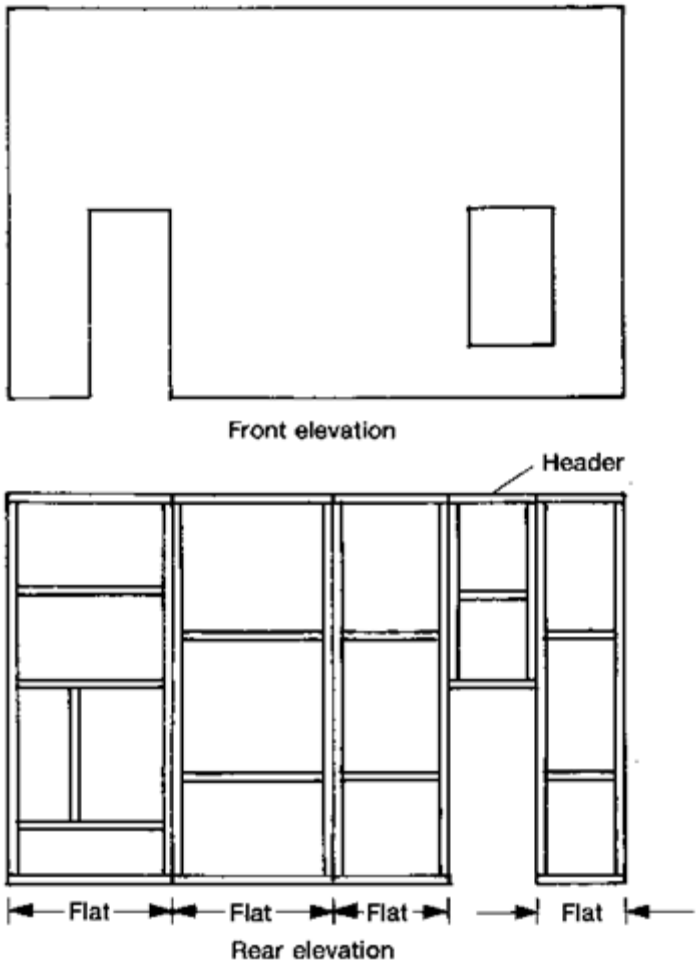
Most designs call for walls that are wider than one flat

To construct larger walls, flats are joined together

There are two primary methods for joining flats

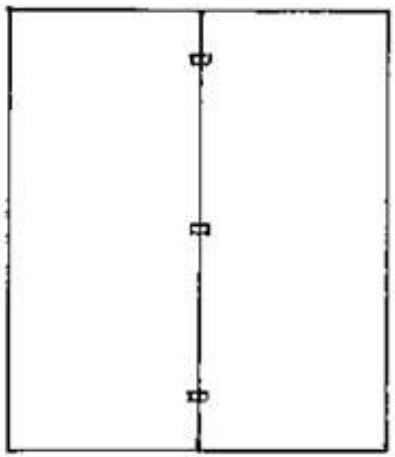
Rigid

Flexible

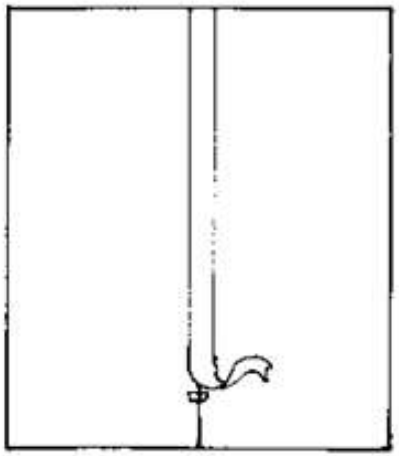


Flats: Rigid Joining

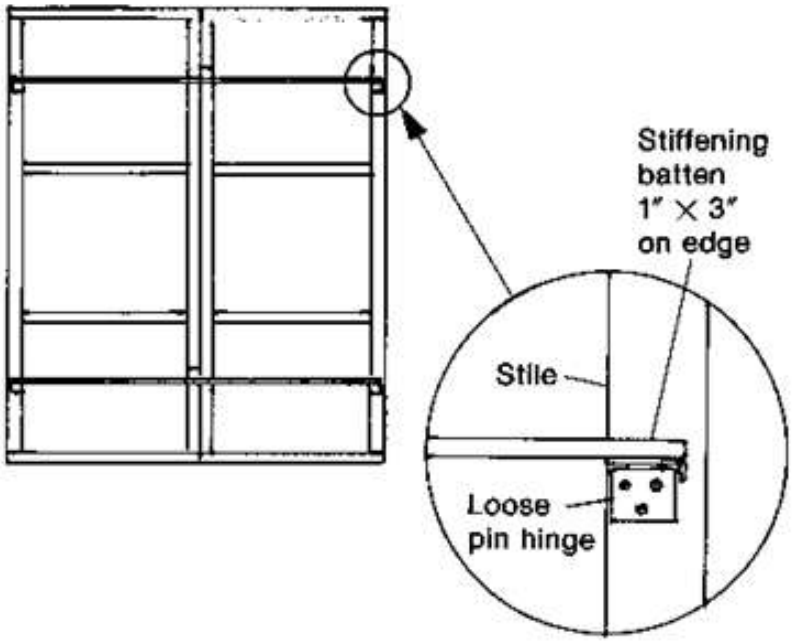
If the multiflat wall does not need to fold, this type of joining is used



Tight pin hinges on face of flats no more than 5'-0" between hinges

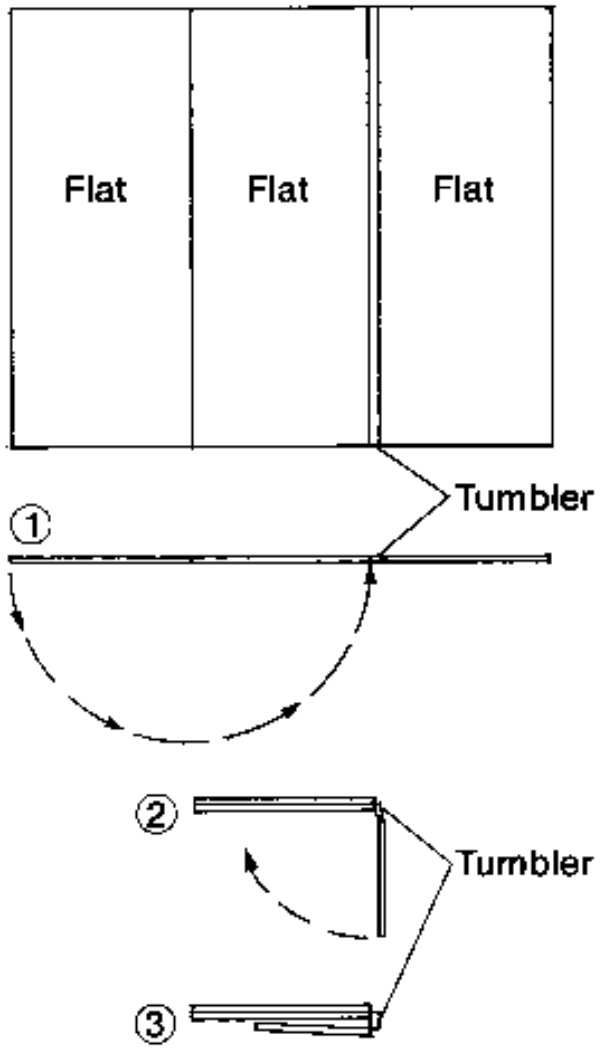


Cover joint with dutchman



Flats: Flexible Joining

If the multiflat wall needs to be folded for shifting and storage, this type of joining is used

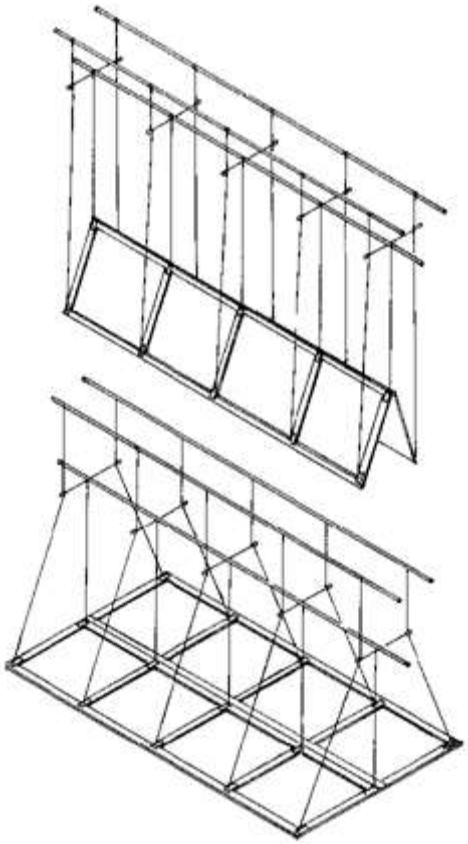


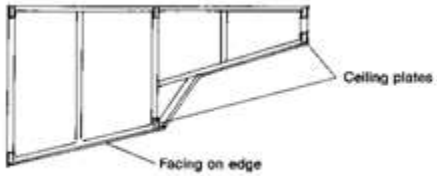
Flats: Ceilings

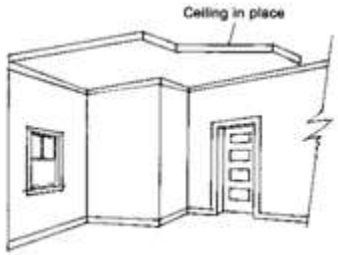
Ceilings are primarily used on proscenium stages, and are large, horizontal flats

The "**book ceiling**" is a permanent piece of stage equipment in many proscenium theatres. It is composed of two large flats the same width as the proscenium arch

Irregular ceilings that do not completely cover the set are built just like any other flat







Soft Scenery: Drops

Drops are large, flat curtains that have no fullness

Tie-Supported Drops

Batten-Clamp Drops

Opaque Drops

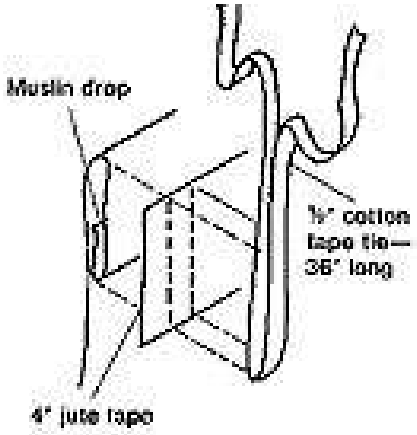
Translucent Drops

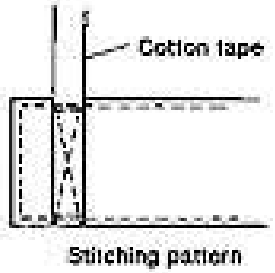
Scrim Drops

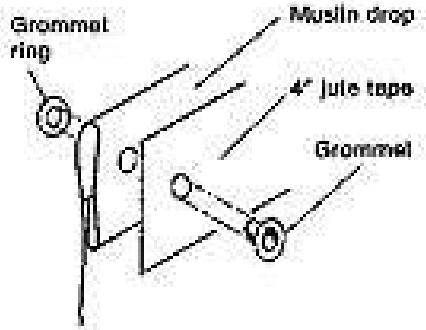
Cutout Drops

Soft Scenery: Tie-Supported Drops

The easiest way of hanging a drop is to tie it to the batten



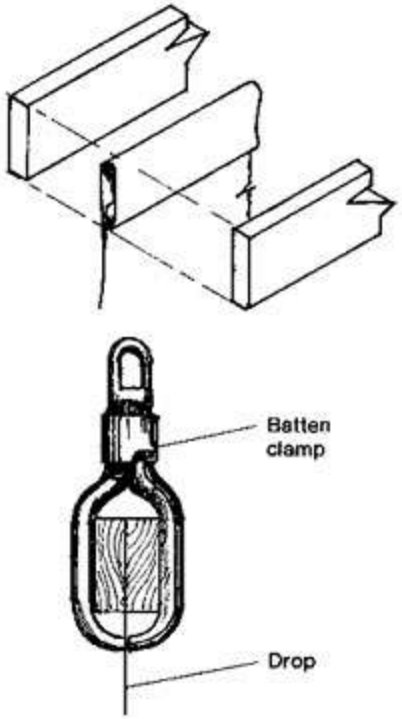




Soft Scenery: Batten-Clamp Drops

Drops are sometimes attached to a counterweight batten with batten clamps

The batten clamp facilitates rapid hanging or removal of a drop



Soft Scenery: Opaque Drops

Made of heavyweight muslin, these drops are painted with opaque paints and are lit from the front

The audience cannot see through them

Soft Scenery: Translucent Drops

Made of heavyweight muslin, these types of drops are painted with dyes or a combination of dye and opaque paint

They are lit form both front and back, making the areas that have been dyed translucent

Soft Scenery: Scrim Drops

Made from sharktooth scrim or theatrical gauze, scrim drops can become transparent when the scene behind it is lit

They can be painted with either dyes or thinned paints

Soft Scenery: Cutout Drops

These types of drops have sections cut out of the material

They create a sense of depth and should be painted before being cut to prevent curling

Soft Scenery: Draperies

The two types of draperies used in the theatre are stage draperies and curtains

A more thorough discussion of stage draperies appears in Chapter 4, while curtains are covered in Chapter 11

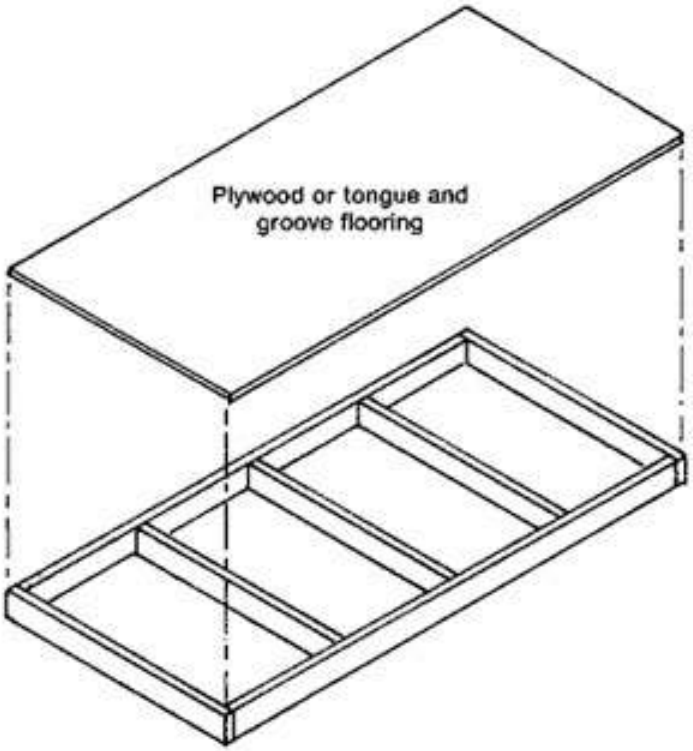
Three-Dimensional Scenery

The term refers to the construction of platforms, stairs, and other similar objects

Rigid Wooden Platform

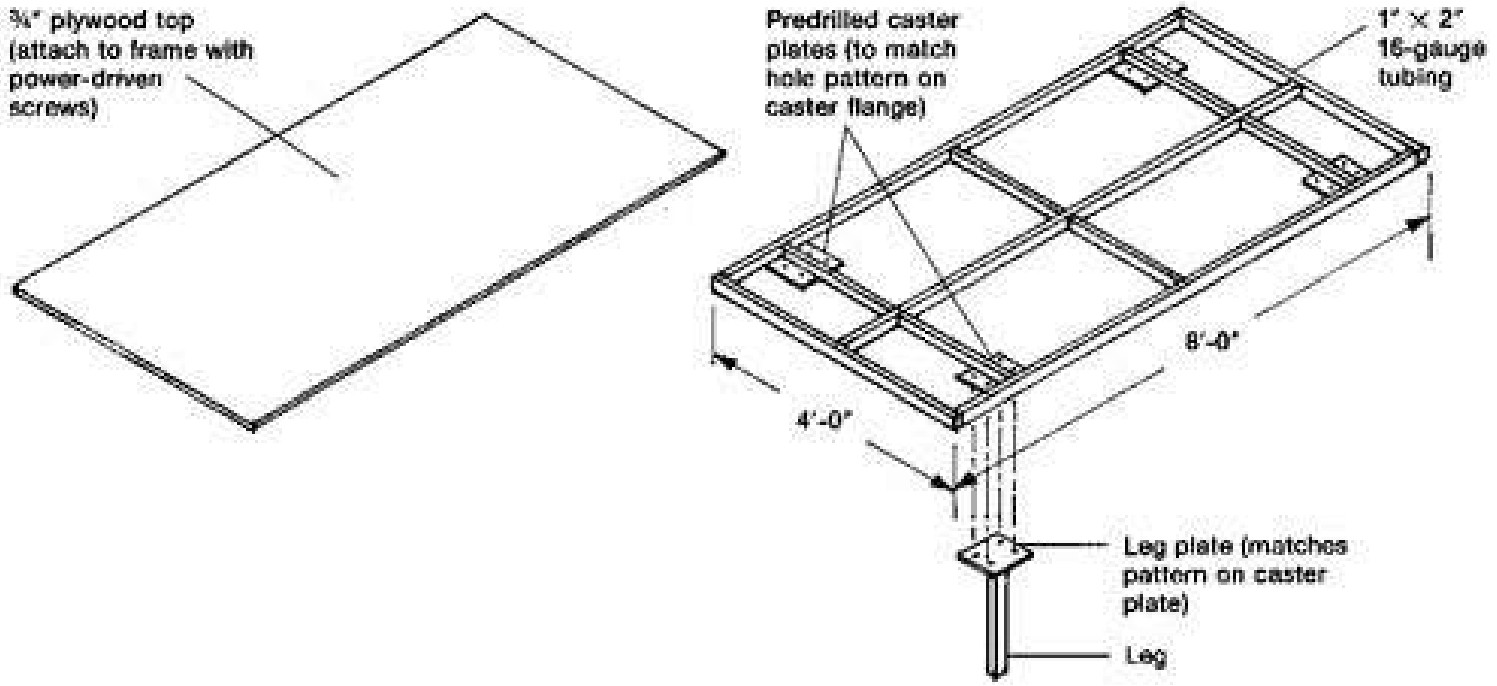
The easiest and least expensive stage platform to build

The legs are detachable, so its height can be easily varied



Rigid Teel-Tubing Platform

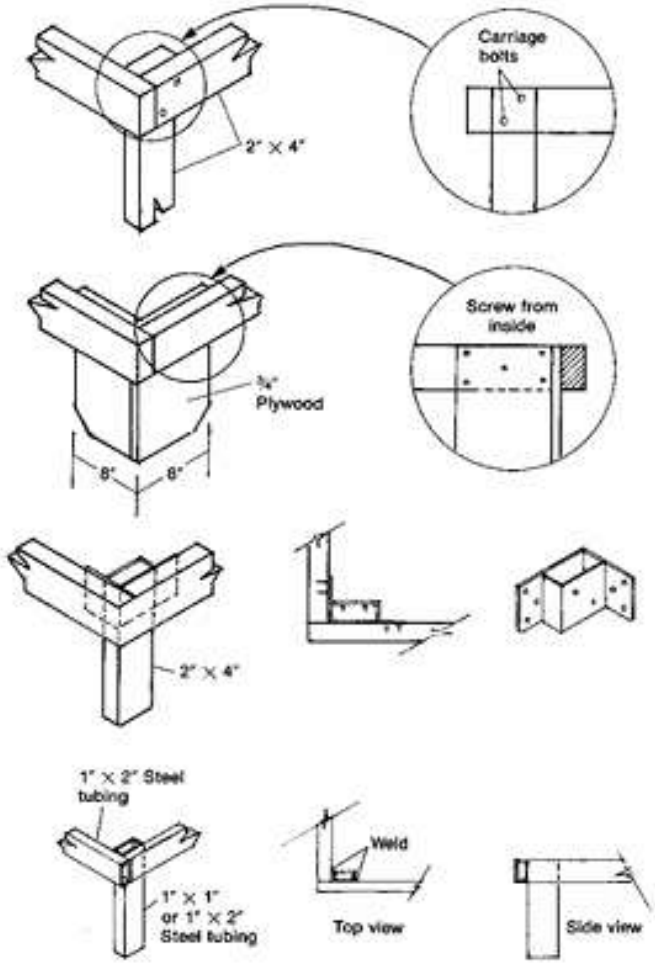
Steel tubing can also be used to fabricate rigid platforms



Rigid Platform Legs

Legs for rigid platforms can be fabricated from a variety of materials

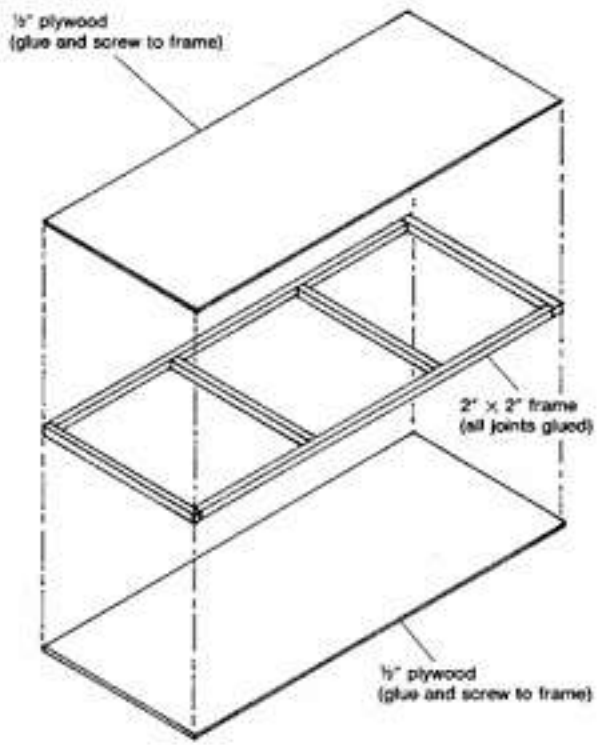
All platform legs over 18 inches tall should be braced, regardless of the material of which they are made



Stressed-Skin Platform

Stressed-skin construction involves securely gluing or screwing plywood "**skins**" to an internal framework that is nailed and glued

Because the skins can be "**laminated**" from two sheets of easily warped plywood, stressed-skin construction can be used for making curved platforms



Skin

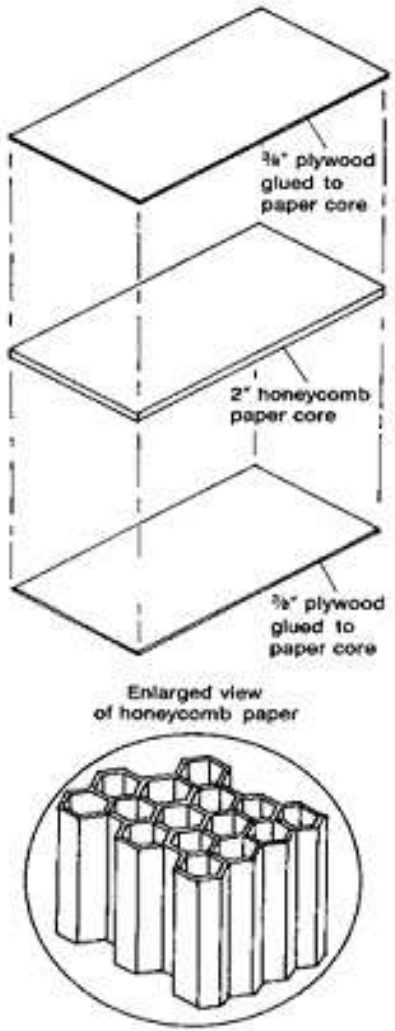
A plywood covering for the top or bottom of a platform

Laminate: To build up an object from several layers

Honeycomb-Paper Lamination

This lamination method is based on the principles used to fabricate the wings of supersonic aircraft

These platforms are made by sandwiching "honeycomb paper" between two sheets of plywood



Honeycomb paper

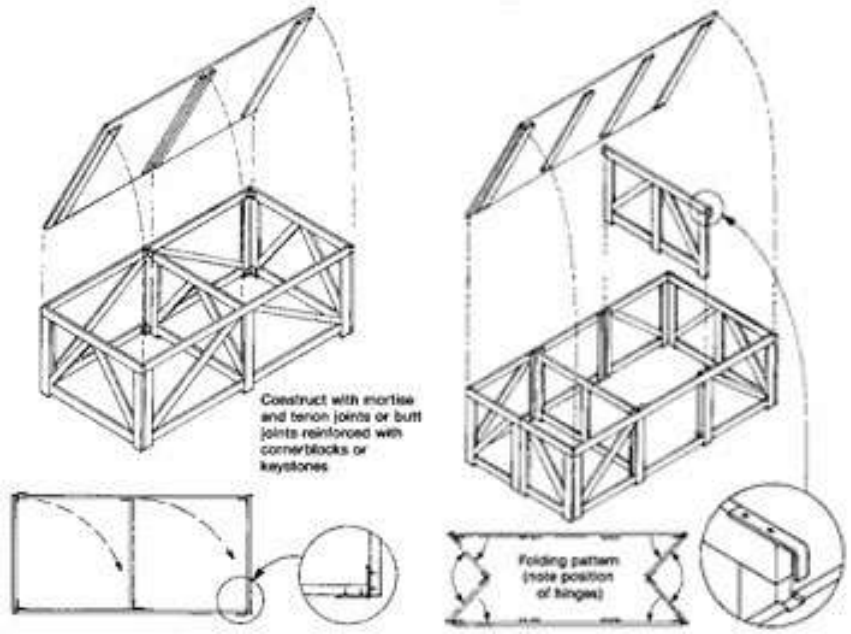
A manufactured paper product with a hexagonal structure similar to a honeycomb

Parallels

Another type of platforming that comes in two varieties. In both, the top is removable and the framework folds for compact storage

Standard parallel: this platform is hinged to fold like a giant parallelogram

Continental parallel: this platform is hinged differently than the standard. It folds into a more compact unit, but its center supports must be removed first

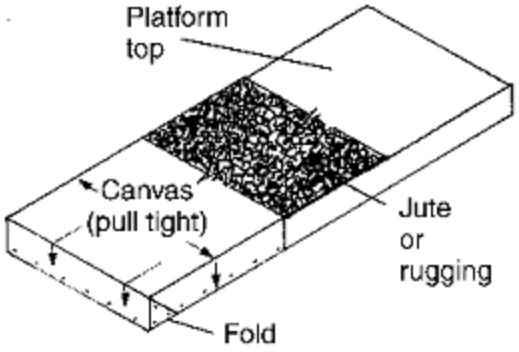


Platform and Parallel Tops

Tops are usually made from ¾-inch AD plywood or ⅝-inch waferboard

These materials are preferred because they are stronger, less likely to squeak, and take less time to construct

Padding can be used to help muffle noise

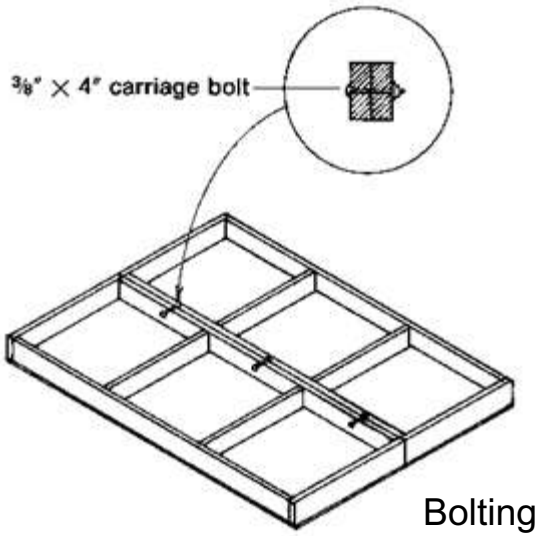


Glue and staple canvas to sides of platform

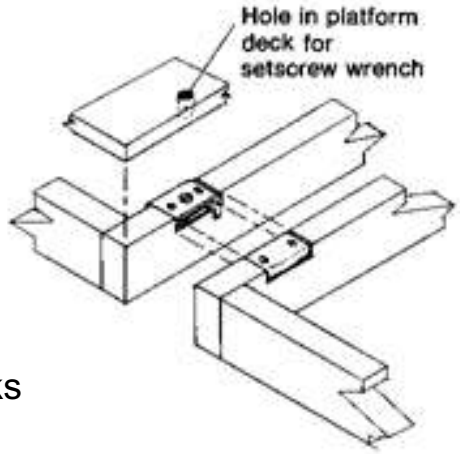
Connecting Platforms

Platforms must be connected to improve the lateral stability of the floor unit

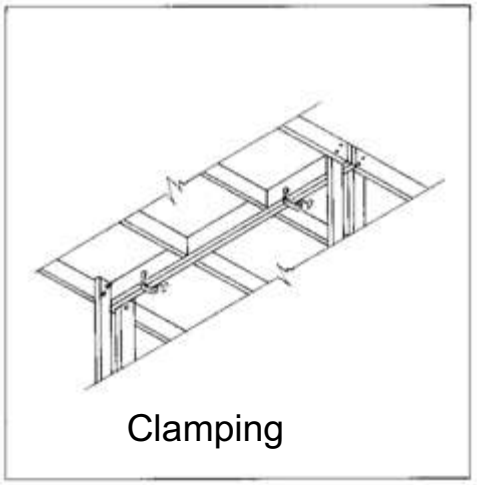
Platforms can be connected in a number of ways



Bolting



Casket Locks



Clamping

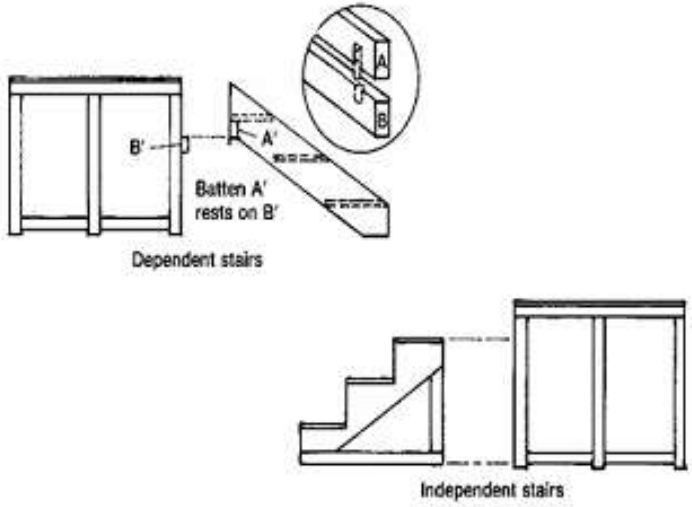
Stairs

Two basic types of stairs are used in scenic construction

Dependent—units that require support from some other element (such as a platform)

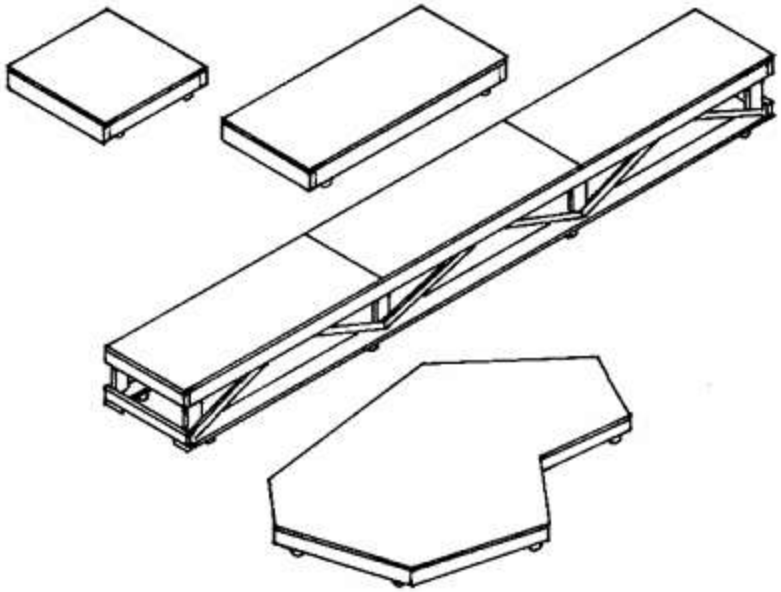
Independent—units that are self-supporting

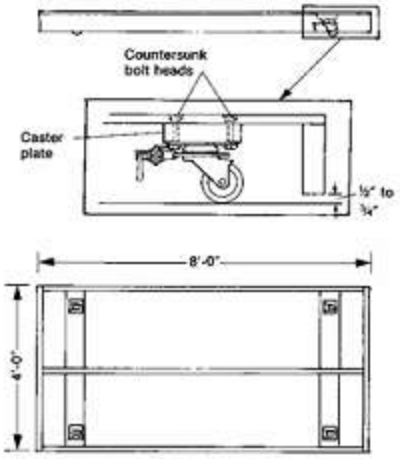
While the support method is the primary difference between the two types of stairs, the actual construction of the units is similar



Wagons

Wagons are usually rigid platforms that rest on casters instead of legs

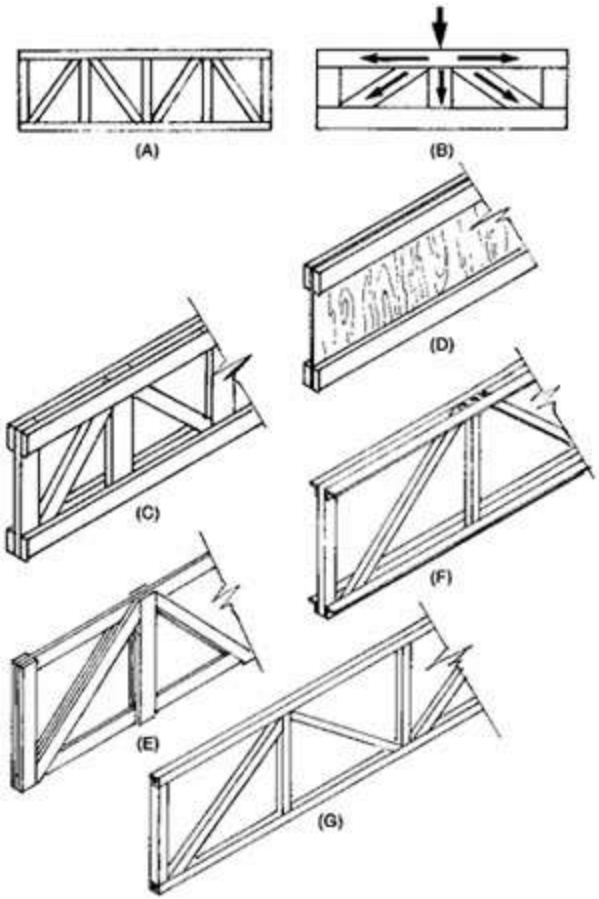




Trusses

Trusses are used when it is necessary to bridge a large span between supporting points

They can be wooden or welded-steel



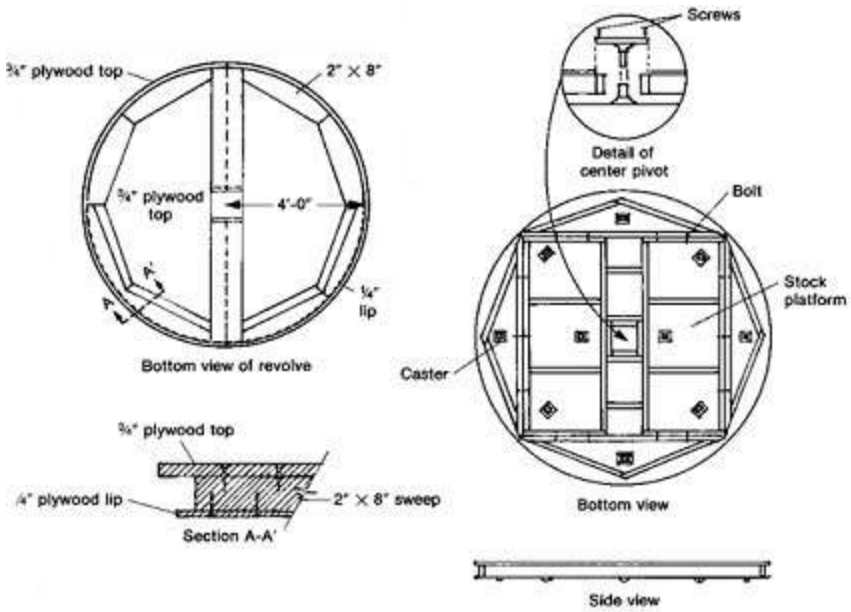
Revolves

Revolves are large, circular platforms that pivot on their central axis

Revolves can be built using any standard platform-construction technique

The rigid platform method seems to work best

Revolves are also called turntables

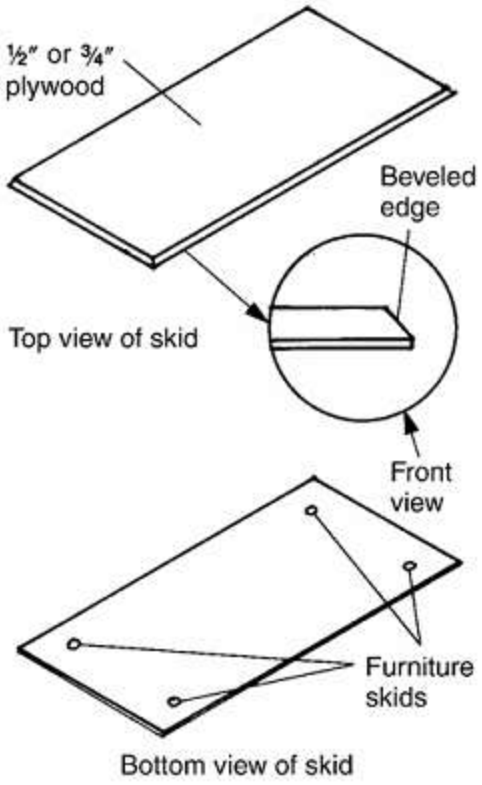


Skids

Skids are casterless substitutes for wagons

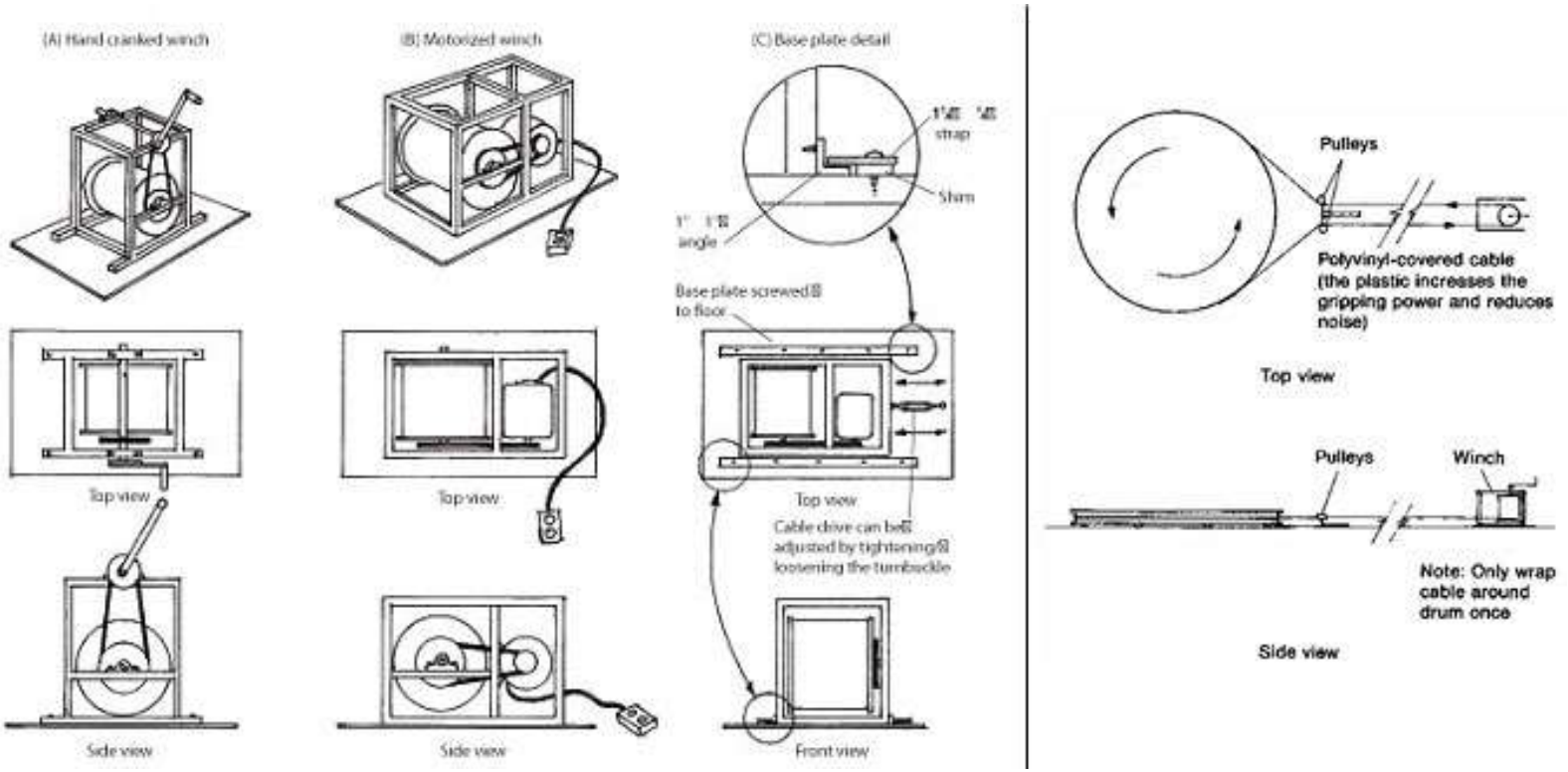
They are generally pieces of ½- or ¾-inch plywood that are skidded across the stage

They can be pushed or pulled using fishing line or propelled by a winch and cable system



Skids are used to shift lightweight scenery

Winch-Drive Systems

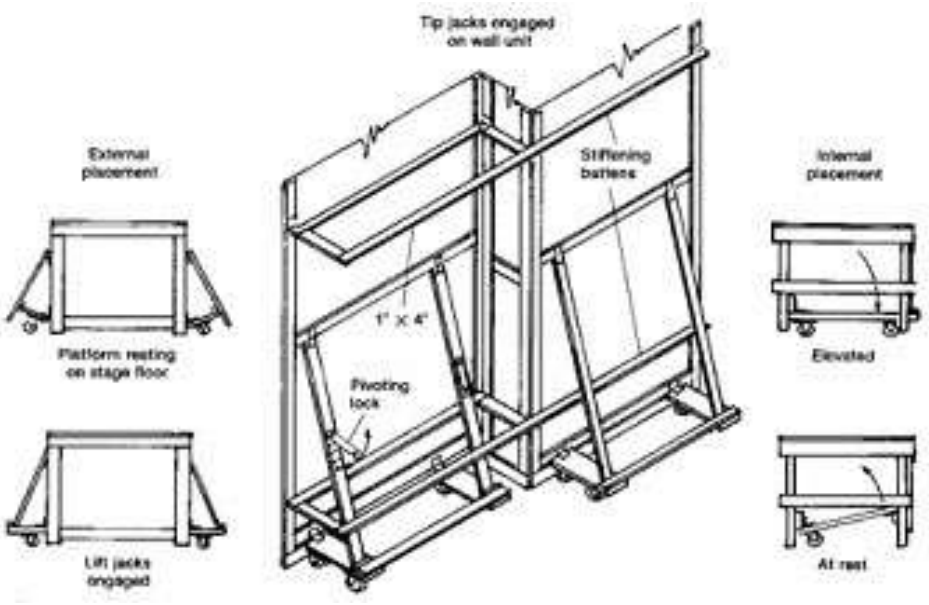


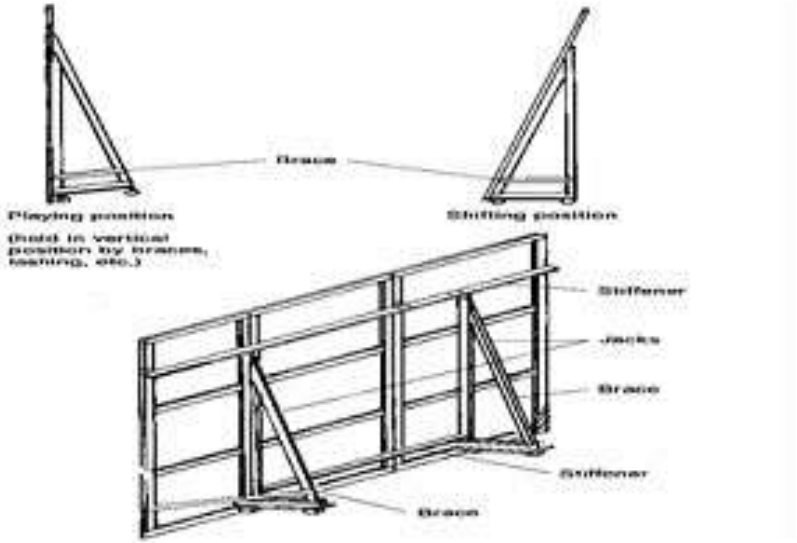
Platform-Anchoring Techniques

Wagons that hold three-dimensional scenery need to be anchored

Lift Jack

Tip Jack

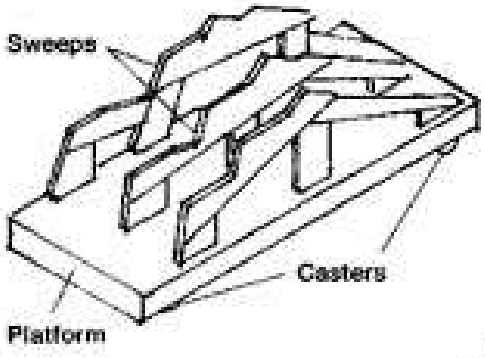


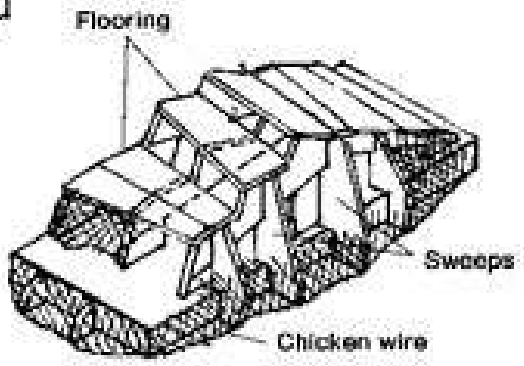


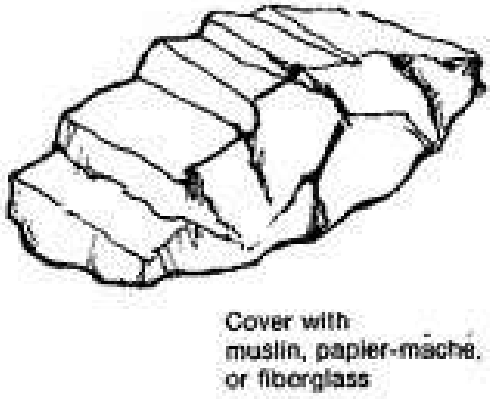
Rocks, Irregular Platforms, and 3-D Trees

All of these items are built in approximately the same manner

These items have surfaces that are not straight, square, or level







Rocks, Irregular Platforms, and 3-D Trees

The irregular quality is achieved with chicken wire and papier-mâché

Trees can also be constructed using burlap for the bark or foam