Many articles appear in the various model publications from time to time dealing with models which require, as past of their construction procedures, some method of holding a number of pasts in a certain relationship to each other white fastening them together. This is especially tsar if more than one similar sub-assembly is necessary. It is also a virtual necessity when many identical pasts are to be cut or shaped.

Such methods are usually dismissed lightly with phrases each as "using a template, cut ---------," as, "a simple jig to hold the pasts will be faced help.

I recently had occasion to build five ('Curtis folding seat wagons of the type used on the Hagenbeck-Wallace Circus in the early 1920's. Jigs and templates played a vital part in their construction and as work progressed, the thought occurred that a description of these aids and their application might generally be helpful to others.

Our newer members, especially, who may have begun their modeling experience in today's atmosphere where kits or ready-to-run versions of almost everything are available, may get some benefit.

Keep in mind that we are dealing with seat wagons only as an illustration. The techniques are appropriate to many situations of all kinds, whether stock car sides or arena panels. The idea is the thing. Applications are just a matter of putting the idea to task to make it accomplish a specific result.

Before attempting to design even the simplest jig, it is wise to get a clear image in one's mind of just what is wanted as an end product, and then what the best approach will be to reach this end. I often "build" a model four or five times mentally before starting actual construction, in order to determine which of several possible methods to construction will be best.

This is particularly true in the case of a model with many working parts, as a compromise is usually necessary to combine scale appearance, proper operation, and sufficient resistance to damage from handling. The method chosen w ill be reflected in any jigs as templates required.

As long as we're using the Curtis seat wagons to illustrate jig techniques, let's examine what information is available on the prototype, in order to better plan our construction.

C.M.B. Plan No .172 makes a logical starting point. There are also kits available in 1/4" and 1/8" scales, but as these are based on the same information as the C.M.B. plan, what follows will be applicable to both.

There are a number of photos, which accompany the C.M.B. drawing showing the prototype in various stages of set-up. Copies to of the original patent drawing and description are available to nominal cost from the Circus World Museum in Baraboo, WI. Other than these, there seems to be little else obtainable today, so we'll start with these.

Upon close scrutiny is becomes apparent that certain differences exist between the C.M.B. drawing, which is based on William Curtis' original patent design, and the photos of the prototype wagons as actually built and used. The most important difference is in the method of setting up the right hand, or upper, tiers of seats. For purposes of explanation, consider the seat sections to be lettered "A, B, C, D, and E" progressing upward from the ground. Sections "A" and "B" together form the lower, or left hand, sections of three rows each, "C" is the center section of two rows spanning the width of the wagon bed, while "D" and "E" are the upper, or right hand, sections also of three rows each.

The Curtis design called for sections "A" and "B" to unfold outward and down, which is followed in the models and which also appears so be the case with the prototype as depicted in the photos. Section "C", according to the patent, was to be assembled from individual stringers and seat planks, while the models and the C.M.B drawings indicate a completely assembled but portable unit. The photos do not make it clear which method was actually used, although I suspect the former.

The big difference shows up in sections "D" and "E". According to the patent design, the lower ends to the stringers in section "D" are pinned to the wagon to bed level, in order to be to the some height as the left side when the wagon is folded for transport. To set-up the pins are to be withdrawn, detaching section "D" completely from the wagon. It is then to be lifted by brute strength to a new position to the top of the right-hand side body supports, while the stringer ends are to be fitted between two angle irons and the pins reinserted. Section "E" meanwhile is unfolded outward and upward, where it is supported by conventional jacks.

Inasmuch as the whole idea of these wagons was to cut down on the time, effort and manpower

Curtis Seat Wagon
Jigs & Templates

DATE: 1922/28	SCALE: 1/2" = 1'	SCANNED & REVISED: 05/10/02	Pg 1 of 13

Circus Model Builders

Drawn By	DRAWING NUMBER
Wilfred A Boucher, Jr.	#0290

required to erect seating, it was inconceivable to me how three or four men could be expected to have the weight of an entire ten or fifteen foot section of assembled grandstand suddenly dropped on them to chest height by the withdrawal of the supporting pins, then to lift the session over their heads, insert the stringers between the angle irons, align a series of holes, and hold the whole thing steady enough for a fifth man to reinsert the pins!

When one considers that the average circus laborer was often some what unreliable and "unsteady" on his feet, the possibility of a man suddenly stumbling to otherwise dropping his share of the load could mean murderous consequences for his fellows, with crushing and crippling a very real possibility!

Thus I felt certain that session "D" must have been permanently attached to the upper pivot point, but how this was accomplished without having the right side of the folded wagon higher than the left kept eluding me. Inquiries to the L.C.W., the Circus World Museum, and individual modelers failed to produce a positive answer.

Continued study of the photos available finally suggested a solution, which I feel was probably followed, and which I used on my wagons. I cannot claim it to be the ultimate authentic answer, but I do feel it must be very close to the design actually used in the prototype.

The photos of the set-up wagons positively show six rows of seats extending out beyond the wagon side. Yet the end view photo of the wagon being unfolded very definitely shows the pivot point as being between the first and second rows to seats to the lower end of section "D"! Also note that a semi-circular cutout exists on one edge of the wagon end panel. If a compass point is placed on the pivot bolt in the stringer and the other point is placed to the extreme

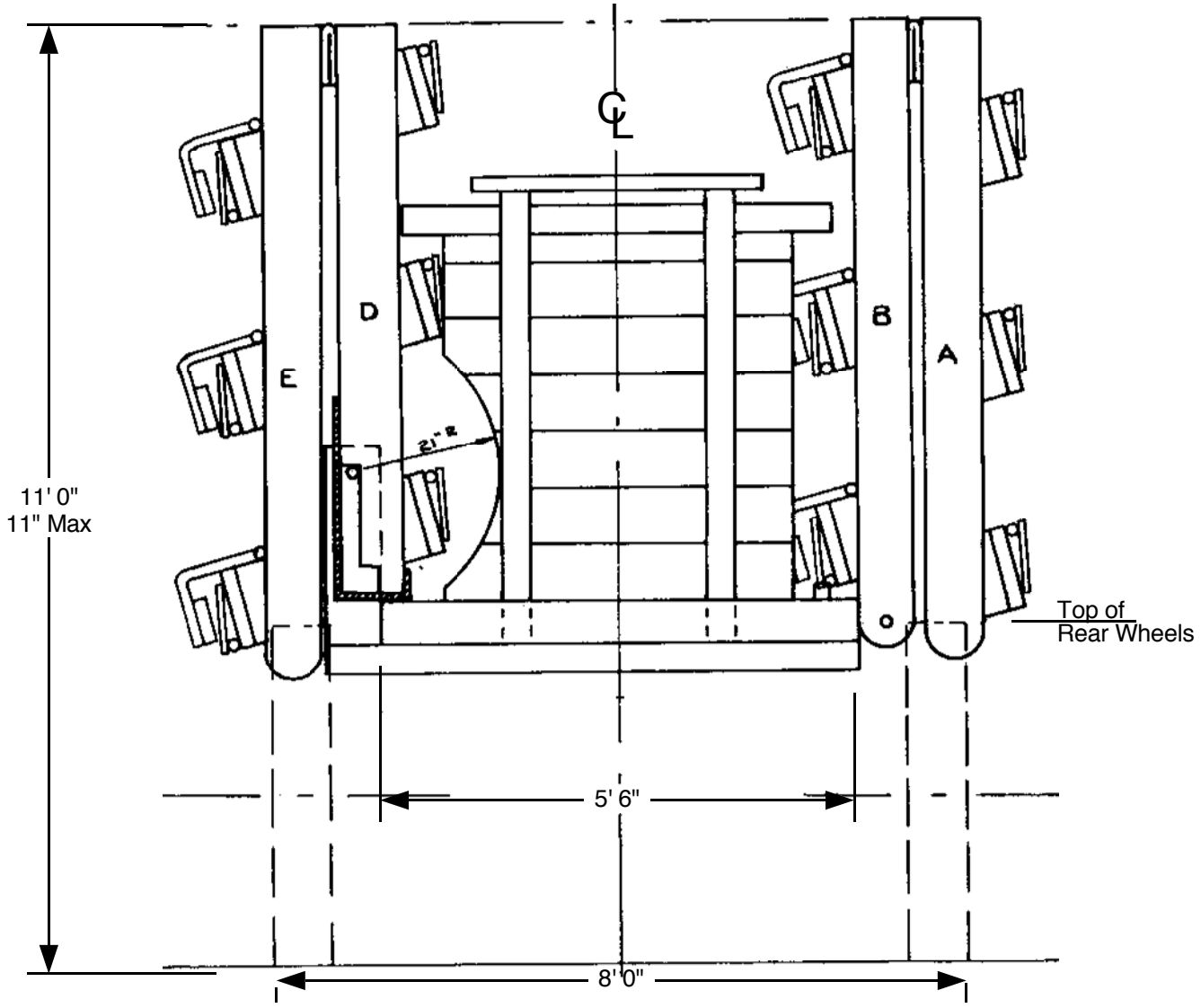
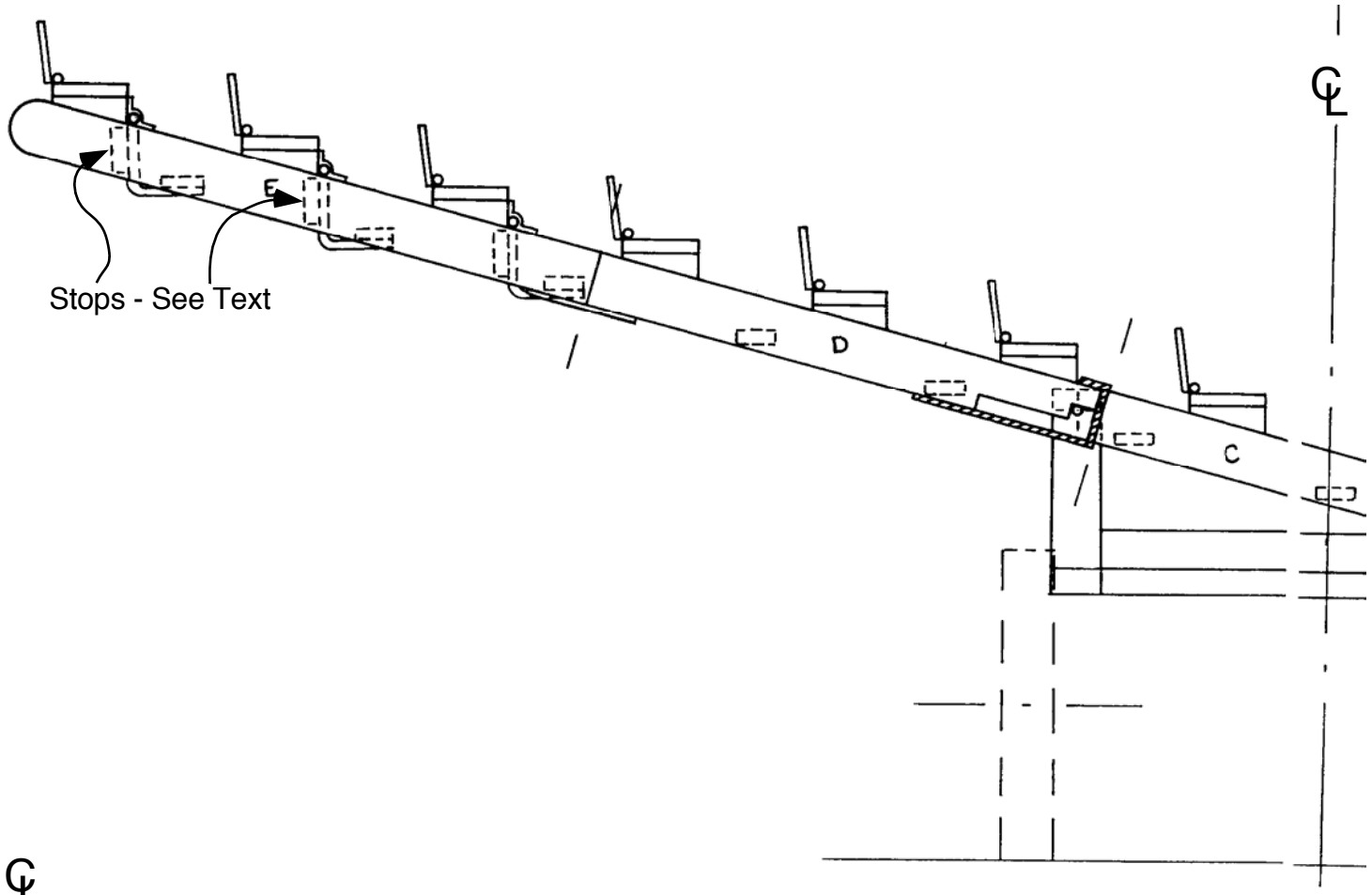


Fig. II
To Scale

Curtis Seat Wagon Jigs & Templates

Pg 2 of 13	SCALE: 1/2" = 1'	SCANNED & REVISED: 05/10/02	DRAWING NUMBER #0290



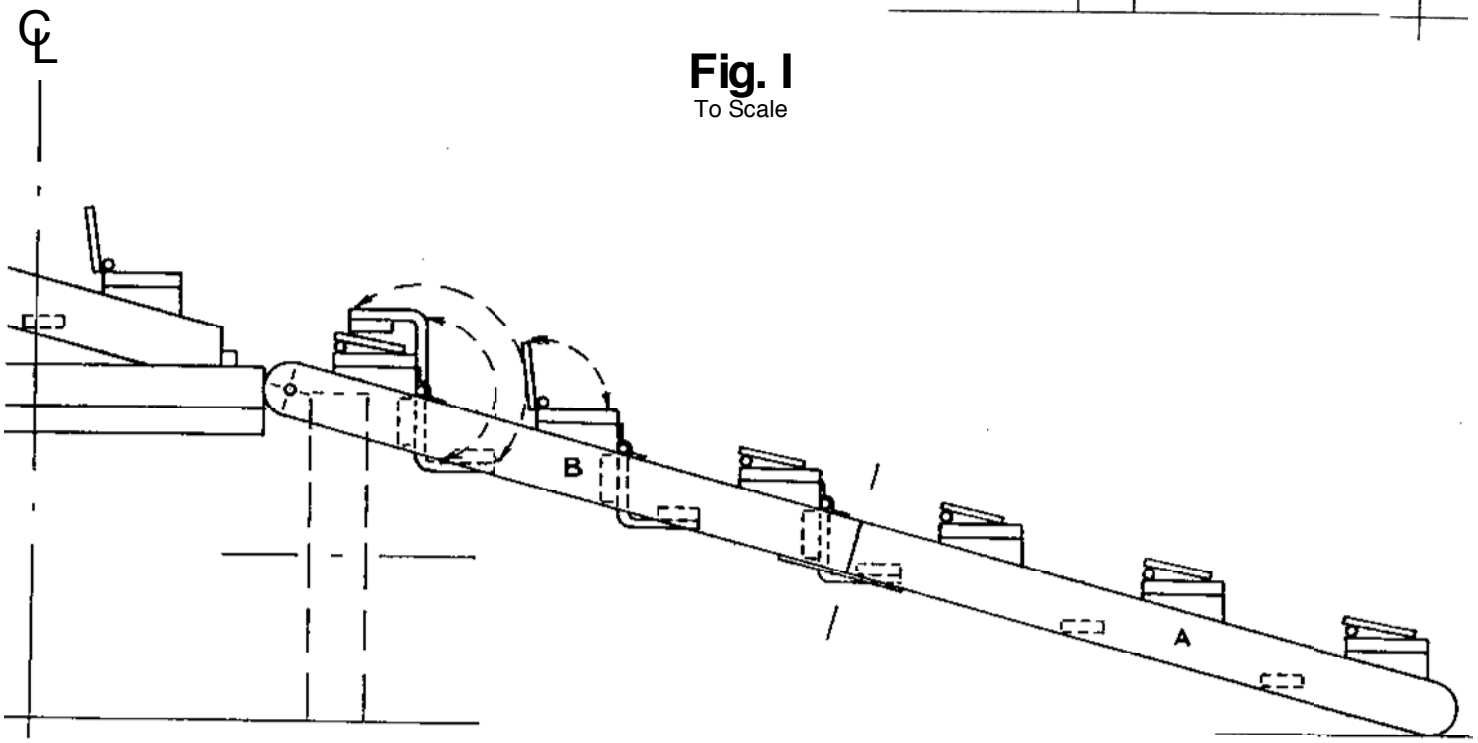


Fig. I
To Scale

Curtis Seat Wagon Jigs & Templates			
Pg 3 of 13	SCALE: 1/2" = 1'	SCANNED & REVISED: 05/10/02	DRAWING NUMBER **#0290**

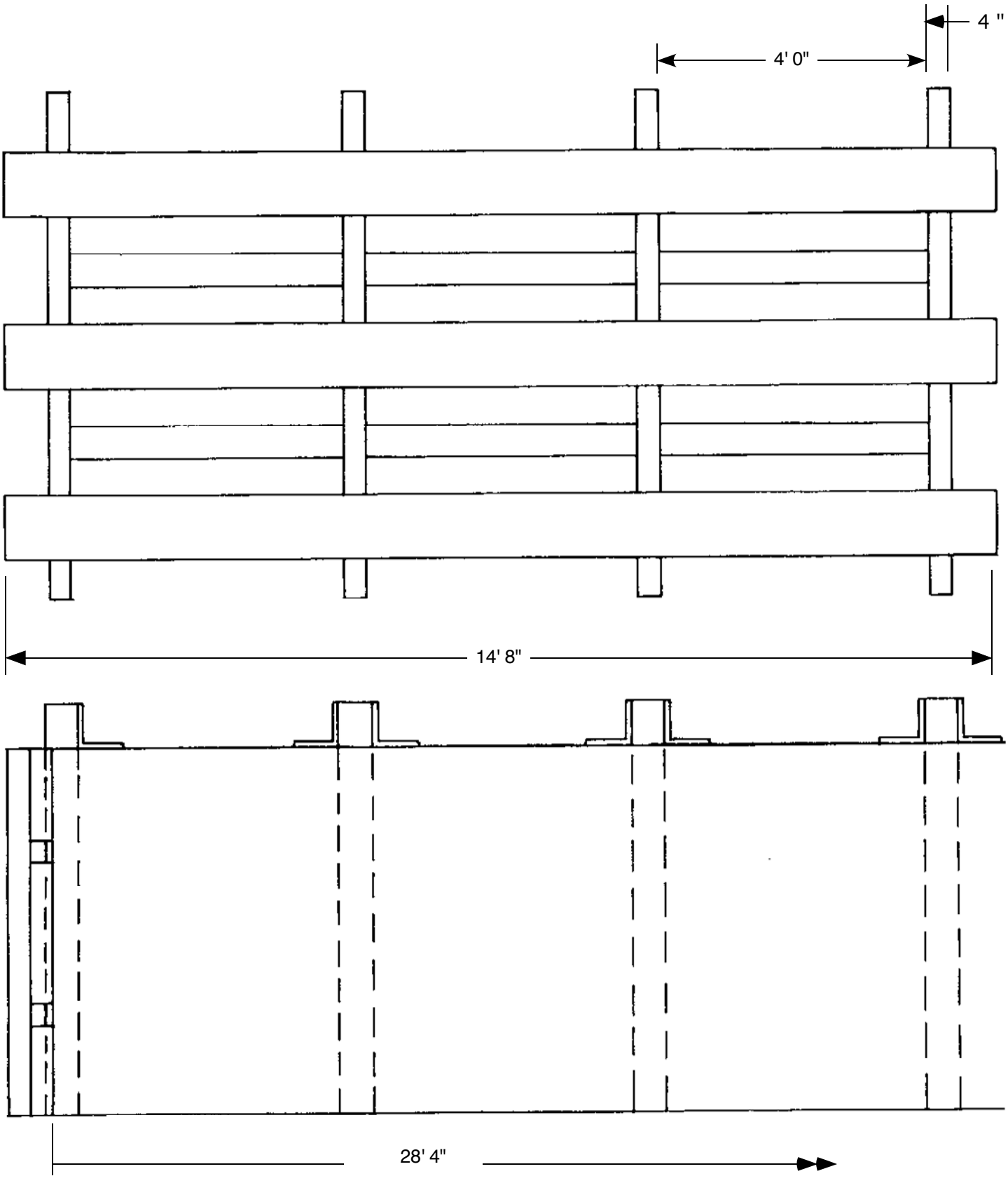


Fig. III
30' Wagon
To Scale

Curtis Seat Wagon
Jigs & Templates

Pg 4 of 13	SCALE: 1/2" = 1'	SCANNED & REVISED: 05/10/02	DRAWING NUMBER #0290

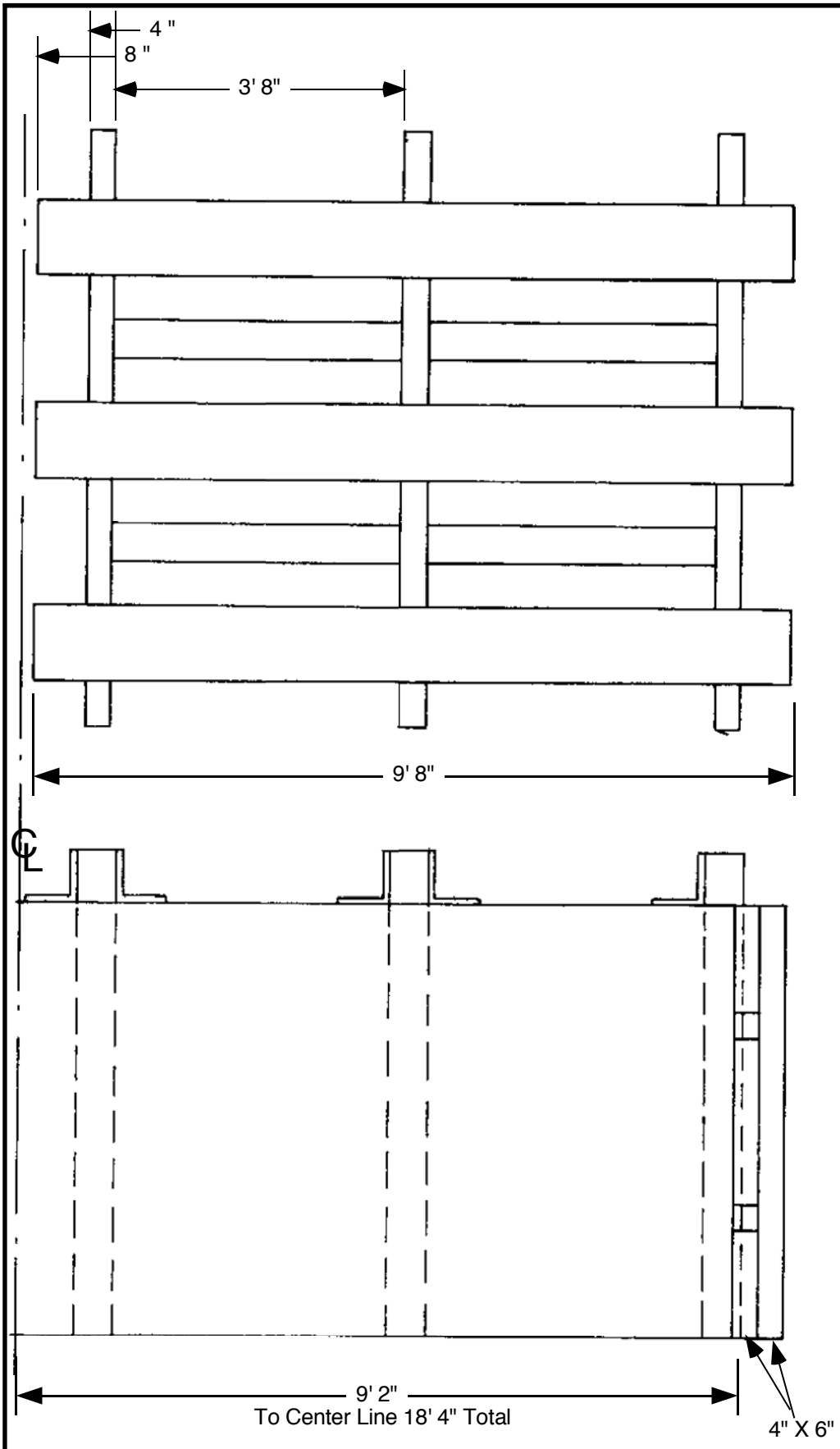


Fig. IIIA
20' Wagon
To Scale

lower end of the stringer, then swung in an arc, it will be found that the cut-out just clears the path taken by the lower end of the stringer as it swings inward and upward over the wagon bed

Now, if the pivot bolt were to pass, not through a hole in the stringer but through a slot, it would then be possible to have both sides of the wagon equal in height when folded. Yet, when sections "D" and "E" were opened and their respective jacks placed at an angle leaning toward the wagon, it would be a simple matter for the seat crew to shove in unison against the section and rock it up and back on the jacks until the slot stopped with the pivot bolt at the lower end, where any type of retainer would catch and hold the seats in position, completely beyond the wagon edge.

To fold up the seats, it would be necessary merely to shove upwards in unison against the bottom of section "D", and the natural slope of the stringers would cause the section to slide forward and down to the upper end of the slot, whence the sections could then he folded.

The weight of the sections would at all times rest on the pivot pin or bolt, and all danger to the crew would be eliminated, as it would now be impossible for the sections to fall or get out of control. The drawings show the principle of operation, including a "stepped" slot capped with strap-Iron (tin can stock on the model) to act as a retainer. The same end photo also shows the latches at the top of the end panels used to hold the folded sections in the vertical position. These are similar to the latches found on ordinary sliding doers, and ride up, over and down over a headed bolt projecting from the face of the stringers in sections "B" and "D".

Curtis Seat Wagon
Jigs & Templates

SCALE: 1/2" = 1'

SCANNED & REVISED: 05/10/02

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The other difference is the fact that the photos (and the C.M.B. plan) show individual folding seat backs hinged to the seat planks, whereas the patent drawing called for floor boards on which to erect separate chairs, and the commercial models have seat planks only, with separate fixed foot rests. Installing folding seat backs is easy enough (though monotonous when several wagons are bring built), but again a hidden problem arises when the wagons are folded.

Seat backs on sections "A" and "D" hang downward when the wagon is folded, thus staying closed flat against the seat planks. However, the backs on sections "B" and "E" hang "upward", hence they flop open when the wagon is folded!

Looking again at the end view photo of the prototype bring unfolded, as well as the photo showing the wagons as loaded aboard the train, it appears that planks supported by iron brackets are mounted outside (or on top, if you will) of the folded seat backs, thus holding them in the closed position, Somewhere I seen to recall reading that the footboards on these sections could he folded into this position, although to do so would necessitate a break where they crossed the stringers, whereas the "loaded on train" photo show a solid continuous plank the full width of the section.

I have been unable to make a positive determination as to how the prototypes were finally built in this respect. Therefore for model purposes, I have made the footboards hinged on sections "B" and "E", with appropriate stops fastened to the stringers to hold them in the proper position when opened. When folding the wagon, seat backs are first folded forward and down, footboards folded upward and back, then the sections themselves jack-knifed and latched in place

Again I do not and cannot offer the foregoing as being 100% correct with regard to the original H-W wagons in every respect, but it is as close as I have been able to come half a century after those originals disappeared. I feel my method would, if built in prototype, be workable, and it certainly makes for easier set-up and teardown in model form!

Building the Model

Starting with C.M.B. Plan No. 172. I checked it with a scale rule, and determined that some dimensional changes would have to be made if the finished model were to fit between the gunwales of the railroad flatcars and also clear tunnels and bridges on the model railroad layout. As is so often the case when one dimension is changed, a chain reaction begins involving all the others, so I set the following arbitrary limits fee the finished wagons: The absolute maximum width over the wheel rims could not exceed eight feet, preferably a few scale inches less. Overall width of the folded wagons must not exceed the outside width of the flat cars to preclude fouling trackside structures, and maximum height from the ground to the highest point of the folded wagon could not exceed 11 feet.

Lengthwise. I settled on a maximum of 29'-10" for 30-foot wagons, and 19'-10“ for the 20-footers. This allows a gap of a few scale inches between wagons when loaded aboard the train, which prevents chafing and permits individual wagons to be lifted elf the flats without snagging adjacent wagons.

Total length of the seat stringers when set up was taken from the C.M.B. plan as being approximately 34'-8". This length, restricted by the above-mentioned limitations and divided proportionately in accordance with the prototype photos, resulted in the design shown in the drawings.

I did not show the running gear to other underbody features in these drawings, as this it adequately covered in Plan No. 172. We will concentrate on the upper works for illustrative purposes.

What I call a "Basic Template" was made from tin can metal to insure uniform length when cutting stripwood. **See Fig. 1.** If you make it long enough originally to cut the longest pieces of wood first, you can just trim it progressively shorter as you cut the shorter pieces. Thus only one such template is necessary.

I started with the seat sections, because the wagon body could then be built to fit the required seating. I cut all the stringers to full length, rounding and sanding the ends uniformly. Using the above basic template, I also cut seat supports from square basswood strip. I didn't bevel them to this paint; I just chopped off some five hundred pieces.

A simple drawing of the stringer was made full size on plain paper. Several photocopies were made, and these copies were then fastened to a smooth sheet of corrugated cardboard with rubber cement and covered with waxed paper. Small pins were pushed in at the locations shown. Thus we have our first Jig.

Simply slip a stringer over the drawing, sliding it down against the end slop pin. Pick up the seat supports on the point of an Exacto knife, touch with cement, and press them against the top of the stringer and against the pin as shown.

With five or six photocopies, it is as shown, not necessary in wait for glue to dry completely. By the

time you've loaded and glued the sixth stringer, the first one is dry enough to lift off the drawing. Thus you can keep working till all your stringers are complete.

The location of the pins is what determines the spacing between seat supports, so a pair of dividers can be used to step off this spacing. If the drawings are lined up and the pins placed with care, you'll he able to turn out any number of stringers, all identical. Let the glue dry, then we'll proceed to beveling. **See Fig. 2.**

Fig. 3 shows the template used to get uniform support blocks. The 15-degree angle insures level seat planks. Make the bends in the "ears" sharp, and file the edges smooth. Chop straight down with your razor blade to get straight cuts.

Move your template from support to support, cutting each one with a sharp blade, and you'll wind up with as many matched stringers as you need. Sand them smooth on both sides, and we'll proceed to cut them into sections.

I suppose each stringer could be cut into five sections using a "basic" template, but I found it quicker to bundle them all together (include a couple of extras; we'll see why later), even up the ends, then cut them with a Zona saw or a jeweler's saw in a miter box. Smooth up the cut ends, then drop them in a muffin tin, an egg carton, or some other divided box, because you don't want to mix up the various

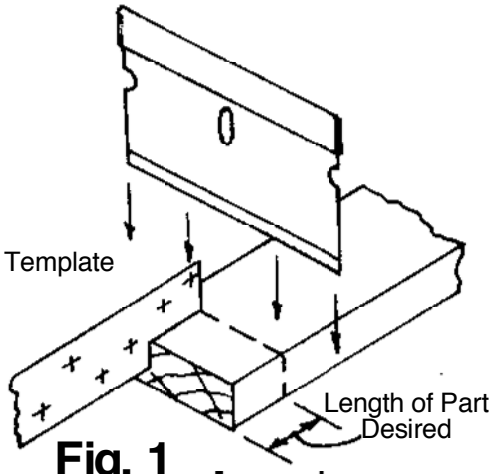

Fig. 1
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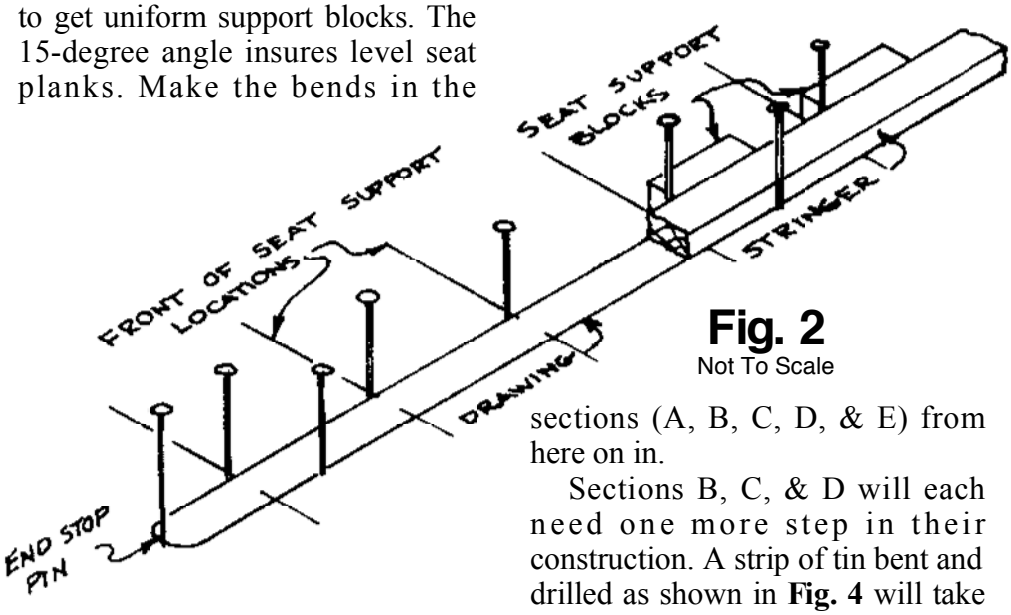

Fig. 2
Not To Scale

sections (A, B, C, D, & E) from here on in.

Sections B, C, & D will each need one more step in their construction. A strip of tin bent and drilled as shown in **Fig. 4** will take care of the pivot hole at the top of section "B". Slip the stringer into the pocket formed by the three folded sides, and drill through the hole using your pin vise and a suitable sized drill.

Section "C" must have its lower end shaped to rest on the wagon bed. **Fig. 5** shows the template for this.

Section "D" is the most critical, as this must slide smoothly on the assembled wagon. **Fig. 6** gives this idea.

Once the ends are shaped, put the stringers away and we'll get on with the nest step.

Using your basic template cut the seat planks to the length shown in **Fig. III;** similarly cut your footrest boards. These latter will be cemented between the stringers for sections A, C, & D. For sections B & E the footboards will swing, so they should be about four scale inches shorter than the others to allow clearance at the ends. I would not recommend fitting any closer than 1/32" (actual) on small scales up to and including 1/4" scale. Maybe 1/16" (actual) will be sufficient on anything larger. Again, keep all these parts separated to avoid confusion at assembly.

We can now begin so assemble some of this pile of lumber. I made several copies of **Fig. 7** (2 for 30 foot. wagon and 2 for a 20 footer) and mounted them on a smooth

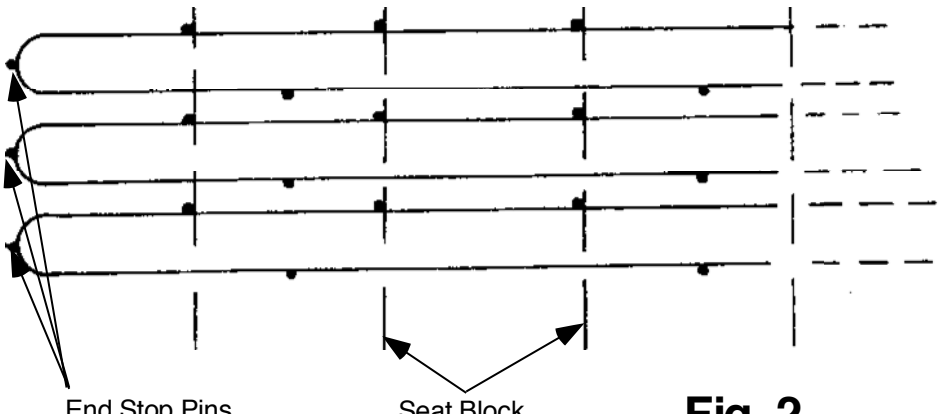

Fig. 2
Not To Scale

Curtis Seat Wagon Jigs & Templates			
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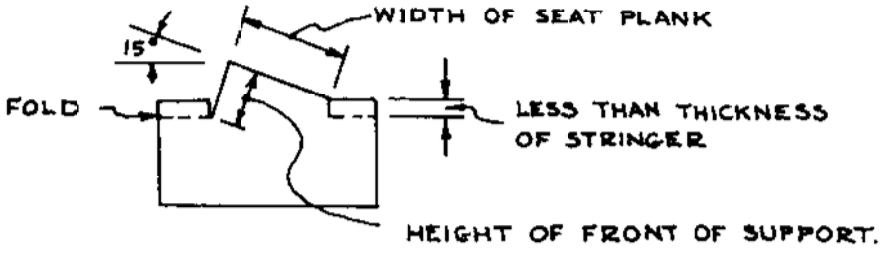
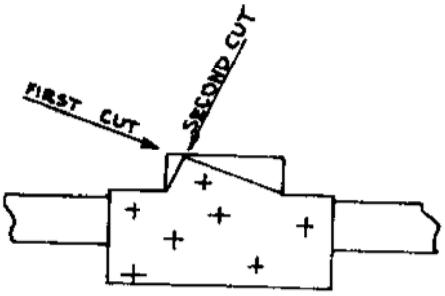




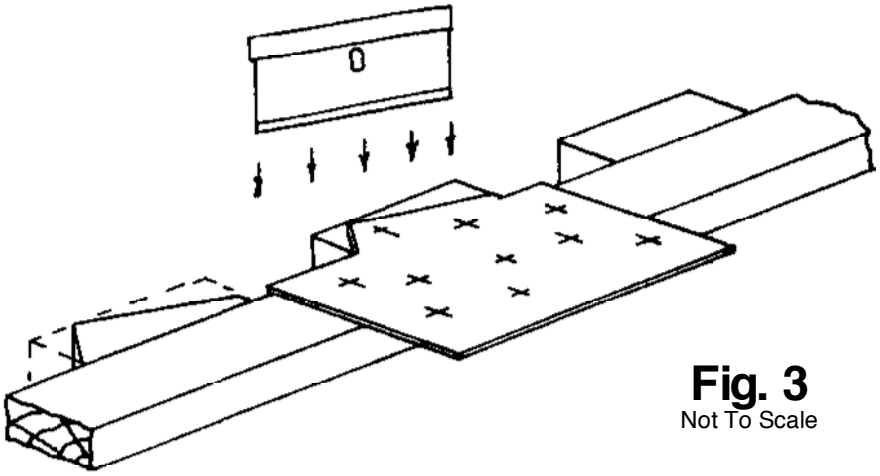


Fig. 3
Not To Scale

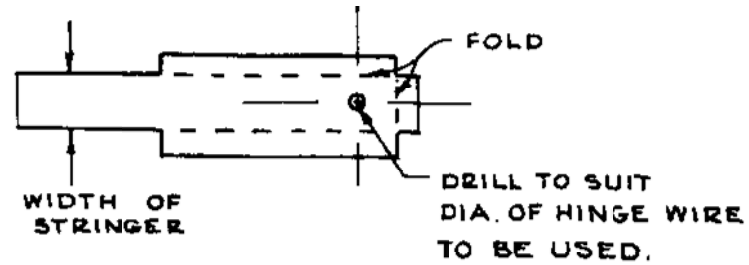
wooden board with rubber cement. We can proceed with what will be the most complicated jig of the whole project.

What we've got to have is something that will hold all these seat planks, stringers, and footboards in proper relation to each other for gluing, allow the assembled unit to be lifted out and still be sure we've not glued anything to the jig itself! There are probably several ways that this can be done, and the scale of the model being built may have some bearing on this. **Fig. 7** is what worked best for me.

Stringer locators should not extend more than half the depth of the stringer. (My stringers are 4X8, so my locators were 4X4). Seat plank locators, as well as the seat plank end stop obviously must be high enough for the seat planks to fetch up against them. These locators are cemented directly to the drawing. The lower stringer stop is moveable because the distance from the front edge of the lowest seat plank to the lower end of the various stringer sections differs between sections. By pinning this top to the drawing it can be moved to accommodate all the sections involved.

The remaining item is the footboard locators. I was able to get away with small rectangles of Northeastern milled basswood clapboard siding material to used for model buildings. However, you'll probably have to come up with an equivalent to fit your scale. What you'll need it something to hold the footboards of a 15 degree tilt. Such locators can be built of scrap stripwood. Make them in one strip then chop off as many as you'll need. These are glued to the paper drawing.

To this point I realized that the joints between the footboards and the stringers were right down to the paper surface, where any excess glue would bind up the whole thing. So I glued a couple of pieces of 1/16 sq. stripwood across the drawing as shown in **Fig. 7** to hold the stringers up off of the paper, and increased the height of the various locators by 1/16" to compensate. Now the assembly jig is complete. Although the above sounds complicated, when you consider that 50 (count them-- 50!) sections are needed to equip five wagons, you'll see that trying to build these sections in any other way would be hopeless! I was able to assemble all 50 sections in less



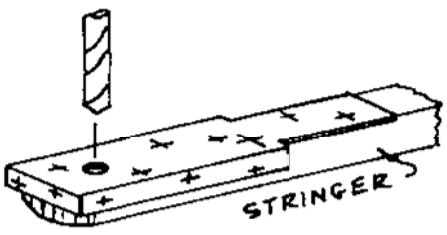


Fig. 4
Not To Scale

Curtis Seat Wagon Jigs & Templates			
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than four hours with this jig!

To use the jig, insert the required number of stringers for section "A" (or whichever section you're working with) between the stringer locators, snug against the bottom stringer slop. Put a drop of cement on the top of the seat supports, and then place three seat planks against the plank locators, snug against the left seat plank stop. Repeat in each of the other copies of the jig. After three or four, the first assembly will have set op enough to cement the footboards in place. Do this in all copies. Again, by now the first assembly may be lifted out of the jig and new stringers inserted. Working steadily, all assemblies may be completed for all sections "A" through "E". Do not put footboards in sections "B" and "E".

With all seat sections completed, the movable footboards ore next. There are a large number of wire supports needed here. Some will be right handed, some left handed, the remainder double ended.

A look to **Fig. 8** shows the general idea of how the seat backs and movable footboards are arranged. The critical dimension here is apparent from **Fig. I.** When installed, the footboard must clear the back edge of the next lower seat plank as it swings upward. Hence bending the wire supports requires close uniformity. I used a jig of scrap brass for this. Fortunately, I was able so utilize standard paper staples so much of the bending was already done.

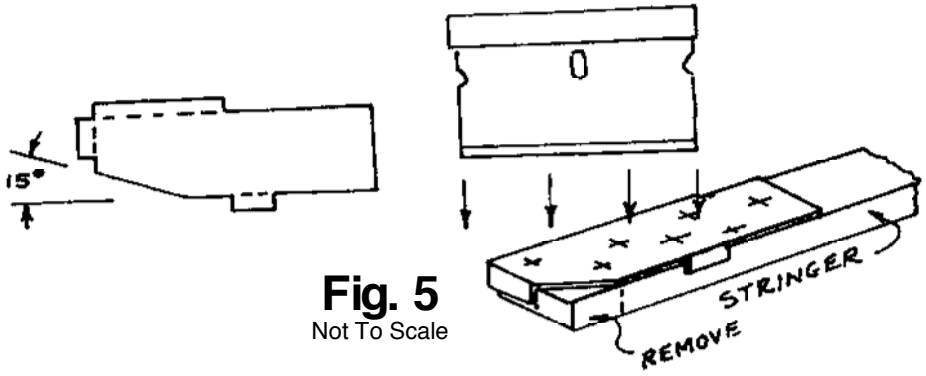


Fig. 5
Not To Scale

If your scale precludes this, the jig can be modified accordingly. Vary the thickness of the stringer to insure that the footboard will overlap the support and still leave clearance at the end. If your scrap box doesn't have a piece thick enough, sweat-solder several thinner pieces together to get the required thickness. (Those working in larger scales may prefer a different hinge arrangement anyway as being more prototypical.)

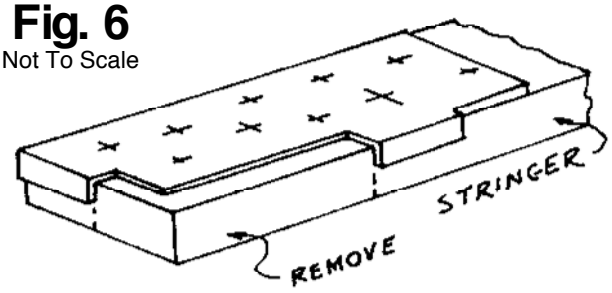
The distance from the bottom of the groove to the back of the pin determines the dimension from the hinge point to the under surface of the footboard. This is what can cause interference with the adjacent seat plank as outlined above.

The best way to build this jig is by trial and error. Drill the plate, insert (either press fit or solder) the piano wire pin further in from the edge then you'll eventually need, then cut the groove with a jeweler's saw a few strokes to a time. Try bending sample pieces of wire after every few strokes until the bottom of the groove is just close enough to the pin to preside legs of proper equal length, with the "hinge' portion in the center. As shown, I use a wire staple has one leg hooked under the pin, the staple is then bent through the groove and down the other side of the jig. The other staple leg should come just below the pin on the back side of the jig. Right and left supports are made in this same jig, but the staple is only bent to a right angle through the groove, and then cut off.

Assembling these movable footboards is perhaps the most tedious part of the project. I inserted the extra stringer sections referred to earlier in place in the seat assembly jig. The wire supports were placed over the stringers and the footboards cemented to the supports using Walther's "Goo". Any kind of good metal-to-wood cement should work here, such as Pliobond, Epoxy or what-have-you. (Since building my wagons, I've read where wood can be coated with white glue to make a non-porous surface, to which metal can then be cemented with Cyanoacrylate cement. This sounds promising, as ACC dries in seconds, and the while glue could be brushed on an entire length of footboard stock, before cutting individual boards to length.)

Try to maintain your 1/32"

Fig. 6
Not To Scale



Curtis Seat Wagon
Jigs & Templates

SCALE: 1/2" = 1'

SCANNED & REVISED: 05/10/02

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clearance between the stringer and the end of the footboard. Do not get any cement between these two parts else you won't be able to remove the footboards from the jig! After the "Goo" is dry, remove the assembly, and reinforcing the joints by flowing a coat of "Duco" or "Ambroid" cement over the joints on the under side of the footboards. When dry the assemblies can be inserted in seat section assemblies "B" and "D". I used heavy band paper for hinges, gluing in place with while glue, which doesn't stick to metal.

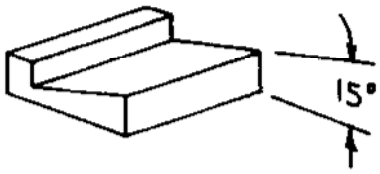
A reinforcing coat of Duco was applied to the top of the paper hinges to strengthen them and present their tearing. – If you're using shim brass instead of paper you can use "Goo" In fasten them and dispense with the reinforcing coat) If you've measured carefully, the footboards should swing forward and upward. Small scraps of 3/64" square stripwood cemented to the sides of the stringers under the front edge of the seat planks keep the footboards from dropping down too far. A strip of tinplate or sheet brass bent and cemented as shown in **Fig. 10,** will serve to complete the lower ends of the stringers on section "D".

All that's left now are the seat backs. Uniformity of size, shape, and spacing is doubly important hero, not only from the point of successful operation, but also regarding the appearance of the unfolded set up wagon. Like a row of crooked ladder rung grab irons, irregularities in supposedly uniform seats just plain took like heck! **Fig. 11** shows a solution to this. Again a jig consisting of a stop strip with spacers equal in width to the spacing between seat bucks was affixed to a smooth board. The distance between adjacent spacers is equal to the width of the seatbacks. The distance "x" determines the height of the seatback, and should be just a hair loss than the width of the seat planks.

To use this jig, strips of seatback material cot to proper width (I used cardboard, although sheet metal probably would have been better) are placed between the spacers, and wires are cemented with "Goo" across them (for sheet metal, fasten with solder). Let the "Goo" dry, then run a bead of Duco or Ambroid over the wires to the seat backs to reinforce the joint. When dry, lift out the assembly and using the wires themselves us a straight edge, cut across the assembly with a sharp razor (or tin snips if using metal). Hold the assembly down flat with a ruler or a book or something similar, and use light pressure on the cutting blade. Heavy cutting pressure will tear the strips and break the glued joints. Maybe sharp scissors would work better here. Reinforce the glued joint again from the bottom edge then bevel the two top corners of each seat back to the shape shown. Again, use paper or shim brass strips to mount the rows of seat backs to the planks. **See Fig. 8.**

Once all the seatbacks are mounted to the seat sections, and you're satisfied that both backs and foot rests swing the way they should, the section, can be joined -- "A" and "B" together, and "D" and "E" together. I've seen both paper and thin leather recommended for the hinges, but because paper would tear and leather was too thick, I settled for lengths of nylon sewing thread.

Cement them to the undersides of the stringers of one section, reinforcing with a layer of cement applied over both thread and wood to make a good bond. Then butt the mating section against the first and cement the loose ends of the



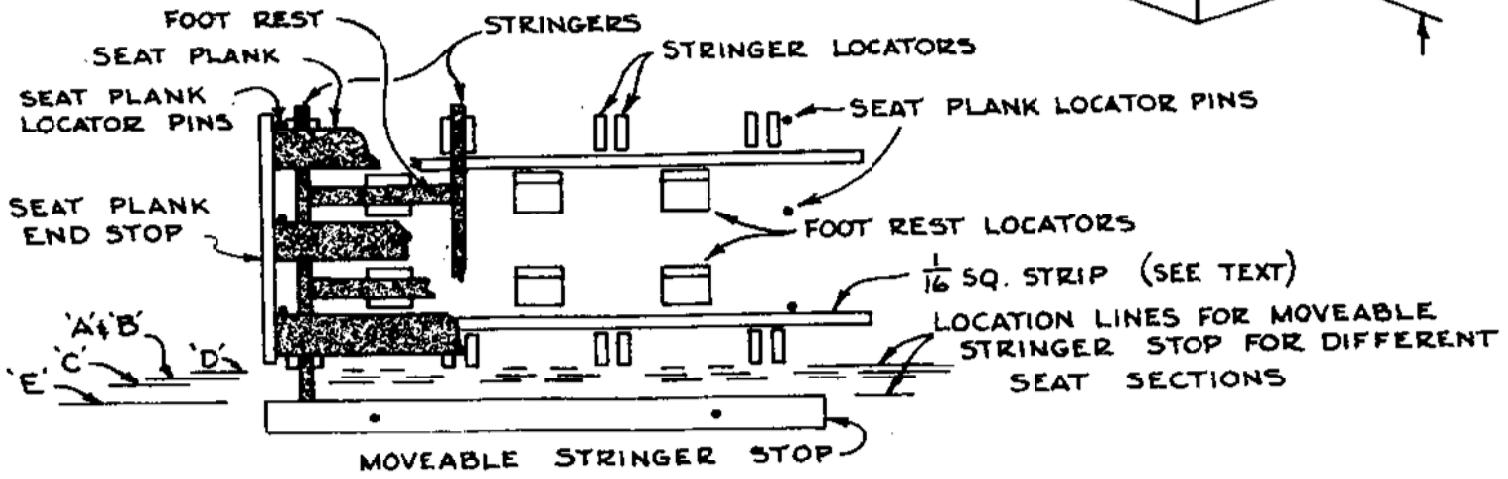


Fig. 7
Not To Scale

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threads to this. Make sure that the cement comes up to the rods of the stringers without actually crossing the joint to the mating sections. If the pieces of thread are to least 3/4" to 1" long, a strong but flexible hinge will result; one that will allow the stringers to fold down on themselves very nicely.

At this point I painted all 50-seat sections with three coats of model airplane dope. I prefer dope because it dries fast, leaves a silky-smooth not-quite-flat finish, and shrinks down around parts and corners as it drier to minimize paint buildup. After each coat I slipped a razor blade between the seat planks and the seat back wires to keep the backs operable.

The wagon bodies themselves are pretty much routine, being simply flat beds with more or less

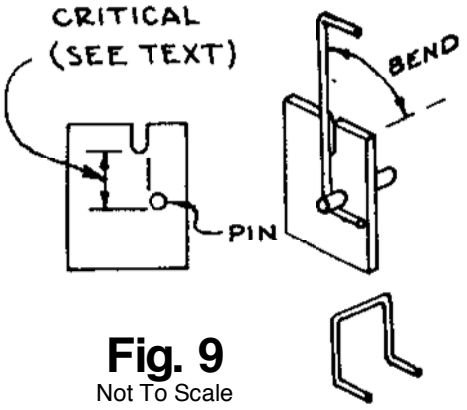

Fig. 9
Not To Scale

standard front and rear running gear, tool boxes, doubletrees, etc. In addition, the 30-foot wagons are braced with a pair to truss rods to prevent sagging in the middle. Just be certain that the rear axle is located such that no conflict occurs with the seat sections in the folded position. **Fig. 12** shows how square stripwood is used to create the stake pockets for holding the end panels in place. I found this easier than trying to drill holes and then filing them square.

The seat sections are best mounted to the wagon bed before

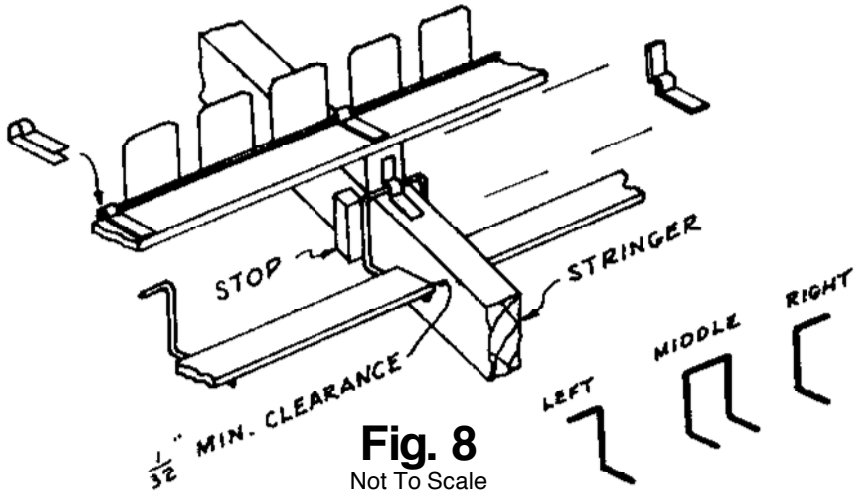

Fig. 8
Not To Scale

any other details, in order to be certain of clearances. Left side sections A-B are mounted using Northeastern eye-pins, or in the ease to commercial hits, with the eye-pins supplied in the kits.

The right-hand sections D-E are mounted between lengths of metal angle stock. I found some 1/8" brass angle to my hobby shop, which should be OK for 1/4" scale. Larger sizes are stocked for larger' scales, but HO builders may have to bend their own angle from tin can stock. (Note: Modern hobby shops carry smaller angle stock from “Special Shapes”) **Fig. 13** shows the relationship of the parts, while **Fig. 13A** shows the jig I used to drill the holes. The depth to the slot in the jig should be about equal to the length of the angle posts, while the distances "a" and “b" locate the mounting pin and hinge rod holes, respectively. (You'll need a right and left hand angle post for each point of stringer attachment. A 30-foot wagon, for example, has right stringers, so eight right and eight left hand angles will be needed.) Simply lay an angle in the jig, with one leg lengthwise in the slot, hold it snug against the bottom of the slot, and drill with a suitable sized drill for one hole. Then put the other leg is the slot and drill for the other hole.

Use the seat sections themselves to determine the spacing of the wagon body cross pieces. The angles are cemented with "Goo" to the edge of the wagon bed and the sides to the projecting body cross piece. A small lill pin or modelers nail pushed into the edge of the wagon bed makes a good solid assembly. It's easier if an undersized hole is first drilled into the wagon bed, using the pre-drilled hole in the angle as a guide,

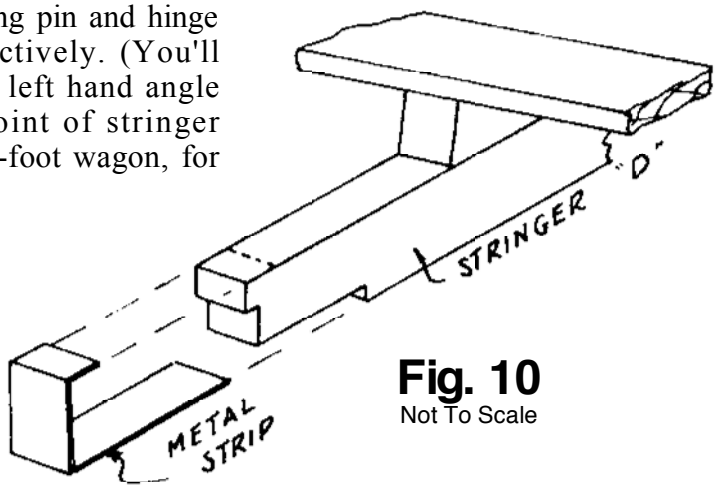

Fig. 10
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than press the pin in with needle-nosed pliers. Hinge rods are one-piece piano wire, long enough to pass through all the angle posts. Once you've placed the stringer ends between the angles and slipped the rods through everything to test for fit and workability, remove the rods and set the seat sections aside while you complete the wagons themselves, to avoid unnecessary handling and possible damage.

A tinplate template was cut to shape and used to lay out ten end panels to scribed sheetwood. Be sure so make five with the cutout on the right, and five with it on the left, unless your panels are built-up of separate boards. Otherwise you'll wind up with the scribing on the outside to one end and the inside of the other, as I did. **Fig. 14** gives the detail of the spring latches I used to hold the seat sections in folded position. These are mounted on the sides of the vertical end stakes, and should be capable of springing downward slightly without rubbing or otherwise hanging up on the face of the panel itself.

A small nail or pin pressed and cemented into a hole in the outside face of the end stringers of sections "B" and "D" engages the latch and holds the seats in the folded position. Depressing the latch with a pencil point will release the seats for set-up. With the pins **above** the latches as shown, the end panels cannot work up and out of place from vibration while traveling aboard the train, preventing inadvertent (and disastrous) release of the seats In addition, larger scale models (1/2" and up) may utilize wire hooks or chains spanning the width of the wagon to help hold the folded seat sections in place.

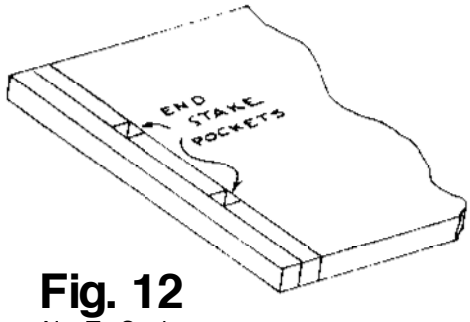

Fig. 12
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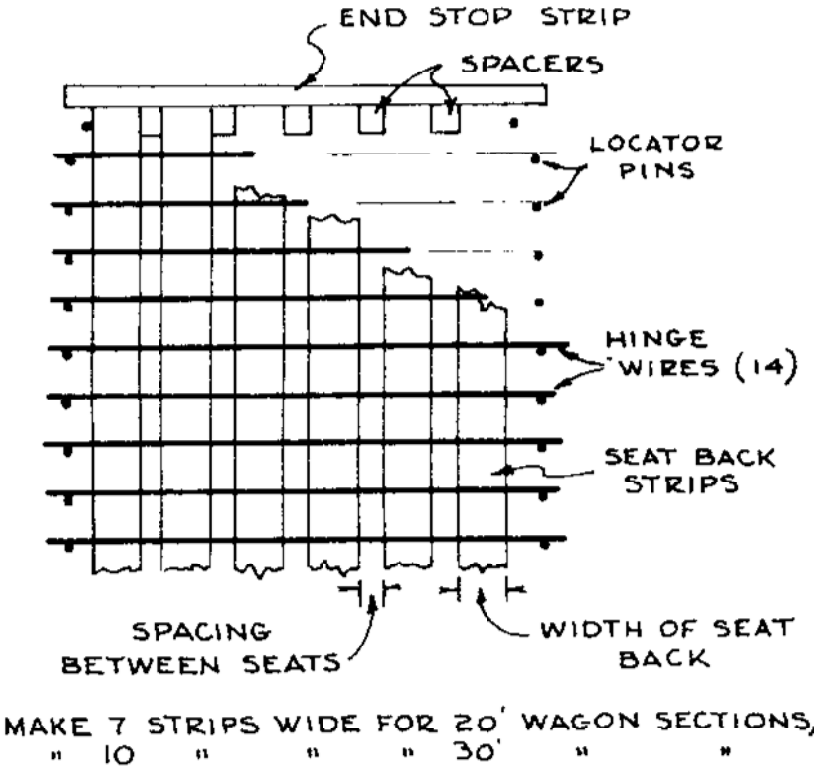
I made seat jacks from 4v4 stripwood pre-painted on all four sides for leg stock, and two opposite sides for spacer stock. Legs were cut to length using a "basic" template, and the ends beveled using a template similar to **Fig. 5.** This exposes the raw wood for a solid, glued joint. Pre-drill the holes for the wire tie rod. These rods are installed **gently** after removing the jack from the jig illustrated by **Fig. 5.** The rods are then trimmed to length and the ends covered with cement.

Touch up any exposed ends with paint, but it's best not to fill the slot at the top with a heavy coat of paint, or you'll find the jacks bind and stick when you try to fit them to the stringers. This same jig can be used for jacks of any height, since they're identical except for leg length. Just move the bottom pins and the wedge up closer to the top stop strip. Again, if several copies of this jig are made and



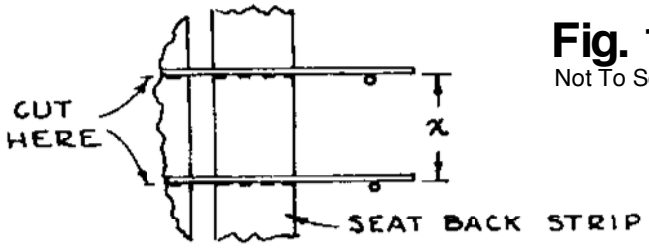


Fig. 11
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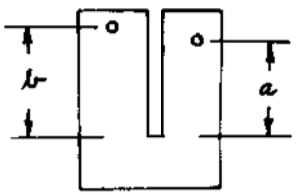

Fig. 13A
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covered with waxed paper, continuous assembly can proceed. Five wagons require 10 jacks, more or less, so this it the obvious way to go.

This wraps it up. We've waded through a lot of detail but that in itself, I think, proves the necessity of using jigs and templates in model work. Certainly, a model or group of models such as these would be literally impossible to build without them.

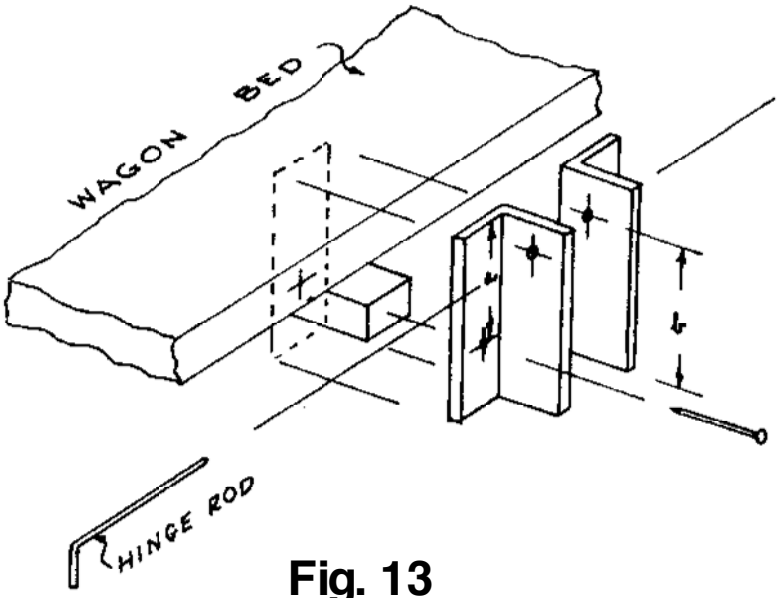

Fig. 13
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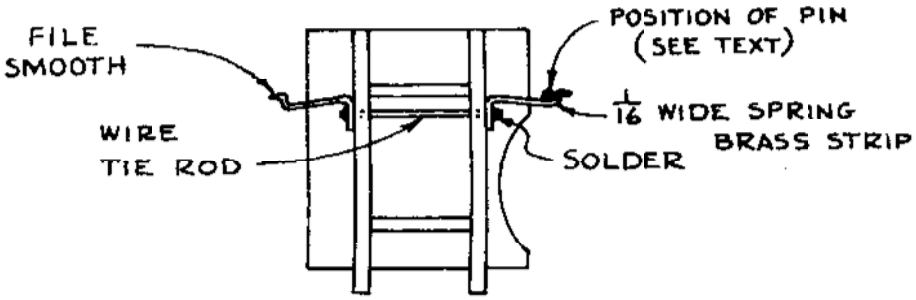

Fig. 14
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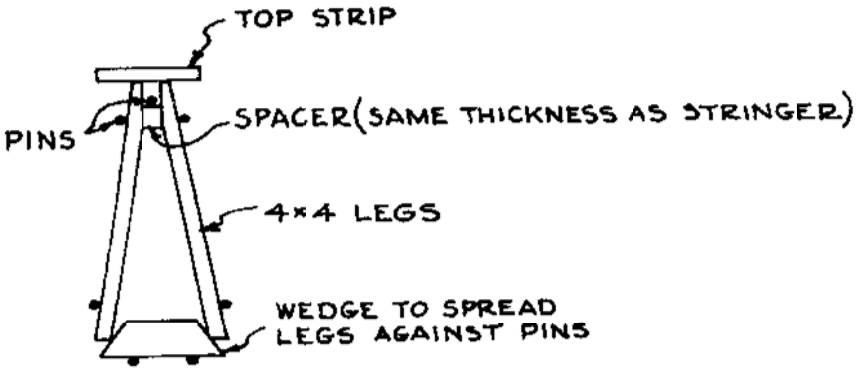

Fig. 15
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