
A-SERIES PRODUCTION DOBBY LOOM

User's Manual



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INTRODUCTION

No doubt you want to get to the business (and the fun) of setting up your loom. OK, but first a few words of advice: There's probably some of you who don't like to read directions or think that this manual is entirely too thick and you don't have time to read all the way through it. Please read through the directions and follow them step-by-step with us. You will spend less time and will end up with the loom looking and working as we have planned it.

There are those of you who have never touched a hex bolt and are not even sure you know what one is. To you, we say, "Try it. If you follow the instructions step-by-step and take your time, you will be surprised at what you can do."

To members of the two above camps, and to all those in between, we say, "Stick with it and we are certain you will find this to be a good experience and a great way to get to know your loom."

Remember, if you are at all serious about weaving, a thorough knowledge of your equipment is vital. So think of this as an opportunity, not as a liability.

PREFACE

The two purposes of this assembly manual are:

1. To assist the loom owner in assembling and getting to know her/his loom by providing complete and detailed instructions and drawings.
2. To allow the weaver to enjoy a well-cared for and properly functioning loom for many years by providing a care and maintenance schedule.

HOW TO USE THIS MANUAL

This manual was written to be read and followed from beginning to end. Some of the information is quite basic and there are those of you who will want to skip those sections entirely. Instead of skipping them, we suggest you skim them (there just may be important information hidden right in the middle of a very basic section).

All of the major sections are in the index, in case you need to refer back for any reason.

We, at AVL, know that a picture is, indeed, worth a thousand words and, for that reason, have included many detailed drawings to help clarify our instructions. Since all of our parts are not numbered, you can use these drawings to help identify certain parts. You will find Figure #1 to be particularly useful and may wish to pin or tape it up in a handy place for easy reference. This drawing shows all the major parts of the loom and is valuable in determining the relative position of parts. The parts list following Figure #1 should be kept within easy reach as well.

This manual includes assembly instructions for A-Series looms. Also included are instructions for options such as:

- ◆ second plain beams
- ◆ sectional beams
- ◆ tension box
- ◆ raddle
- ◆ single- and multiple- box flyshuttle beaters
- ◆ automatic cloth advance
- ◆ pressure roller

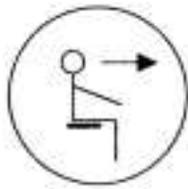
You need only read the sections for the kind of loom or option(s) you have ordered.

Finally, for those of you who just can't tolerate reading another manual, we have included a series of Assembly Photos for you to refer to. They are located in Section #3.

LOOM ORIENTATION

Before we really get going, there are a few things you should know in order to better understand our instructions. First, and very important, is what we mean when we say “the front of the loom”. The front of the loom is the end where the seat is; the back of the loom then, is where the warp beam is. Everything is oriented as if you were sitting in the weaving position. The right side of the loom is the side to your right as you are sitting at the loom and the left side is to your left. A piece marked “bottom” would, of course, go toward the floor.

Figure #1 is a full drawing of the loom. This can be referred to as often as necessary to obtain relative placements of assemblies. Following this is a parts number list. Since this list includes the names and part numbers of all parts and assemblies, you may need to refer back to it. Study all the drawings carefully and make certain that your assembly looks like the one in the drawings before continuing.



Where applicable and necessary on the drawings, we have included a “weaver symbol” to help clarify the view of the drawing. This symbol shows a weaver seated at the weaving bench. Remember, the symbol is included only to help clarify the orientation of the drawing. In the example shown, the weaver is sitting, looking toward the right of the page. That would indicate that the front of the loom is to the left of the page and the rear of the loom to the right. If the arrow were pointing left, then the rear of the loom is to the left.

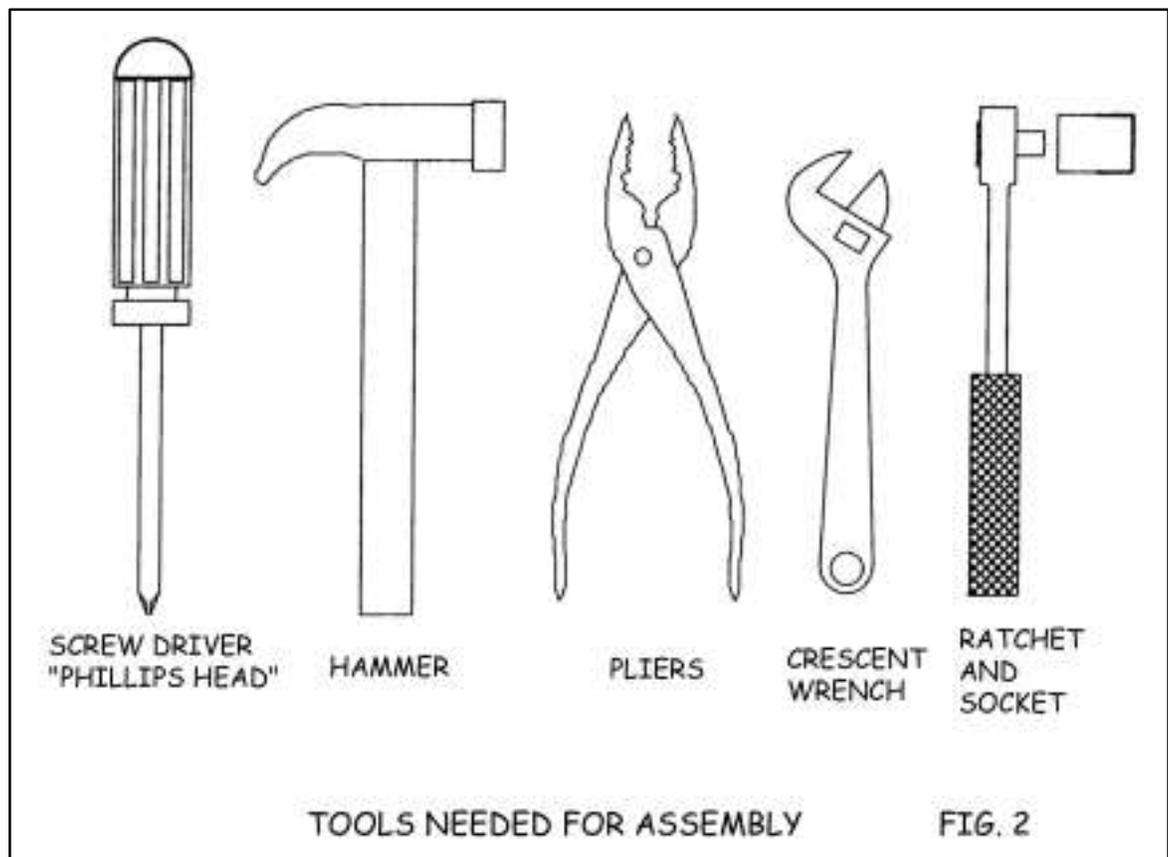
The right and left of the dobbie head is oriented as if you were standing right in front of it.

TOOLS NEEDED FOR ASSEMBLY

There are a few tools you’ll need before we can get started. These are:

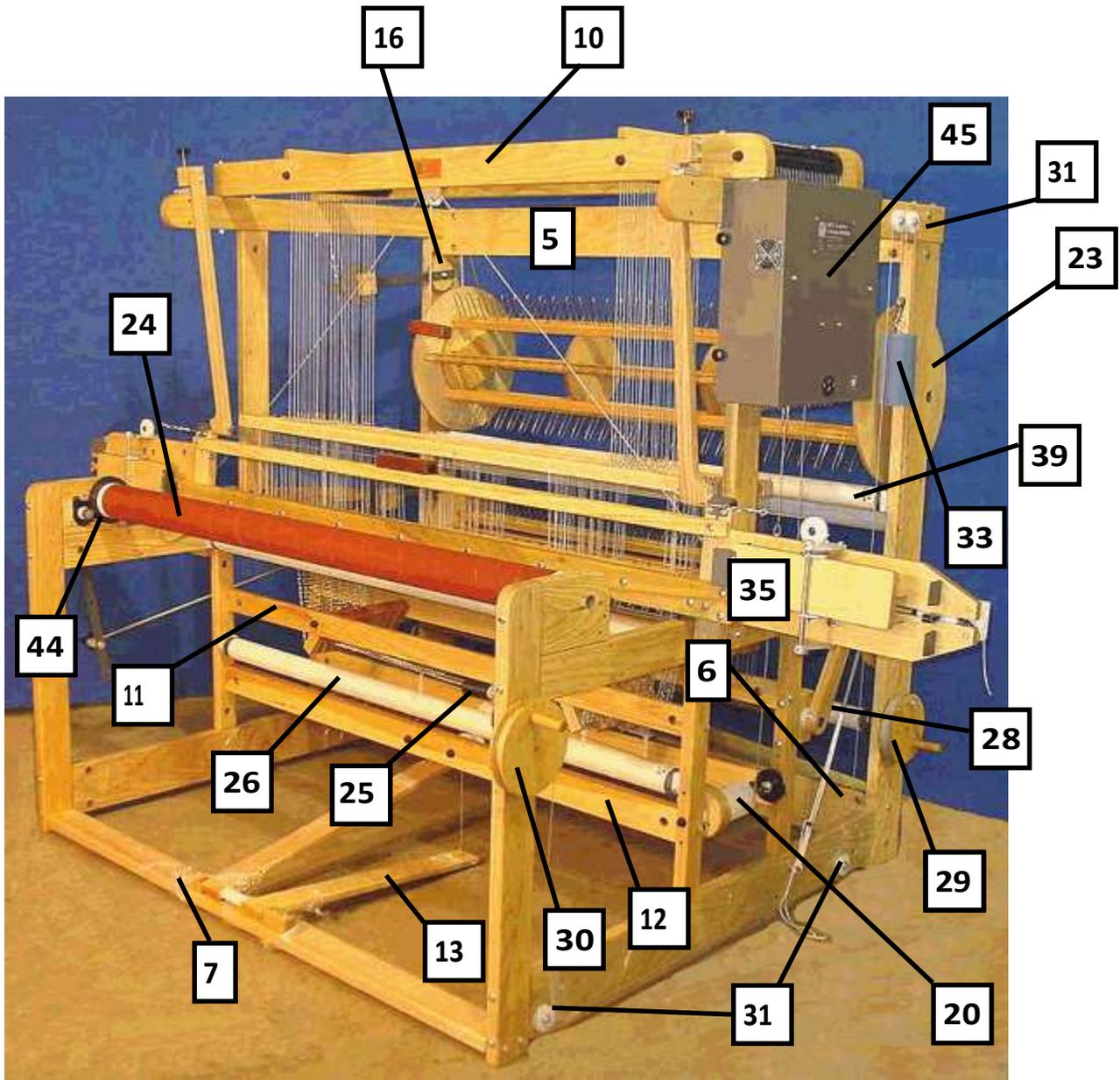
- ◆ Philips head screwdriver
- ◆ light hammer
- ◆ pair of pliers
- ◆ 4" or 6" crescent wrench

A ratchet/socket set is very helpful and will speed up the assembly process, but it is not essential, except in the case of mounting the tension box track arms. For this assembly, you will need a 1/2" socket.



LOOM PARTS LIST

Part #	Part Name
5	Upper Back
6	Lower Back
7	Lower Front
10	Harness Pulley Support Assembly
11	Spring Lever Assembly
12	Treadle Pulley Assembly
13	Treadle
16	Tension Arm Assembly, Standard
20	Dobby Cam, Cylinder, and Pulley
23	Warp Beam, Sectional
24	Cloth Beam
25	Cloth Beam Ratchet Handle
26	Upper and Lower Cloth Rollers
28	Cloth Storage Roller
29	Cloth Storage Drum
30	Cloth Take-Up Drum
31	Cloth Take-Up Pulleys (x5)
33	Weight
35	Beater
39	Warp Beam Separation Roller(s) (one or two)
44	Automatic Advance Gear
45	Compu-Dobby



A-SERIES LOOM

FIG. 1

LOOM ASSEMBLY

UNPACKING

The very first thing you need to do is take a nice, deep breath and slowly exhale.

Now you can unpack your boxes being very careful not to throw any parts away with the packing paper. Remove all strapping tape and bubble pack. Lay out all of the parts so that you will be able to identify each one as they are called identified in the instructions.

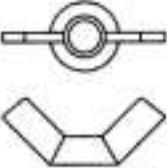
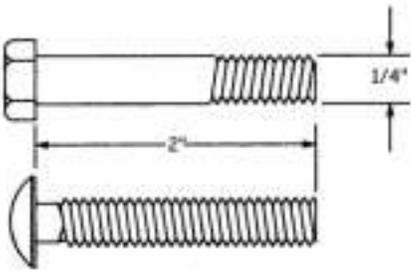
IDENTIFYING PARTS

1. Hardware -
Identifying and
Measuring

Pick up your bag marked “cross member hardware”. Empty its contents onto a tabletop. In the bag are :

- ◆ hex bolts
- ◆ carriage bolts
- ◆ washers
- ◆ hex nuts
- ◆ square nuts
- ◆ low profile hex nuts
- ◆ Allen wrenches
- ◆ possibly two machine screws

Now look at the Hardware Identification Chart on the following page to familiarize yourself with the hardware.

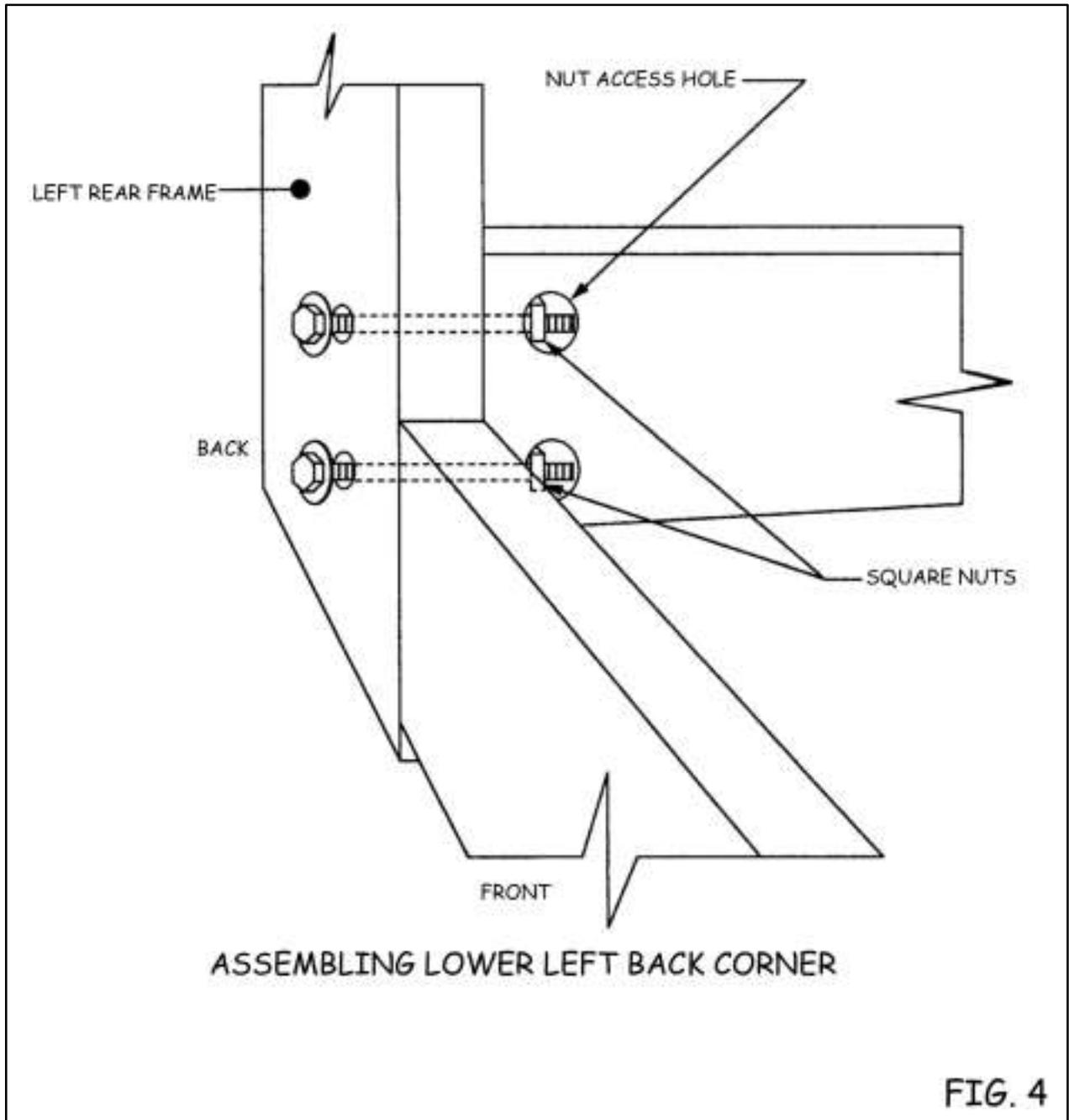
 <p>HEX BOLT THESE ALWAYS GET A WASHER BETWEEN THE HEAD OF THE BOLT AND THE WOOD</p>	 <p>CARRIAGE BOLT THESE NEVER GET A WASHER BETWEEN THE HEAD OF THE BOLT AND THE WOOD</p>	 <p>FLAT HEAD MACHINE SCREW</p>	
 <p>FLAT WASHER</p>	 <p>HEX NUT THESE ALWAYS HAVE A WASHER BETWEEN THE NUT AND THE WOOD AND THEY ATTACH TO HEX BOLTS AND CARRIAGE BOLTS</p>	 <p>SQUARE NUT THESE ALWAYS GO IN A NUT ACCESS HOLE. THEY ATTACH (WITH NO WASHER BETWEEN NUT AND THE WOOD) TO HEX BOLTS.</p>	 <p>WING NUT THESE ALWAYS HAVE A WASHER BETWEEN THE NUT AND THE WOOD. THEY ATTACH TO CARRIAGE BOLTS.</p>
 <p>ALLEN WRENCH</p>	 <p>BLACK KNOB</p>	 <p>MEASURING BOLTS</p>	

HARDWARE IDENTIFICATION CHART FIG. 3

Now you know all that you need to know about hardware to set up and maintain your loom.

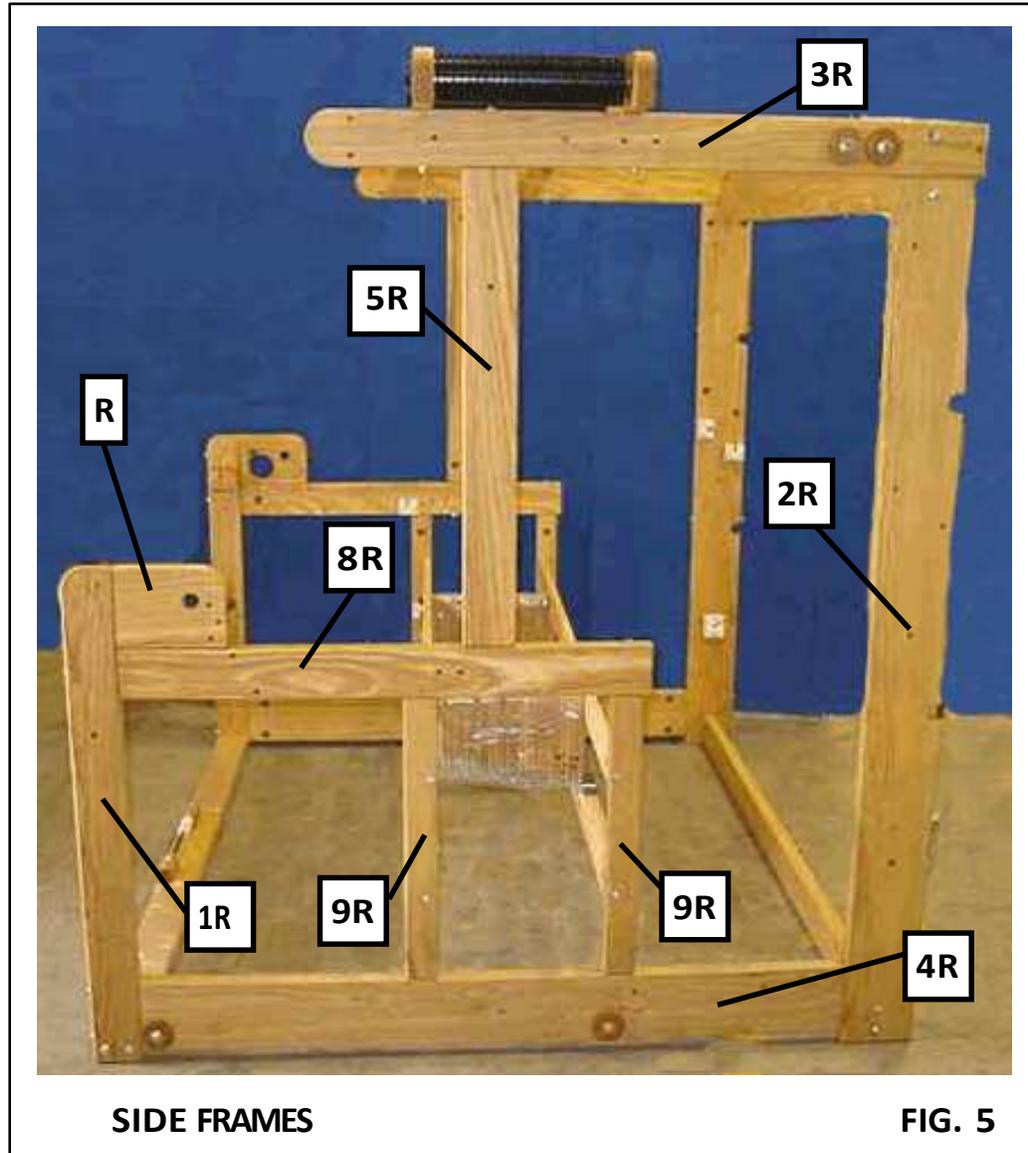
Bolt and Nut Hints

- A. If a bolt is a little tight going into a hole, give it a light, friendly tap with a hammer.
- B. To start the threads on a square nut in a “nut access hole”, it is often helpful to hold the nut in place with the end of a screwdriver or the tip of your finger.
- C. Always have the larger “nut access hole” (see Figure #4) facing toward the inside of the loom unless otherwise specified.



- D. Remember to put washers under the heads of the hex bolts and the exposed nuts (nuts that are not in access holes) to prevent damage to the wood.
- E. Carriage bolts usually require a tap or two from the hammer to seat the square part of the bolt's head into the wood.

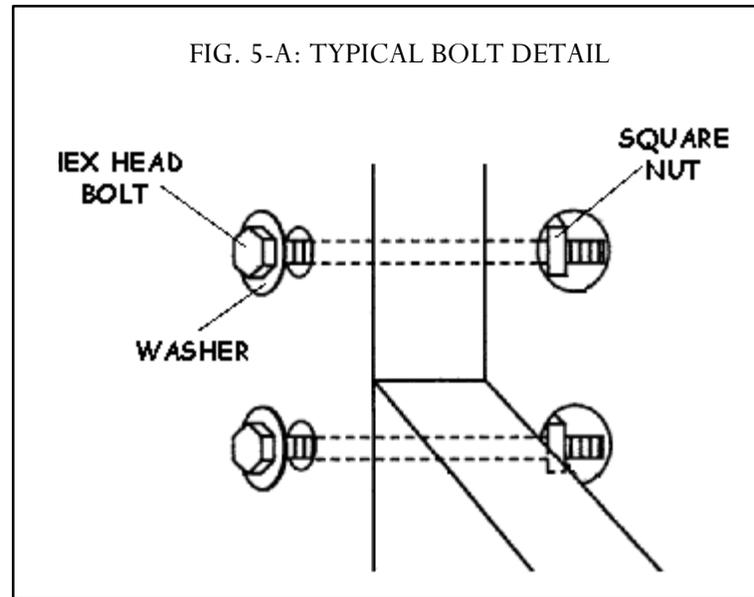
2. Side Frame Assembly



AVL Production Loom Side Frames are shipped disassembled. Use the following procedure to assemble them. The Side Frames must be assembled properly for the loom to operate. You will want to refer to the attached Side Frame illustrations periodically to insure the proper relationship of these parts.

1. Unpack Box #1 and lay the pieces out. Notice that each piece has an identifying number stamped on it. Also, locate the hardware package in which you will find twenty 5/16" x 5-1/2" hex head bolts, eight 5/16" x 7-1/2" hex head bolts with washers and square nuts, and two 5/16" x 5" hex head bolts with washers and square nuts.

Assembly is made by inserting a bolt (with a washer on it to protect the wood) through the width of one member into the end of the adjoining member with a nut installed on the bolt in the nut access hole in the side of the adjoining member.



2. Locate the right bottom horizontal (4R) (see Figure #5). Notice the four large nut access holes drilled in one side. On all parts, these nut access holes will go to the inside of the loom. Using two 5-1/2" bolts, assembly the right front vertical (1R) to the front end (the end with the number stamp) of the right bottom horizontal (4R), making sure that the nut access holes on both parts are to the same side.
3. Assembly the right rear vertical (2R) to the rear end of the right bottom horizontal (4R) using the same procedure with the 7-1/2" long bolts.

4. Assemble the two right side supports (9R) to the right bottom horizontal (4R) using the 7-1/2" long bolts. Install the right side support (9R) with the bracket attached to it to the front of the side frame and the right side support (9R) with no bracket to the rear. Make sure the number stamps on the right side supports (9R) are facing down or toward the right bottom horizontal (4R) and the nut access holes and bracket are to the inside.
5. Assemble the lower right cloth beam support (8R) into the right side frame. It attaches with one bolt through the right front vertical (1R) and with one bolt in each of the right side supports (9R). Again, be sure to keep the nut access holes to the inside.
6. Assemble the upper right cloth beam support (10R) into the right side frame. It attaches with one 5/16" x 5" bolt through the right front vertical (1R).
7. Assemble the right castle (5R) into the right side frame. It attaches with two bolts through the lower cloth beam support.
8. Assemble the right top horizontal (3R) to the top of the right rear vertical (2R) with two bolts. The end of the right front vertical (1R) with the number stamp on it must be attached to the right castle (5R) with one bolt, with the number stamp facing down. If this is done correctly, the two small holes located on the right top horizontal (3R) will be on the top as shown in the side frame drawings.
9. Finally, repeat Steps 2. through 8. for the left side frame.

JOINING SIDE FRAMES

1. Locate the cross member hardware package and examine it. From its contents, please locate the following items:

A-Series Dobby Cross Member Hardware	
Hardware (with washers and	Location
4 - 5/16" x 2-3/4" Carriage Bolts	Beater Bumper Blocks to Loom Frame
20 - 5/16" x 3-1/4" Hex Bolts	Most Cross Members to Frame
4 - 5/16" x 7-1/2" Hex Bolts	Harness Pulley Supports to Frame

The above hardware will be used to assemble cross members. The remaining hardware will be used later.

2. Upper and Lower Backs

Locate the upper back (#5), the lower back (#6) (see Figure # 5).

Set your left and right side frames opposite each other with the lower back in-between. Remember, the nut access holes face the inside of the loom. Using four 5/16" diameter x 3-1/4" hex bolts, attach the lower back to the side frames (see Figure #5). Get the nuts started on the bolts, but don't tighten them yet (see Figure #4).

Now install the upper back (#5) using four 5/16" x 3-1/4" hex bolts, washers, and square nuts (as shown in Figure #1). Tighten these now, as well as the bolts and nuts on the lower back, which we left loose in the previous step.

3. Lower Front (#7)

Locate the lower front. This part has rods and blocks attached to it and nut access holes on the bottom face. Now the lower front assembly (#7) can be put on the loom. Orient it so that the rods and blocks are toward the front of the loom (as shown in Figure #5). From the outside of the loom, insert the two 5/16" x 3-1/4" hex bolts halfway into the holes in the left side frame and two 5/16" x 3-1/4" hex bolts in the right side frame where the lower front will be attached. Now kindly ask your helper to prop up the front of the loom so that you can bolt the lower front to the side frames. Go ahead and tighten the bolts. After the bolts are in place, gently let the loom down again.

4. Treadle Pulley Support (#12)

Non-A-Lift or E-Lift Equipped Looms

Locate the treadle pulley assembly (#12) (refer to Figure #1 for proper placement). Orient it so that the stamped words "BOTTOM FRONT" are on the front piece, facing down, and on the right side of the loom. This should put the two rods a little bit closer to the right side of the loom. Insert the 5/16" x 3-1/4" hex bolts with washers through the corresponding holes in the vertical support assembly (#9-R and #9-L), attach square nuts, and tighten securely.

A-Lift or E-Lift Equipped Looms

The #12 Treadle Pulley Support will arrive as two wood crossmembers. The rear crossmember will have the spring lever /

spring assembly attached. Orient this piece with the spring lever / spring assembly facing forward and closest to the right side of the loom. Orient the front #12 crossmember so that the two vertical holes are closest to the right side of the loom. Insert the 5/16" x 3-1/4" hex bolts with washers through the corresponding holes in the vertical support assembly (#9-R and #9-L), attach square nuts, and tighten securely.

5. Spring Lever / Spring Perch Assembly (#11)

8 / 16 / 24 Harness Equipped Looms

Locate the spring lever assembly. This assembly consists of two long pieces attached by rods with many short, thin, rectangular "spring levers" between. Orient this assembly so that the stamp "BOTTOM FRONT" is on the front piece facing the floor and on the right side of the loom. Using four 5/16" x 3-1/4" hex bolts, washers, and square nuts, attach the spring lever assembly between the side frames, a foot or so above the treadle pulley assembly (as shown in Figure #5).

32 / 40 Harness Equipped Looms

Locate the spring perch assembly. This assembly consists of two wood crossmembers with spring perch (with 64 or 80 eye hooks attached) spanning between the two boards. Orient the assembly with so that the quarter circle cut-out faces forward and down. Using four 5/16" x 3-1/4" hex bolts, washers, and square nuts, attach the spring lever assembly between the side frames, a foot or so above the treadle pulley assembly (in the same location as the spring lever assembly as shown in Figure #5).

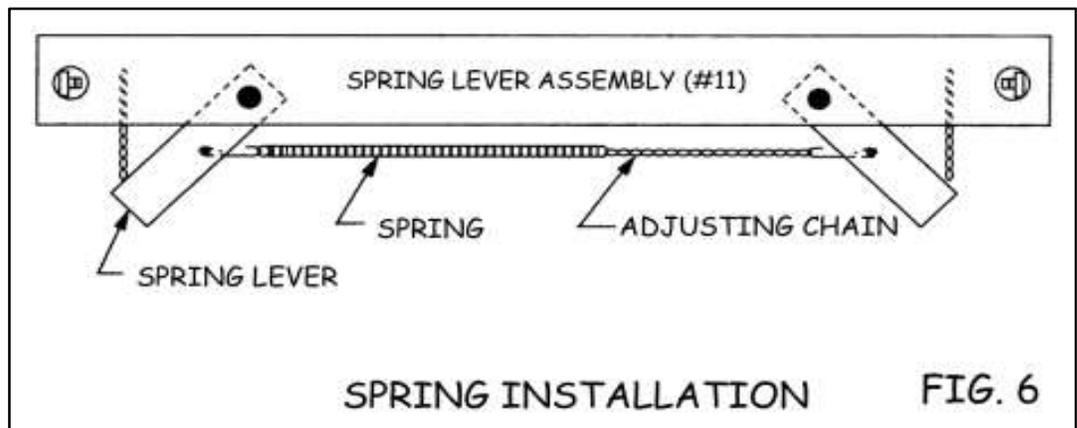
6. Spring Installation

8 / 16 / 24 Harness Equipped Looms (See Figure # 6)

Now it's time to hook the springs to the spring levers. Locate your springs with the chain attached. Starting with the rear-most spring lever, attach the spring to the hook on one side and the chain to the hook on the other side. The chain is for adjusting the harness tension, so for right now, just attach the last link to the wire hook and you can adjust it if need be after you get your first warp on.

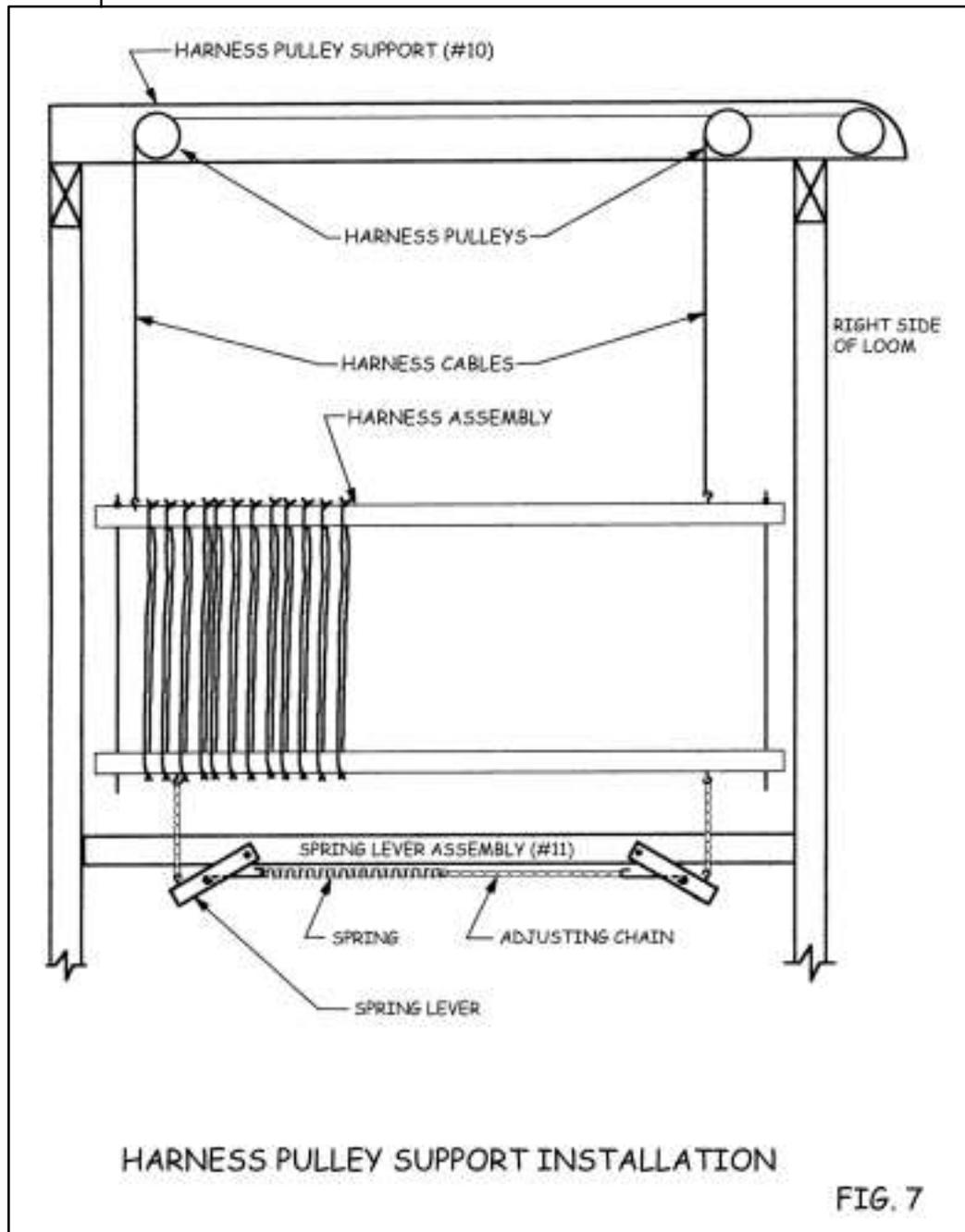
32 / 40 Harness Equipped Looms (See Fig. #6-A)

Wait until after the harnesses are hung before attaching the harness springs to the spring perch eye hooks. When it is time, locate the harness springs. Starting with the rear-most springs, attach the springs to the eye hooks on the bottom of the harness sticks.



9. Harness Pulley Support (#10)

Locate the harness pulley support. This assembly has three rows of sixteen or twenty-four sheaves (pulleys) between two long cross members. Using four $5/16"$ x $7-1/2"$ hex bolts, washers, and hex nuts (remember that you'll need washers under the hex bolts and the hex nuts), attach the harness pulley Support assembly to the side frame (as shown in Figures #1, #5, and #7). When correctly positioned, the left side will be flush with the left side of the loom and the right side will stick out a few inches beyond the right side frame pieces.



10. Overhead Beater Axle Mounting Blocks
(overhead beater only)

If your loom is to be equipped with an overhead beater, locate the package from box #3 marked "axle blocks". These blocks have a large hole in them. Using the 5/16" x 5" carriage bolts in the package, mount these blocks to the back edge of each rear side support (look ahead to Figure #27). The heads of the carriage bolts should end up in the holes provided for them on the front edge of each rear side support.

11. Dobby Cam and Pulley (#20)

Locate the dobbie cam and pulley assembly (see Figure #8, 8-A, 8-B, and 8-C). Orient it so that it matches the drawing. Using the Allen wrench that came in the cross member hardware package, loosen the stop collars (a metal doughnut with a set screw in the side) and remove them. Pull the rod out from the left and locate the larger set of holes in the right vertical support members. Slip the rod through the hole on the left (as you are looking at it while facing it), then through the dobbie cam assembly, two of the stop collars, the separate pulley, and the last stop collar.

Slide the rod through the hole on the right vertical support (as shown in Figure #8). Using the Allen wrench, tighten the stop collar close to the cam assembly. Check to see that the assembly spins freely.

Leave the other two stop collars loose for now.



DOBBY CAM & PULLEY

FIG. 8



CLOSE UP

FIG. 8-A



FIG. 8-B: E-Lift Dobby Cam-Cylinder & Pulley

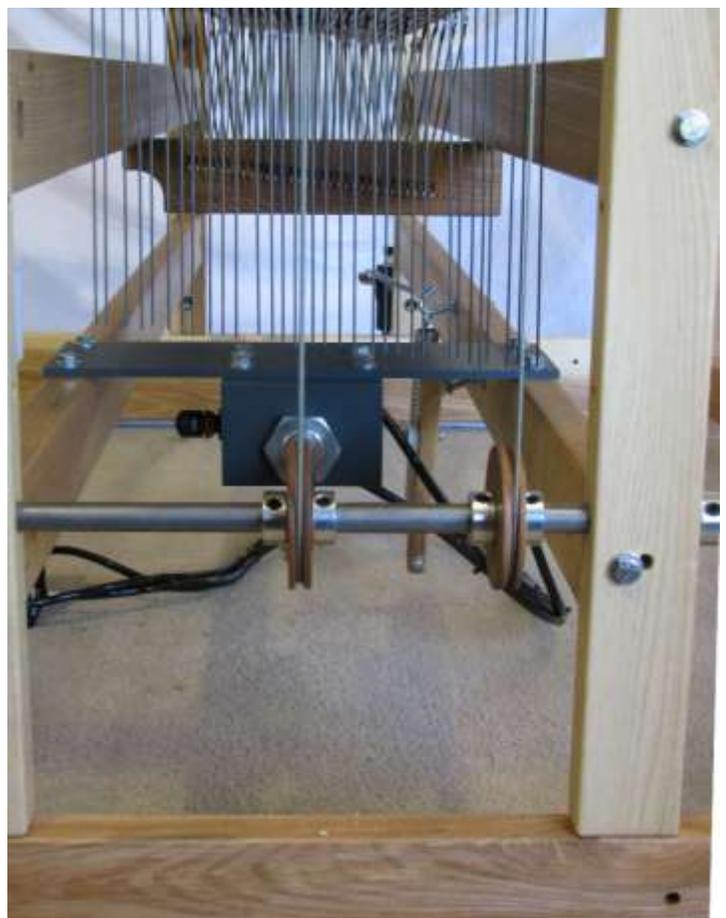
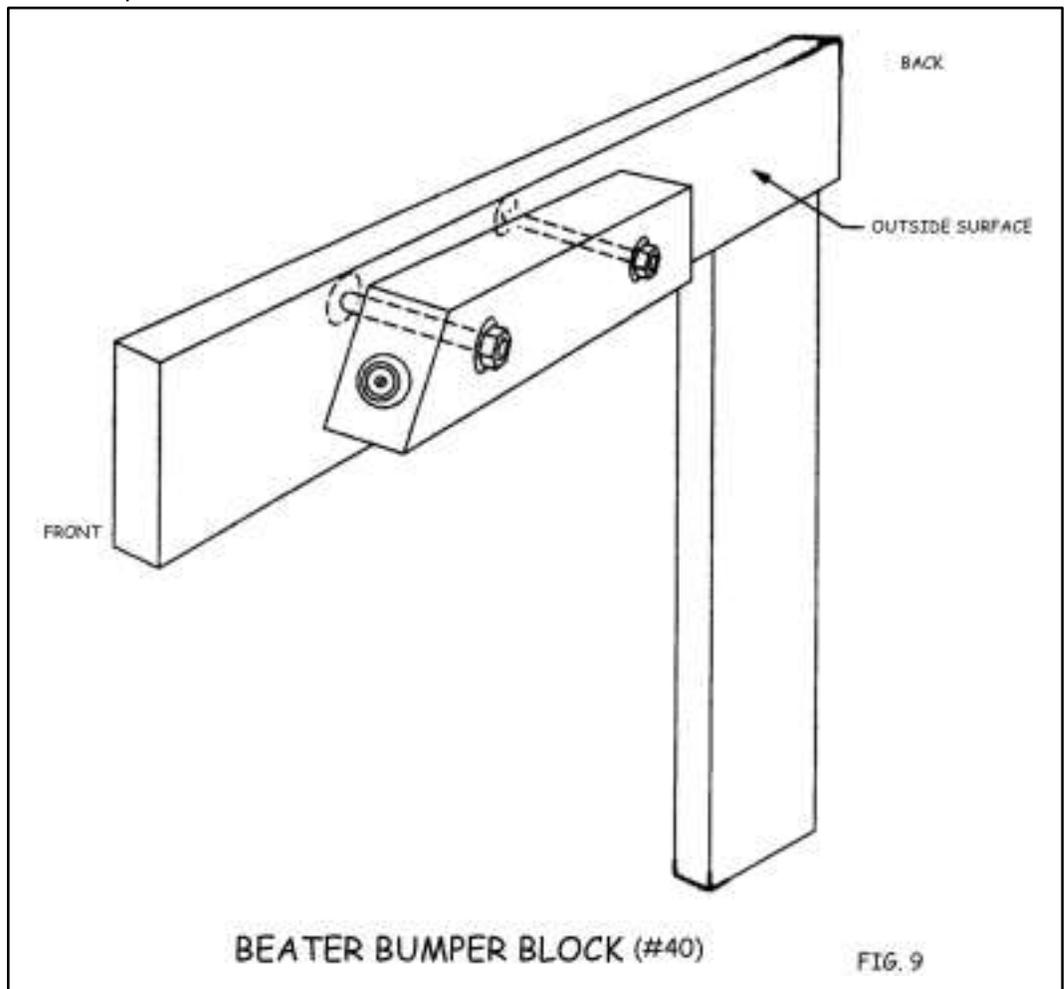


FIG. 8-C: A-Lift Dobby 'Cam' & Pulley

12. Beater Bumpers

Locate the beater bumpers (#40) (see Figures #1 and #9). The left is stamped "L" and the right one is stamped "R". They are each mounted to the outside of the cloth beam supports with 5/16" x 2-3/4" carriage bolts, washers, and hex nuts. Orient these beater bumpers so that the bumper faces the front of the loom and the stamp faces the cloth beam support that it will be mounted to. It is best to situate the carriage bolts so that the washers and nuts are to the outside of the loom leaving the smooth head of the carriage bolt on the inside of the loom frame. Now take a look at your loom. Shaping up nicely, isn't it?



ASSEMBLY PHOTOS



ASSEMBLED FRAME



SIDE VIEW



DETAIL – RIGHT SIDE WITH SPRING LEVERS



WITH A TWO-BOX AND OVERHEAD BEATER



FRONT VIEW



SIDE VIEW



BENCH



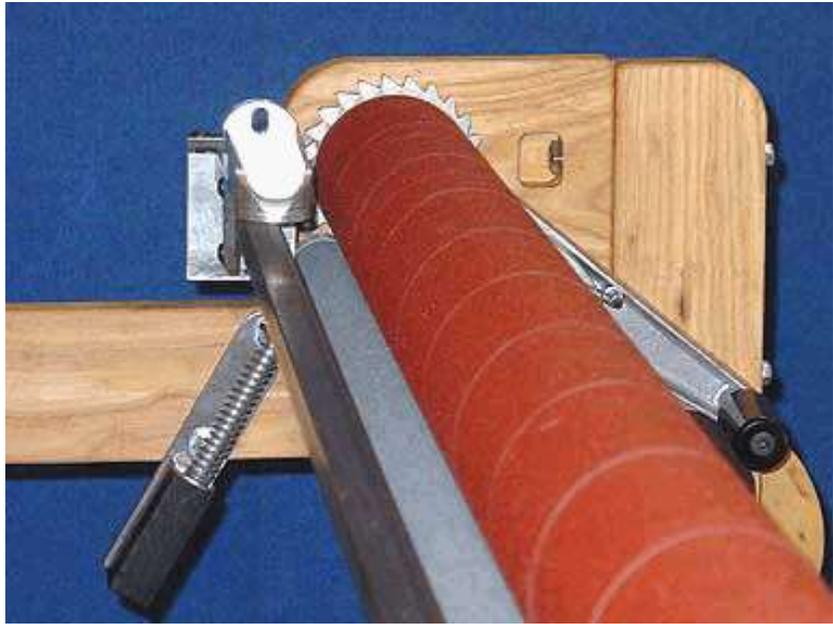
AUTOMATIC ADVANCE - OVERHEAD BEATER



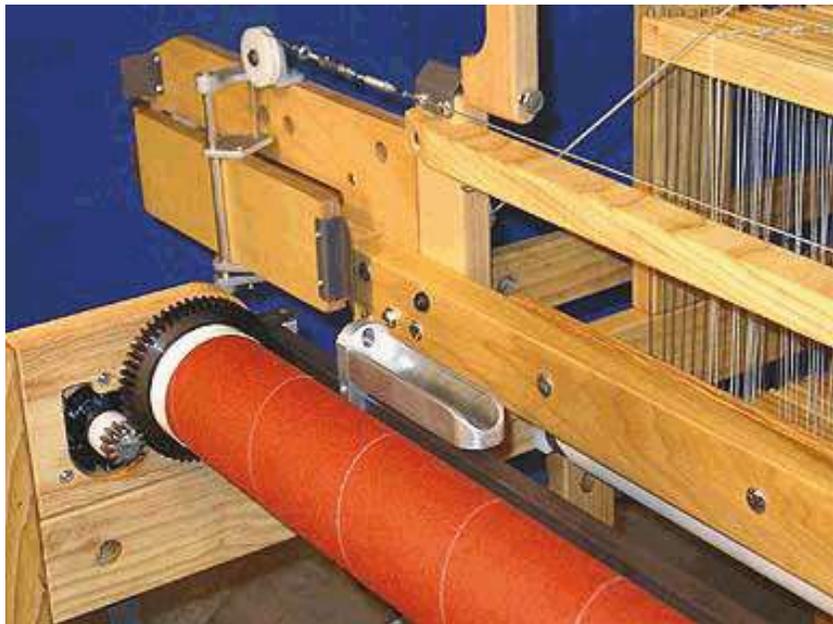
TEMPLE ROLLER CASTING



DETAIL



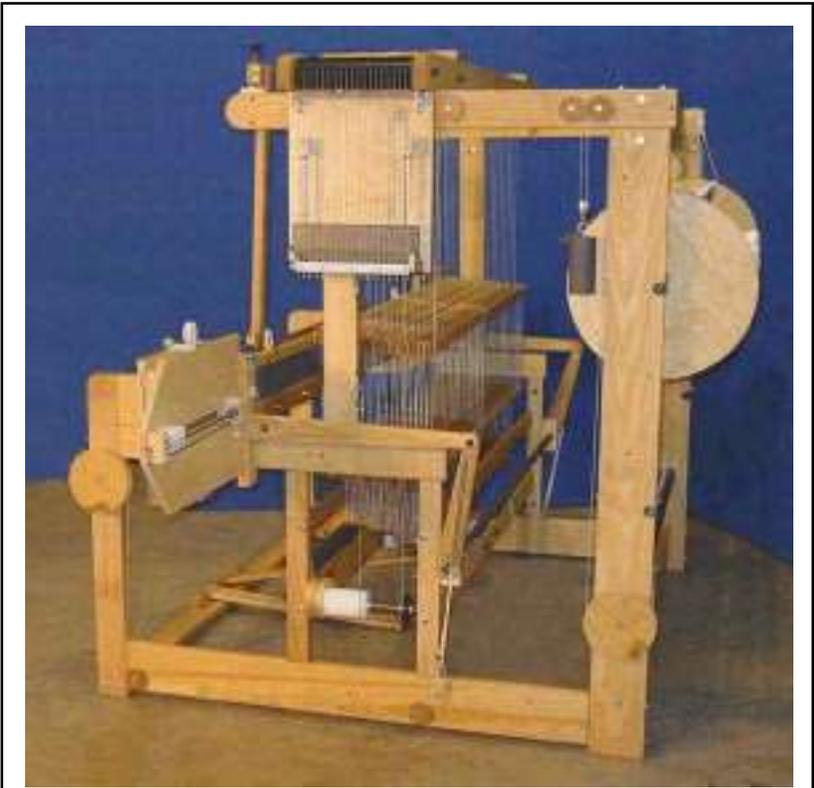
PRESSURE ROLLER



AUTOMATIC ADVANCE GEARS



FOUR-BOX ASSEMBLY – SIDE VIEW



FOUR-BOX ASSEMBLY – BACK VIEW

COMPU-DOBBY INSTALLATION

Mounting the Dobby

The Compu-Dobby will arrive in a separate box. The dobbie is comprised of two main parts: the dobbie head (wood back plate with attached slide plate) and the Compu-Dobby (gray metal box with solenoids). Unscrew the black thumbscrews on the sides of the solenoid box and lift it off the dobbie.

Please note, your dobbie head will come with zip ties on the slide plate. These are in place for shipping only and must be removed prior to use along with the stretch wrap.

On the back side of the dobbie head you will find three bolts with washers and hex nuts attached. Remove these washers and nuts making sure you don't unseat the carriage bolt heads on the top of the dobbie back. Remove the hex nut, washer, and carriage bolt from the middle of the dobbie back. Check back to Figure #1 to see where on the right side of the loom the dobbie is mounted.

Bring the dobbie into position under the harness pulley support (See Figure #CD-1). Insert the two 5/16" x 2-1/2" carriage bolts in the top of dobbie backboard through the top horizontal. Secure each bolt with one washer and a hex nut. Insert the third bolt through the castle into the dobbie back and secure with the washer and nut.

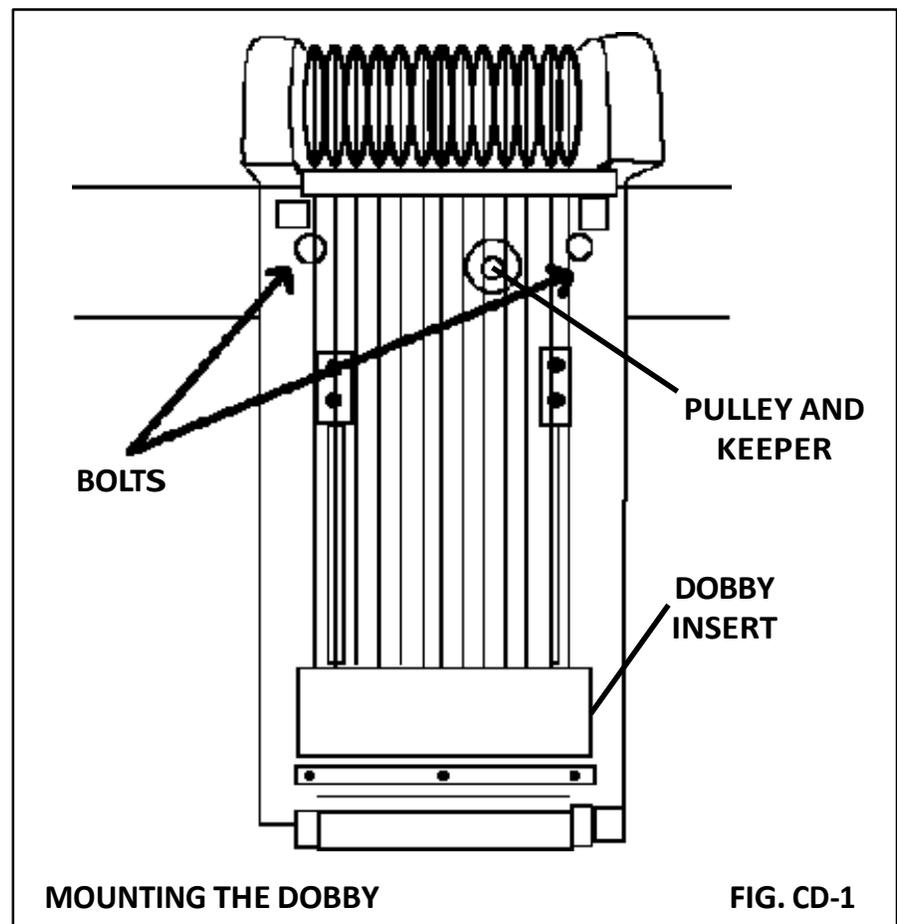




FIGURE CD-2: DOBBY ON LOOM

Cable Connections on All Looms

The clips on the ends of the harness cables connect to the corresponding dobby cables. Connect each.

Dobby Cable Tension

The cable attached to the nautilus or tear shaped side of the cam cylinder connects to the right treadle. Guide the cable under the cam and over the right pulley on the treadle pulley support. Connect the cable to the pin on the right treadle. Re-tighten the pin.

Each of the dobby cables in the dobby needs to have a little tension in order for proper selection by the Compu-Dobby. The tension translates through the attached harness cables all the way down to the harness spring system. Should you find incorrect harness selection by the Compu-Dobby, the cause is often due to harness float. To address, simply increase harness spring tension by incrementally shortening up on the links at the spring lever, or for 32 and 40 harness looms, by adding a set of heavy duty (or second set of standard) harness springs for the floating harness

Bolts and Screws

Check that all the bolts and screws holding the dobby set up to the backboard are tight.

Compu-Dobby
Box

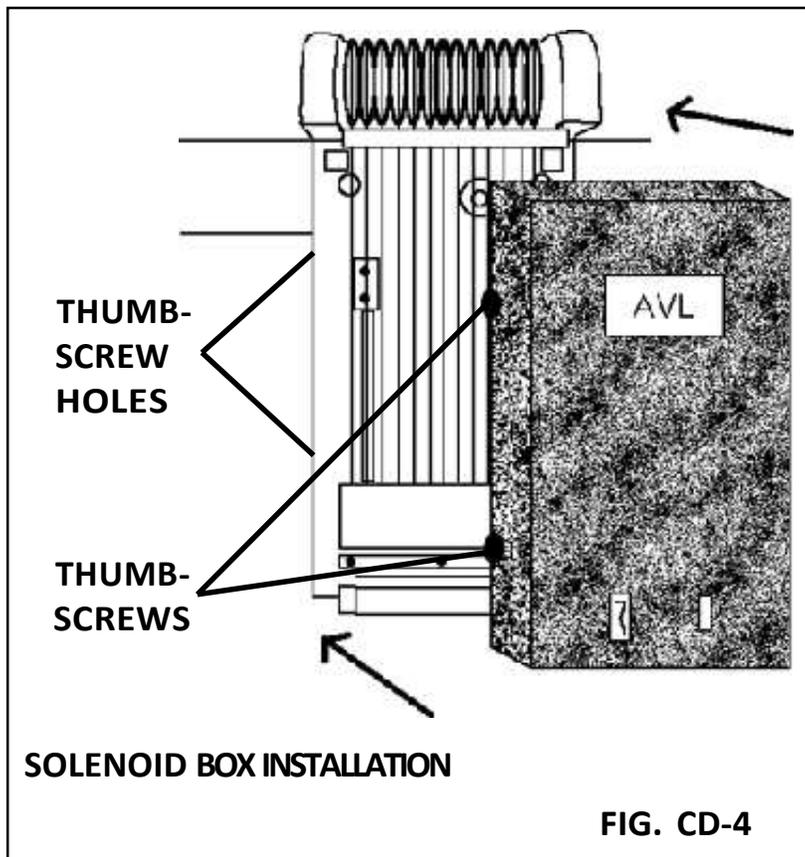
NOTE: Each solenoid has a concave tip (a half circle) that must capture its corresponding dobbie cable.



CONCAVE TIP - CLOSE UP

FIG. CD-3

Take the Compu-Dobby solenoid box and thumbscrews over to the dobbie set-up. Now, slide the Compu-Dobby box over the dobbie head, rest it on the support pins and hold it in place while you line the side holes of the box up to the holes in the dobbie backboard (see Figure #CD-4). Insert each of the four thumbscrews through the holes and into the barrel nuts. Tighten each one.



SOLENOID BOX INSTALLATION

FIG. CD-4

USB and Software Setup

Your Compu-Dobby comes with a standard USB 2.0 A/B data cable. Before connecting your computer, install all computer software, including USB device drivers if needed.

While software setup is left for the specific software manual, this instruction will provide some tips to ease setup.

1. The Compu-Dobby IV supports USB communications, which requires drivers be installed onto your PC. AVLDrive automatically installs this driver. The WeavePoint CD-ROM includes a driver self-installing .exe file that must be executed separately from the WeavePoint installation. Other loom control software may require that you download the driver from the AVL website: <http://www.avlusa.com/resources/library/>
2. Driver installation on Windows systems can take up to 45 minutes to associate the USB driver with the loom. This is especially true for PCs with slower processors and older operating systems. For the first time communicating after installing the USB driver, it is best to wait 45-60 minutes with the PC and Compu-Dobby IV powered and connected by USB cable.
3. The everyday start up protocol is:
 - a. Turn on the Compu-Dobby.
 - b. Start up the PC and loom control software.
 - c. Wait 60 seconds after the completion of the Compu-Dobby self-testing pattern (the powering of each solenoid to verify operation).
 - d. Enter weaving/loom control in the loom control software and begin weaving.
- 4) Some loom control software is better than others at clean USB communications. Additionally, poor performing PCs can drop USB communications during what the PC thinks are idle moments. Recovery from these issues requires re-establishing communications by rebooting the Compu-Dobby, then waiting 60 seconds before trying to reconnect. The rule of thumb is to do this whenever you have a USB communications failure or error message.

Power Cord

Now, you may connect the power cord to the Compu-Dobby and your AC power source.

At Compu-Dobby startup, you will notice a series of clicks. This is the Compu-Dobby self-test. You must wait until completion before attempting to connect your weaving software to your Compu-Dobby.

Surge Protectors and UPS

Surge protectors are electronic protection devices that limit the amount of electrical current that can be delivered to your equipment. UPS (Uninterruptable Power Supply) offer short term backup power in the event of a black or brown out. Though your power supply is regulated by your utility company, occasional load fluctuations can result in power spikes and black/brown outs. Electrical events such as these can do great harm to sensitive electronic equipment, your computer or Compu-Dobby, for example. We strongly recommend that you install a surge protector between your electrical socket and computer/Compu-Dobby. In areas with frequent loss of power, we also recommend a UPS.

Adjusting the Solenoids

If you find that the solenoids do not push the corresponding cables, then a small adjustment is needed. Locate the two screws on the front of the Compu-Dobby. Loosen them slightly. Now, from above the Compu-Dobby, look down the cables to where the solenoids are. Make sure they are still lined up with each of the cables. Slide the Compu-Dobby box to the right or left for alignment. When aligned, retighten the screws on the outside front of the box.

It is also crucial that each one of the doobby cables is lined up with the slots in the doobby arm insert. Remember, one cable for each slot. One solenoid for each cable.

HARNESSTIE-UP AND ASSEMBLY

1. Attaching the Harness Cables

Locate the bag labeled “harness cables”. Unwrap and separate one from the rest. Hold it up and stretch it out. You’ll see that there is a clip at one end and a loop at each of the other two ends. Hold the cable up by this clip so that the two loop ends are hanging down. The shorter end will support the right side of a harness and the longer end will support the left side of the same harness.

Now stand directly in front of the dobbie head. Look at the cables coming out of the top of the dobbie head. The cable farthest to the left (closest to the front of the loom) corresponds to the first harness and the cable farthest to the right (closest to the back of the loom) corresponds to the last (either the 16th or 24th harness). Cable #1 is the cable closest to the front of the loom. We will refer to the cables as number 1 through 8 (16, 24, 32 or 40) from now on.

Now attach the clip you are holding to the loop at the end of cable number 1 in the dobbie head. To spread the clip, simply press the two sides together and slip the cable loop onto one of the exposed ends of the clip. Now, work the cable loop toward the other side until it is free to move inside the clip and the clip sides are together again. Repeat this process for the remaining harness cables.

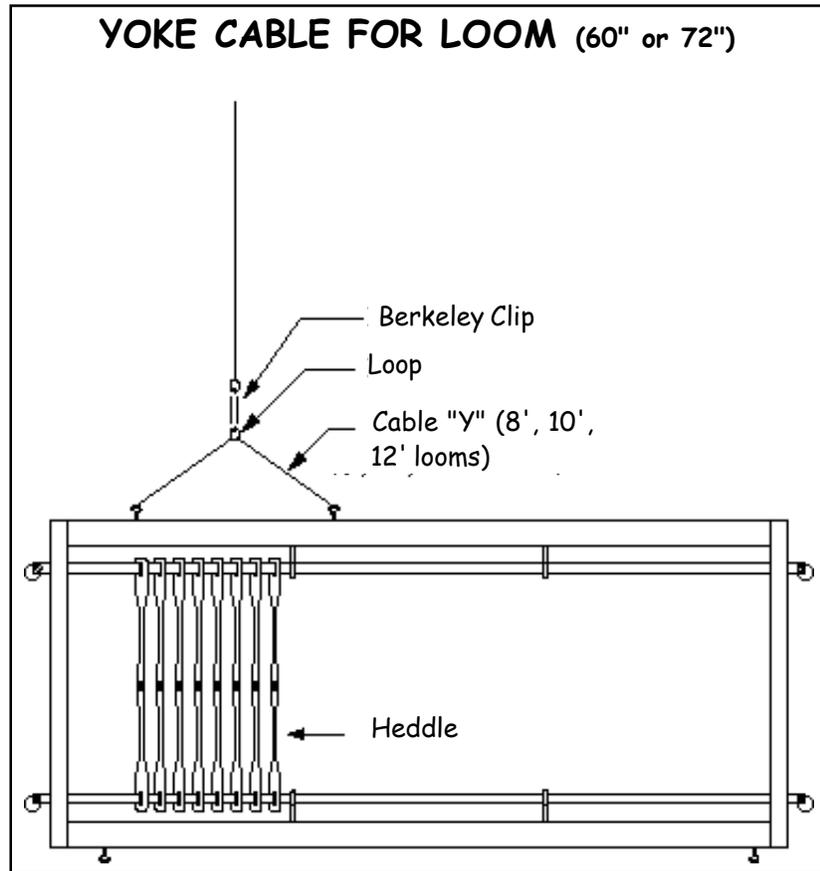
2. Cable Retainers

Mounted on top of the harness pulley supports are two wooden cross bars with felt on their undersides. Using a Philips screwdriver, temporarily remove these parts from the loom.

3. Laying the Harness Cables

It is helpful for this next step to stand on a sturdy bench or chair. Set the bench (or stand) between the lower front and the spring lever support. Take hold of the number 1 harness cable and route it over the pulley directly above it. Now bring that same cable (both ends) over the number 1 pulley in the next set of pulleys. Let the short cable hang and route the longer cable over the far pulley on the left side of the loom and let it hang. Repeat this procedure with each of the remaining cables until all of the harness cables are over all of the pulleys.

On larger 32 and 40 harness looms, you will also have yokes that connect the harness wires to the harness. The yoke forms a "Y" by connecting to a pair of screw eyes.



4. Replacing the Cable Retainers

Now replace the cable retainer above the right set of pulleys, tightening the screws so that it almost touches the pulleys. It is essential to the proper functioning of the loom that they be free to move. The cable retainer's only purpose is to keep the cables from jumping off of their pulleys.

5. Routing the Cables

Route the long ends of each of the sixteen cables (or twenty-four) over the far left of the pulleys. After all cables are in place on each pulley, check to see that no cables have crossed over each other. When you are certain that all is as it should be, replace and tighten the left cable retainer as you did the right one. Very good. Now on to the next step.

Your loom may be equipped with either polyester or metal heddles. If your loom has polyester heddles, start at step #1 below. If your loom has metal heddles, skip ahead to step #5.

1. Locating and Identifying the Harnesses

Locate your harness sticks. They are long, thin pieces of wood with screweyes on either end. There should be two groups. One group is labeled "tops". The other group is separated into bundles of either eight or twelve harness sticks each. Each of the bundles of the bottom harness sticks are labeled with a "1" or "2". Leave the tape and number stamp on these until they are needed.

On 40 harness looms, the bottom sticks are all the same.

2. Preparing for Harness Assembly

You'll need a table top for this next step. What you are going to do is assemble the harnesses so that you can hang them on the cables.

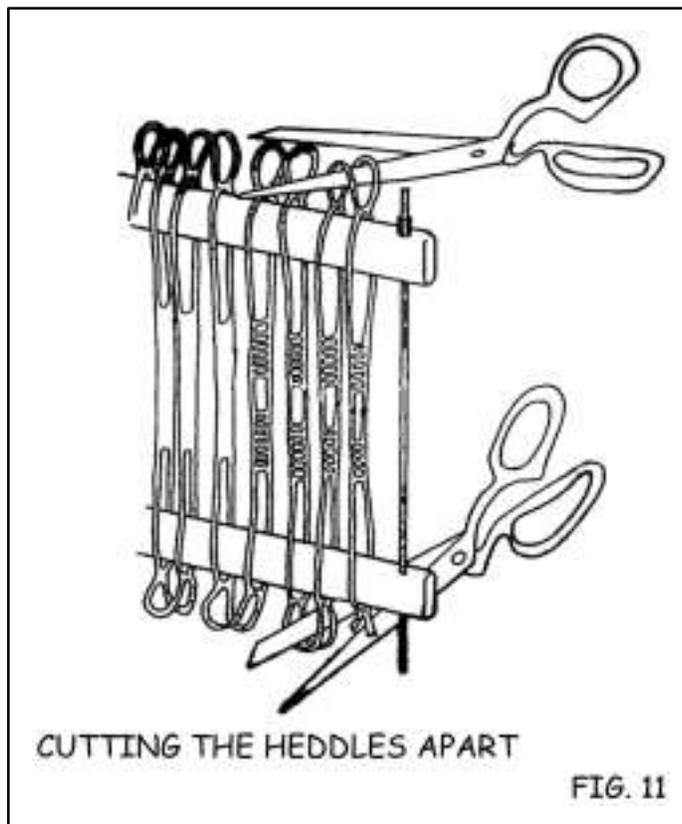
Untape the bundle of harness sticks labeled "tops". Lay one of these on the table, about a foot and a half in from the edge, with the screweyes facing away from you.

3. Understanding your Heddles

Now locate the bag of heddles. Open it and look at your heddles, but DO NOT remove the twist ties yet. Now locate your harness wires (those are the long wires with copper stops near one end). Pick up a bundle of heddles (there are approximately one hundred heddles in each bundle) and hold them up by one end allowing the other end to hang freely. Notice that there are four twist ties: two above the eye of the heddle and two below the eye. Now, with the thumb and index finger of your right hand, take hold of the upper right twist tie. Grasp the upper left twist tie likewise with your left hand. Gently pull apart and notice that all of the strings are captivated in either the right or left twist tie. If you had four hands, you could grasp the bottom two twist ties in the same manner. Then you would realize that there is, indeed, some order and reason to this twist tie business. Into the space that is created by pulling apart the twist ties, you will later insert a harness. Now that you understand twist ties, you can see that if they were to be removed at this point, you would experience chaos.

4. Harness Assembly (polyester heddles)

With one group of the heddles in hand, return to the table with the harness stick laying on it. Now insert the harness stick into the space that was created by pulling apart the twist ties. As this point, you should have an assembly made up of one harness stick (with screweyes facing away from you) and one bundle of heddles (still possessing four twist ties). Around the end of the harness should be the heddles. The heddles should be oriented so that the eyes of the heddles are between you and the harness stick. Notice that there is another “space” (between the twist ties) that should be lying between the eyes of the heddles and you that will accommodate another harness stick. OK, now untape the bundle of eight or twelve harness sticks labelled #2's. Take one of these harnesses to the table and with the screweyes facing you, insert the end of the harness into the “space” in the heddles.



Since AVL looms are available in a variety of widths and total number of harnesses, consult the chart below to determine how many heddles came with your loom and how many heddles to put on each harness (should you wish to distribute the heddles evenly between all of your harnesses). Remember that each individual bundle contains one hundred heddles (see Figure #11 for information as to where to cut the heddles).

# of harnesses		40"	48"	60"	72"
8	heddles per loom	800	800	800	800
	# of heddles per harness	100	100	100	100
16	heddles per loom	1600	1600	1600	1600
	# of heddles per harness	100	100	100	100
24	heddles per loom	2400	2400	2400	2400
	# of heddles per harness	100	100	100	100
32	heddles per loom	3200	3200	3200	3200
	# of heddles per harness	100	100	100	100
40	heddles per loom	4000	4000	4000	4000
	# of heddles per harness	100	100	100	100

Now pick up one of the harness wires and notice that there is a copper stop near one end of it. That end is the top. Insert the bottom end of the harness wire into the hole located at the end of the “top” harness stick and down through the hole in the bottom harness stick. Repeat this for the holes on the other end of the upper and lower harness sticks.

When you are certain you’ve done this correctly, you can untie the twist ties. Now, if you will spread the heddles out along the lengths of the harness sticks, you will notice that the heddles are all attached to one another at the top or bottom. These connecting loops can be cut to make threading easier. This will not weaken nor unravel the heddles (see Figure #11).

(Another hint to make threading easier: While you have your heddles spread out between two harnesses, mark above the eye of each one with a colored pen. For instance, you may use four colors of pen and mark the eyes on the heddles of harness 1 with purple, the eyes of harness 2 with red, the eyes of harness 3 with blue, and the eyes of harness 4 with orange. Harness 5’s code color will be purple, harness 6’s code color red, and so on. This makes it easier to tell which heddle belongs to which harness and lessens the chance of threading errors.)

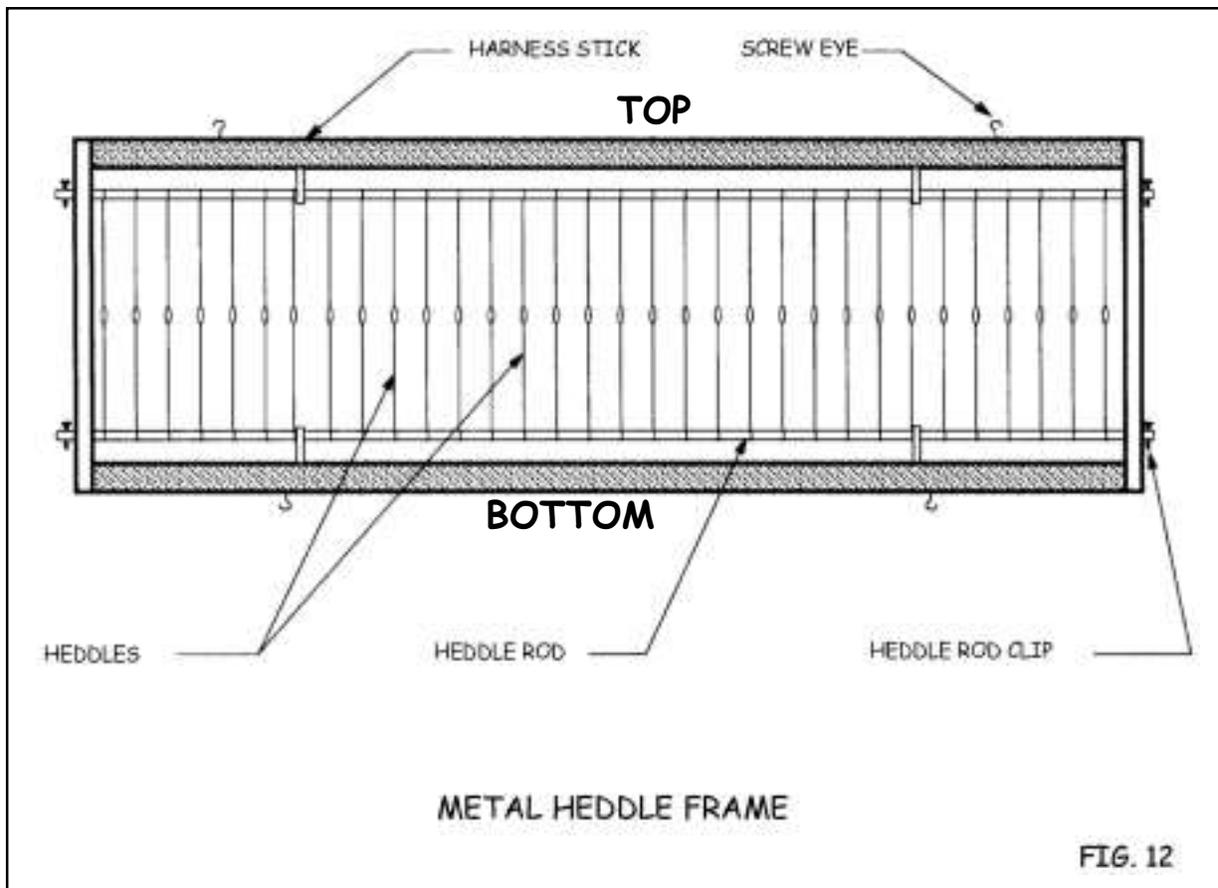
Now pick up your single harness assembly by the top harness (the one farthest away from you on the table). Bring it over to your loom and hook up your last harness cables (the ones closest to the back of the loom) to the screweyes in the harness stick. There, you’ve completed one harness, now the rest should be easy!

Repeat the steps above for each harness assembly. Always have the “top” harness stick be the one furthest away from you with the screweyes facing away.

Remember to keep the bottom harness sticks in order. The 1’s go toward the front of the loom followed by the 2’s closest to the back of the loom. Proceed to #6.

5. Metal Heddle Harness Frames

The metal heddle harness frames come fully assembled with the exception of the heddles themselves. The heddles should be installed onto the harness frames before you hang them in the loom. To do this, remove the clips from either end of the heddle rods and transfer the desired amount of heddles onto each harness (see Figure #12). After replacing the end clips on the heddles rods, you can hang the harness frames in the loom by connecting them to the waiting ends of the harness cables. Note which harness stick is top.



6. Attaching the Spring Lever Chain

Now that you have assembled and hung all of your harness sticks, you can hook them up to the spring lever chain. Near the outside end of each spring lever is a chain. Take the end link of your last spring lever on the left side and hook it to the left screweye on the underside of the last harness stick. Repeat for the right side. Now hook up all of the harnesses in the same fashion.

7. 40 Harness Looms: Attaching the Spring Pulley Chain

Now that you have assembled and hung all your harness sticks, you are ready to attach them to the spring pulley system. These springs are different from our other loom springs, therefore needs more attention when assembling.

Notice there are four packs of springs numbered 1-10, 11-20, 21-30, and 31-40 sitting on the floor in front of your loom. Open package 31-40. Take one end and hook it under the #40 harness. Bring the cord down and under the pulley, over to the corresponding pulley, and up to the other hook on the opposite side of the #40 harness. Repeat this procedure through harness # 31.

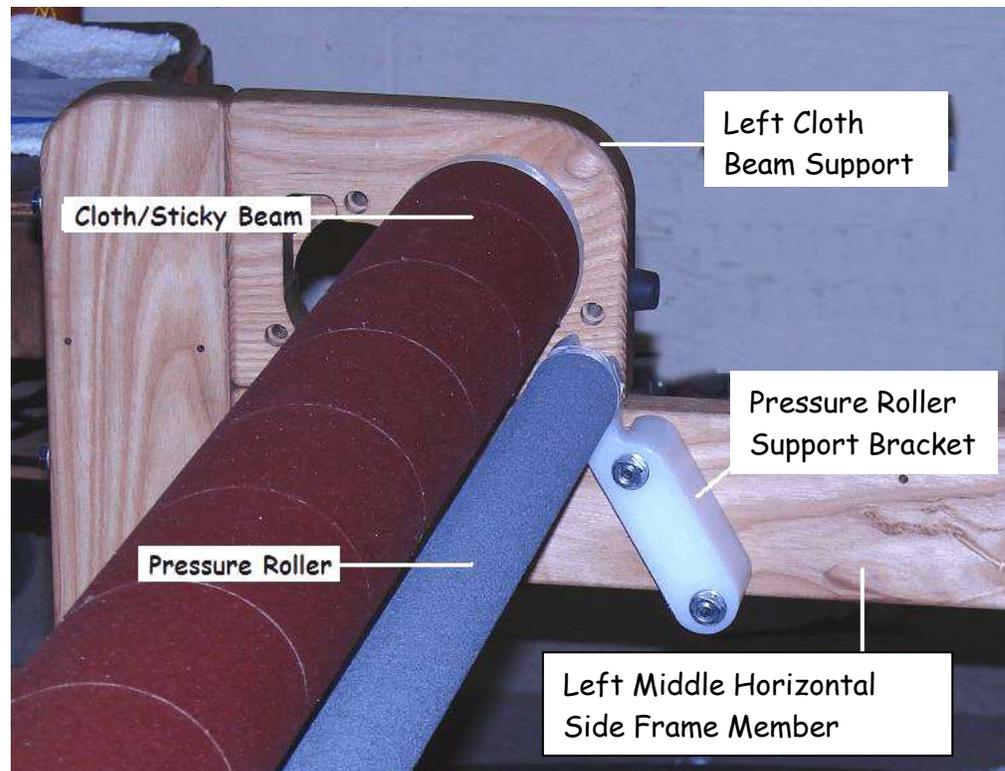
Next, open package 21-30. Repeat the procedure as above. Continue on with 11-20 and 1-10. Due to the different lengths of these cords, it is very important they do on in order.

PRESSURE ROLLER ASSEMBLY

The Pressure Roller adds increased capacity to the Cloth Storage System because it extends the contact of the woven cloth with the Sticky Beam well beyond the point where it would otherwise leave the beam and move on to the Cloth Storage System. Another advantage is that you can cut off your work at any time without losing warp tension.

1. **The Pressure Roller Assembly** consists of:

- 2 - Support Brackets with Spacers
- 1 - Pressure Roller
- 1 - Hardware Pack
 - (4 - 5/16" x 3-1/2" Carriage Bolts)
 - (4 - Washers)
 - (4 - Hex/Jamb Nuts)



PRESSURE ROLLER

FIG.PR-1

2. **Mounting the Pressure Roller Mount Brackets**
(See Figure PR-1)

Locate the two diagonally spaced holes that are located in the Lower Cloth Beam Support, below and slightly behind the Upper Cloth Beam Support. Insert the carriage bolts, from the outside, through the Support and Bracket. You will need to use a hammer to seat the carriage bolts in place. Tap on the head of the carriage bolt until the square part of the bolt is pressed into the wood.

Mount the oblong Spacer (without the claw) on the two bolts and then mount the Support Bracket onto the bolts, so that the claw-like end is up and opens away from the Cloth Beam. Place one washer and one hex/jamb nut on the end of each bolt, in that order and tighten securely in place. Repeat for the Bracket on the opposite side.

3. Installation of the Pressure Roller

Locate the Pressure Roller. Position it along the back of the Cloth Beam, aligning the pins at each end with the openings in the Mount Bracket "claws". Drop the Pressure Roller into place.

TREADLES

NOTE: Skip this section if your loom has an A-Lift or E-Lift,

1. Removing Rods and Blocks

NOTE: Since this step involves removing hardware from the bottom of the lower front crosspiece, you may wish to block up the front of the loom for easier access to the hardware.

Look at your lower front crosspiece and notice that mounted on the top of it are two wooden mounting blocks: one 3/8" steel rod and two round wooden spacers. Remove both blocks and separate them from the rod (notice that the "rod hole" is off-set (slightly) away from the lower front ... remember to reassemble the blocks the same way).

2. Installation of Treadles (see Figure #14)

Locate the treadles. There are two treadles: one is shorter than the other. Kneeling over the lower front, orient them so that the longer one is on the left.

Now pick up the rod that you took off of the lower front. Slip the rod through the horizontal hole at the end of each treadle with both wooden spacers in place between the treadles. Now slip the treadle end blocks onto each end of the rod. The order of parts in the assembly now should be as follows (from left to right):

- ◆ left mounting block
- ◆ left treadle (the long one)
- ◆ two spacers
- ◆ right treadle
- ◆ right mounting block

You can now bolt this treadle assembly to the top face of the lower front and gently set the front of the loom back down on the floor.

Check your treadle assembly with Figure #14 to be certain you've done it correctly. OK, now let's tackle the tie-up.



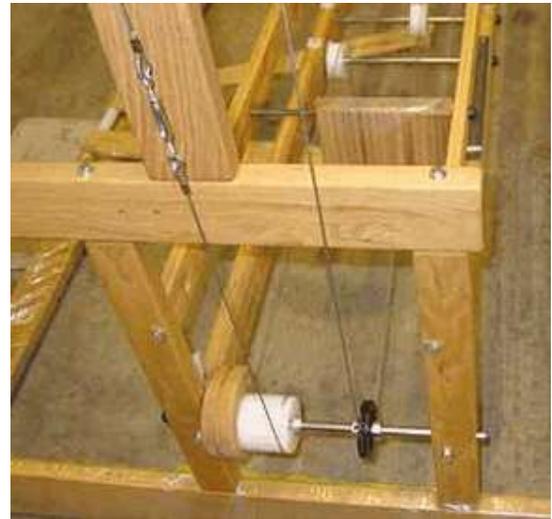
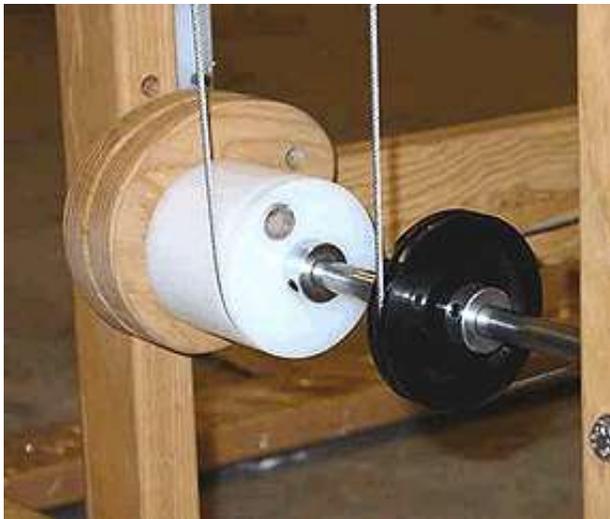
TREADLES

FIG. 14

3. Treadle Tie-Up

A. Left Treadle

There are two cables coming out of the bottom of the dobbie head. Take the longest one and run it down to and under the groove of the pulley nearest to the rear of the loom in the dobbie cam and pulley assembly (see Figure #15).



DOBBY CAM & PULLEY ASSEMBLY

FIG. 15

Now climb right inside the loom and continue by routing the cable over and down the far left pulley in the “treadle pulley assembly”. Notice the bolt going through the large access hole near the far end of each treadle. Remove the nut from the bolt in the left treadle and back the bolt out so that the end of the bolt is at about the middle of the large access hole. Now slip the loop (of the long cable you have just routed over the pulley) over the end of the bolt. Push the bolt back in and tighten the nut provided with a wrench. With the treadle hanging, the cable should be coming straight up from the bolt and over the left side of the left pulley.

B. Right Treadle

Now let's handle the right treadle. Look at the dobbie cam and pulley assembly and you'll see another cable wound around and taped to the groove in the cam pulley (nearest to the front of the loom). Untape and partially unwind the cable around the pulley. Now run the cable over the top of the pulley directly above the right treadle and down to meet the treadle. Pull the bolt out beyond the access hole as you did for the left treadle and secure the cable to the treadle by holding the loop in line with the bolt (inside the access hole) and passing the bolt through the loop and on through the treadle. Replace and tighten the bolt and acorn nut as you did on the left treadle.

C. Cable with Turnbuckle (see Figure #15)

Look at your dobbie head and notice that there's one more cable coming out of the bottom of it. Notice also that there's an eyebolt on the bottom end of the cable with a metal turnbuckle attached to it. OK, now turn your attention back to the dobbie cam and pulley assembly. There is, wound around the middle groove in the assembly, a cable with an eyebolt on the end of it taped down. Untape this cable and rotate the dobbie cam assembly by hand in a clockwise direction (as you are looking at it from the rear of the loom). This will cause the short treadle cable to wind up on its pulley and raise the right treadle. Keep rotating the pulley until the treadle comes all the way up and stops against the treadle pulley. This has also probably caused the cable that you have just untaped to get wound up on the dobbie cam assembly. If it has, unwind the cable while you hold onto the dobbie cam making sure that the right treadle stays up against the treadle pulley.

Now take hold of the end of the eyebolt and pull it up toward the dobbie head. If you've done the assembly correctly, you should be able to make the treadle go up and down by pulling the eyebolt on the cable up and letting it down.

Good, now take the turnbuckle completely off the dobbie cable and then restart it again, but just enough to get it started (not more than two turns). Now pull up the cable that makes the treadle go up and down and screw the turnbuckle to the eyebolt (this is a reverse thread so turn the turnbuckle in the same direction you did to start it onto the dobbie cable eyebolt). That's it except for the final adjustment.

D. Adjusting the Turnbuckle

The purpose of the turnbuckle is that it provides a way to adjust treadle travel so that you get a full shed.

In order to get the proper adjustment, you'll need to tighten or loosen the turnbuckle until, when the left treadle is pushed all the way down, the slide plate raises and touches the upper bumpers in the dobbie box. At this point, the short treadle should stop about 1/2" to 1" below its cable pulley. When adjusted properly, the right treadle should stop approximately 1" to 2" from the floor on its down swing and 1/2" to 1" from the cable pulley on its upswing.

INSTALLING BEAMS AND ROLLERS

1. Rear Cloth Storage System Rollers

A. Upper and Lower Rollers

Now the roller tubes for the rear cloth storage system can be installed. Here's all there is to it:

Drop the upper cloth roller #26 into the slotted brackets (see Figure #1 for placement). Then pick up the lower cloth roller (also #26) and slip one end into its pinned slot. Pull the pin out of the other bracket, drop the roller in, replace the pin, and you've done it.

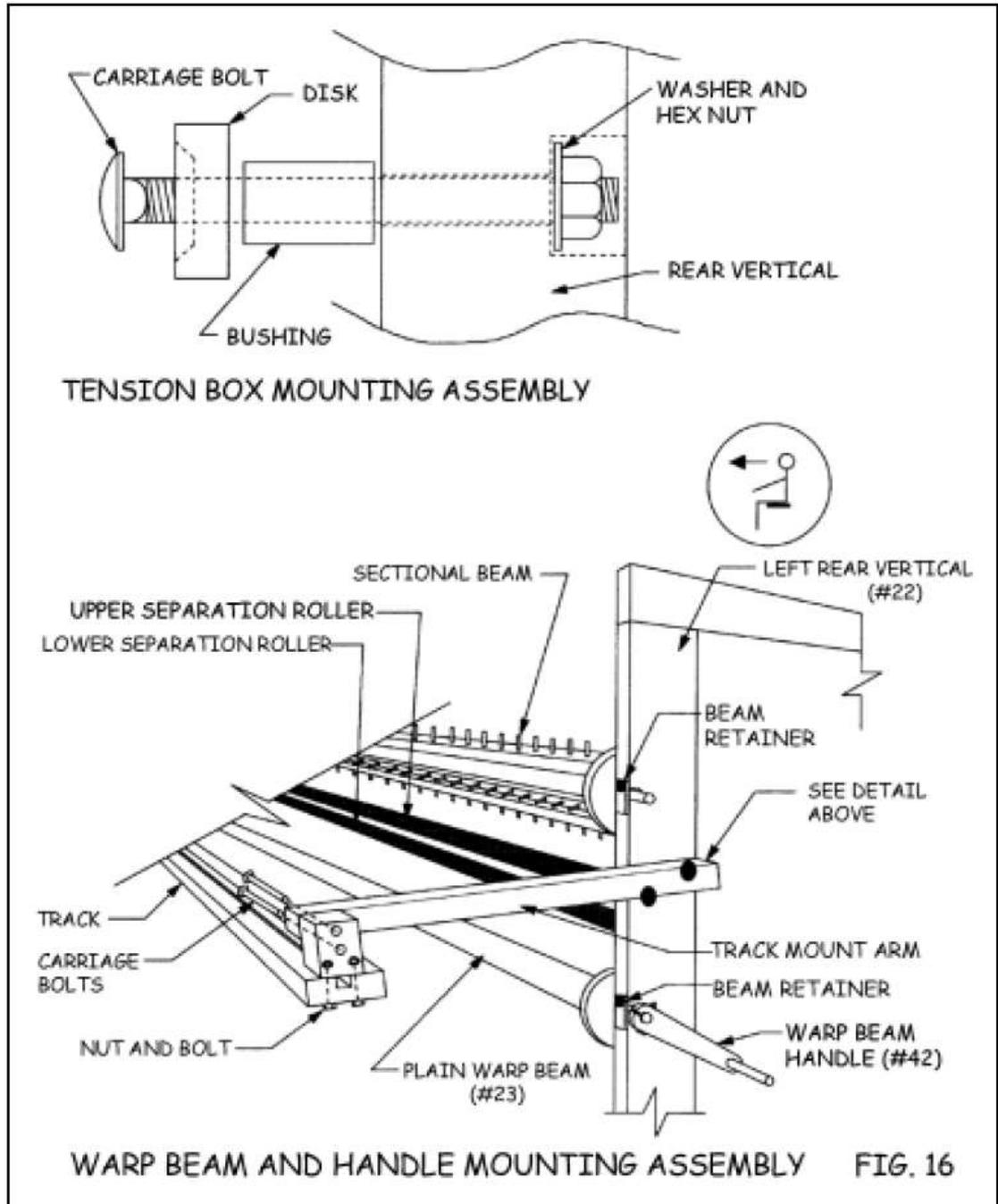
At this point, you should have one roller left (#28). It is a bit longer than the others and the open end of the roller has a small notch in it. This tube will be installed later when we complete the cloth storage system. You can set this part aside for now.

2. Installing the Standard "Plain" Warp Beam or 1/2 Yard Sectional Warp Beam

Install the standard plain warp beam in the lower two slots in the back edge of the rear verticals (see Figure #16). The axle of the warp beam is locked in place by the beam retainers. Lift up the warp beam, and with the (large, round) wooden drum to the left side of the loom, seat the beam axle into the slots. Swing the retainers around to hold the beam. When the latches have captivated the axle and are in a vertical position, tighten them down.

3. Warp Beam Handle

Locate your warp beam handle (#42) (see Figure #16). Remove the wing nut, washer, and bolt from the end of the handle. Place the hole in the handle over the left end of the warp beam axle (making sure the handle faces away from the loom). Line up the hole in the axle with the carriage bolt and push it through. Reattach the washer and wing nut and tighten.



4. Installing the Second Plain Warp Beam
(optional equipment)

Install the second plain warp beam in the upper slots to the outside edge of the rear verticals.

Lift up the second warp beam, and with the drum to the left side of the loom, seat the beam axle into the slots. Swing the retainers and when they have captivated the axle and are in vertical position, tighten them down.

5. Installing the Separation Roller (#39) (see Figure #1)

If you have ordered one beam, you will have received one separation roller. If that beam is a plain beam or a 1/2 yard sectional beam, the separation roller will go in the lower position as shown.

On the other hand, if that beam is a one yard sectional beam, the separation roller will go in the upper position.

Slip one end of the roller into its pinned slot. Pull the pin out of the other bracket, drop the roller in, and replace the pin.

If you have ordered two beams, you will have received two separation rollers and you will install one in the upper and one in the lower position.

6. Installing Tension Box Mounting Studs
(optional equipment) (see Figure #16)

If you've ordered a tension box and a sectional beam, you'll need to assemble the tension box track arm mounting studs to the side frame prior to installing the sectional beam. Here's how to do it.

Out of your tension box hardware bag, locate four 5/16" x 2-1/2" carriage bolts, black discs and bushings, washers, and hex nuts. They are called track arm mount studs. Install this assembly, from the outside of the loom, through one of the two holes provided on either rear vertical (as shown in Figure #16). Slip the washer and nut on the inside of the loom frame and tighten with a 1/2" socket wrench. Repeat this process with the remaining three bolts.

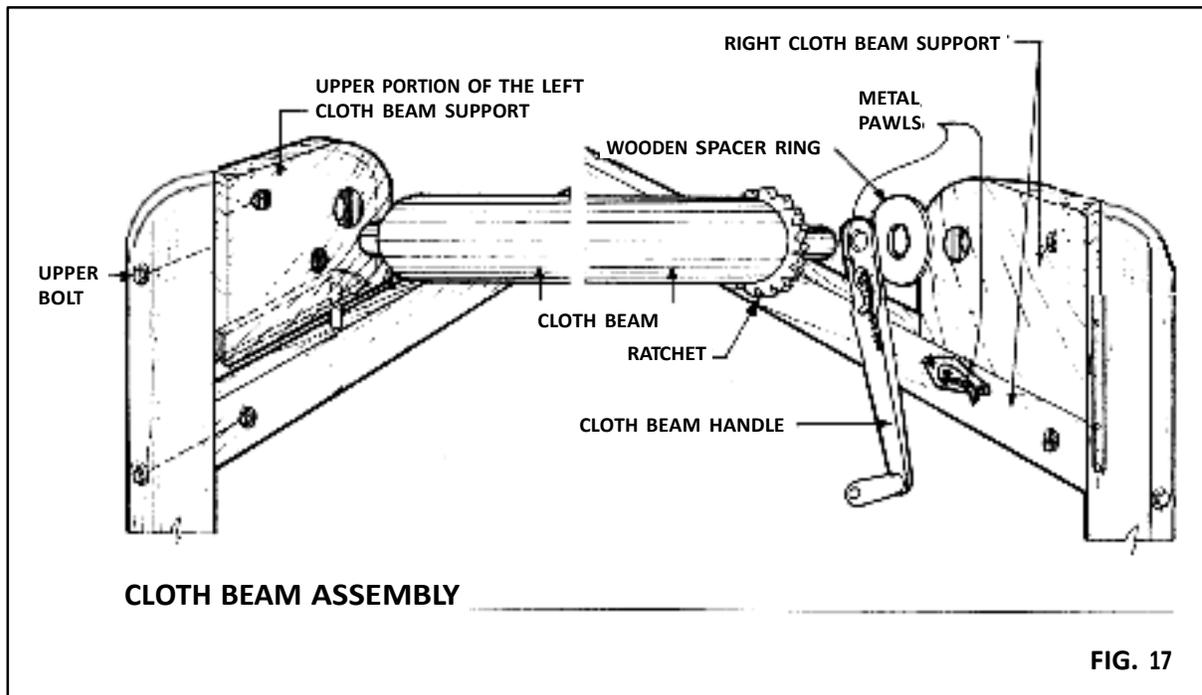
7. Installing the Sectional Beam (optional equipment)

Install the sectional beam in the upper slots to the outside edge of the rear verticals (as shown in Figure #16). Lift the sectional beam up to the back of the loom. Make sure that the large drum end of the beam is toward the left side of the loom. Fit the axle into the slots and swing the retainers around to hold the axle. When the retainers have captivated the axle, and are in a vertical position, tighten them down.

8. Installing the Cloth Beam

A. Removing the Cloth Beam Support

The cloth beam can be taken in and out of the loom simply and easily by removing the upper section of either cloth beam support (see Figure #17). In our example, we'll remove the upper portion of the left cloth beam support. Using your crescent wrench (or socket), turn the upper bolt (shown clearly in the drawing) counterclockwise until the nut disengages it. Pull the bolt until the upper portion of the cloth beam support can be lifted out.



B. Assembling the Cloth Beam Handle

Locate the cloth beam. It is the beam with the abrasive covering and a ratchet on one end.

Now locate your cloth beam handle and plastic spacer ring (#25). Insert the ratchet end of the cloth beam into the hole in the cloth beam handle (with the wooden knob of the handle facing the inside of the loom), then into the spacer ring. Insert the other end of the cloth beam into the large hole in the upper portion of the cloth beam support that was removed in step A..

C. Assembling the Cloth Beam

NOTE: Before installing the cloth beam to the loom, make certain that the metal pawl is in the “off” position or pulled back around so that it is out of the way of the cloth beam ratchet.

Slip the end of the cloth beam with the ratchet, handle, and spacer ring into the corresponding hole in the cloth beam support that is still on the loom. Now bring down the left end of the beam and fit the pin (belonging to the lower portion of the cloth beam support) into the slot (belonging to the upper portion). Reinstall the bolt and tighten the square nut.



ASSEMBLING THE CLOTH BEAM



FIG. 17a

INSTALLING BEAMS AND ROLLERS

TEMPLE SYSTEM
(to prevent draw-in)

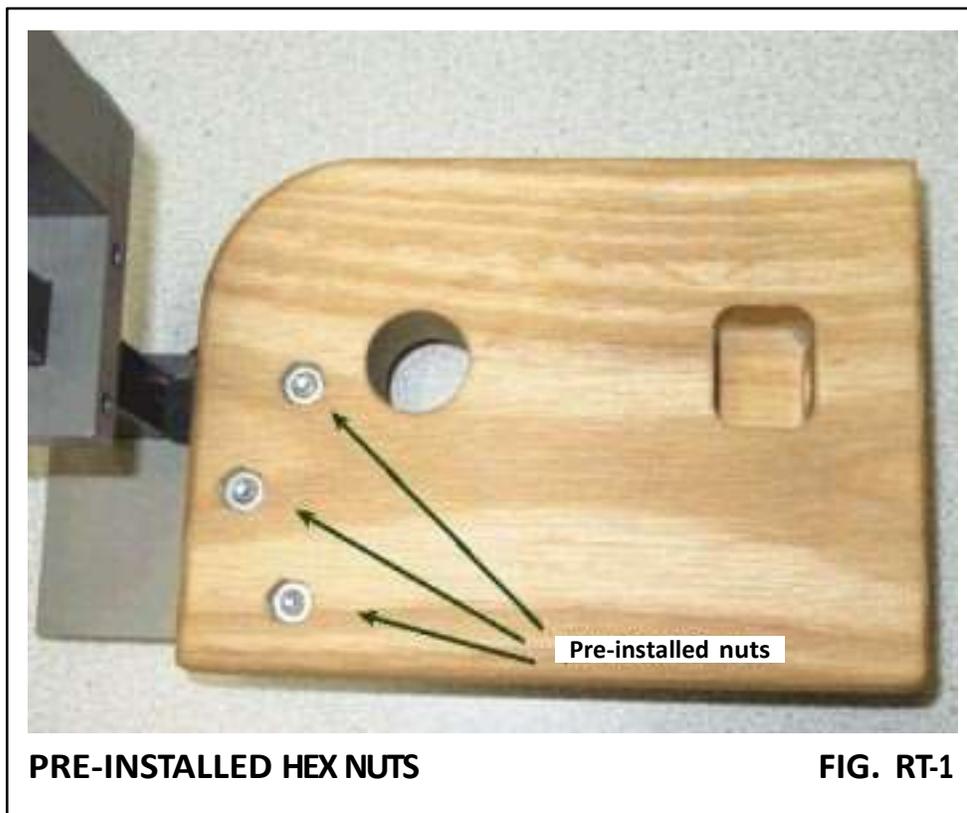
The Temple System is used to maintain a good selvage and prevent draw-in. You'll usually deploy it after you've woven-off a yard or so of fabric, once you have selvage enough to work with. It consists of two rollers (barrels), working in tandem, which grab the selvage and prevent it from drawing in.

Ring Temple System
Assembly

The ring temple system is used to maintain a selvage and to prevent draw-in. It is best to install the rod and side brackets before tying on your warp. The ring temple cloth guides can be put on after you have woven enough yardage to get your apron rods around the front beam. Once you have gotten this far on your project, it's time for your ring temples.

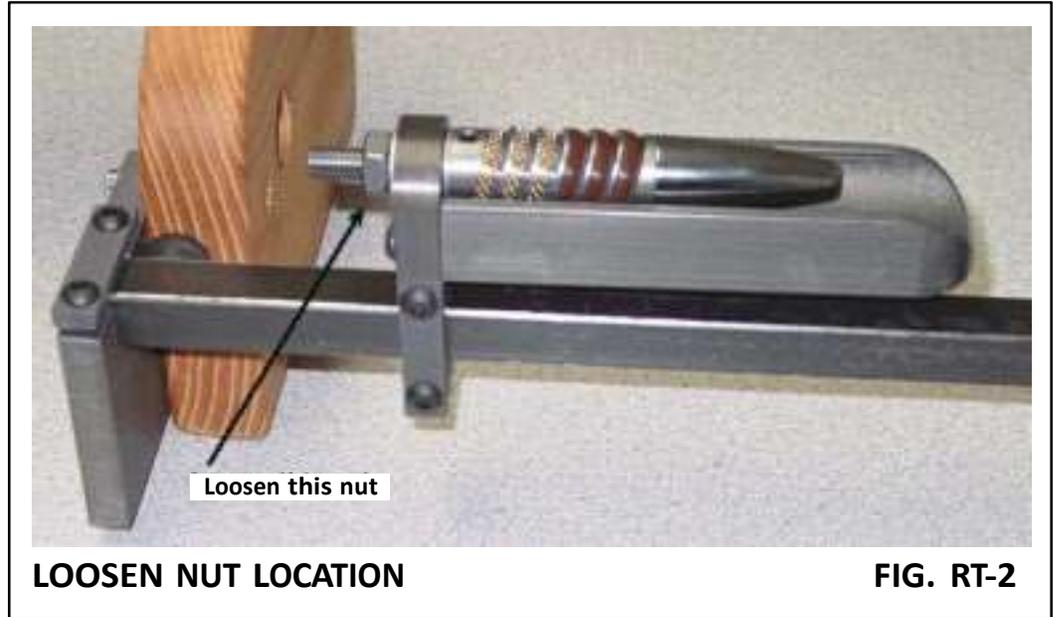
This device looks complicated, but is, in fact, relatively easy to work with. So take a deep breath and here we go.

First notice on your upper cloth beam supports, there will be three pre-installed hex nuts.



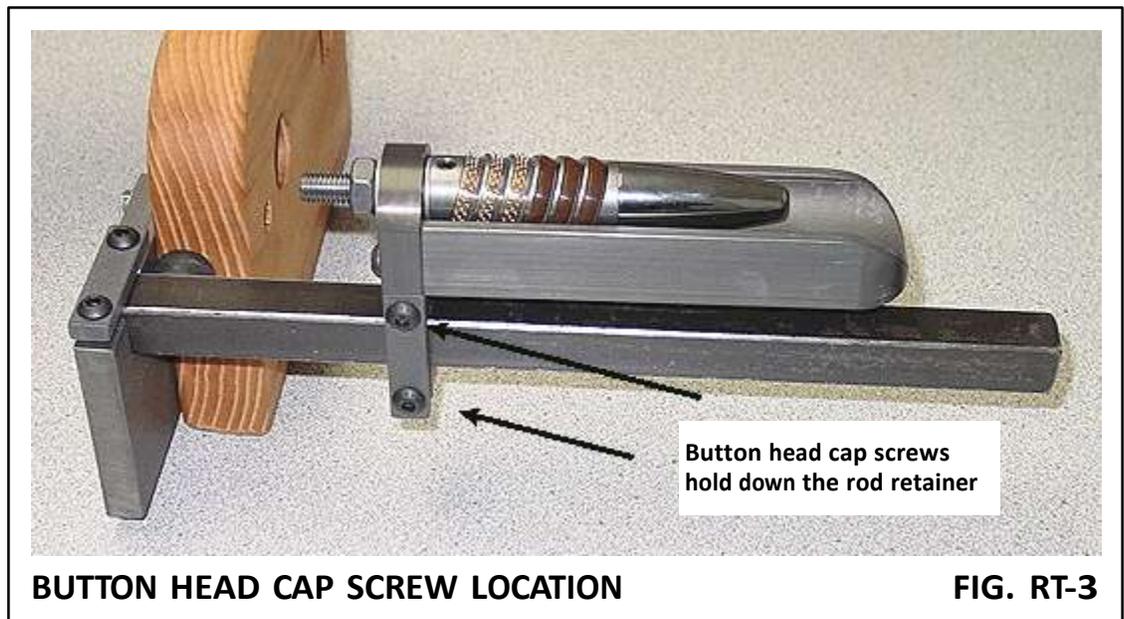
Mount the temple rod brackets to the outside of the loom with the three bolts provided in your hardware packet. Put on both brackets, then loosen the button head cap screws on the top of the bracket in order to slide the rod. Once the rod is in place, tighten the cap screws securely.

Remove the ring temple assembly from the packet. The first thing you want to do is take the ring temples off by undoing the nut at the end of the rod. Set them aside for now.



Remove both button head cap screws on the side holding the rod retainer. This is the small strip of metal that will hold your ring assembly in place.

Mount the temple cloth guide onto the rod from the front of the rod so the rod retainer will be facing the back of the loom.

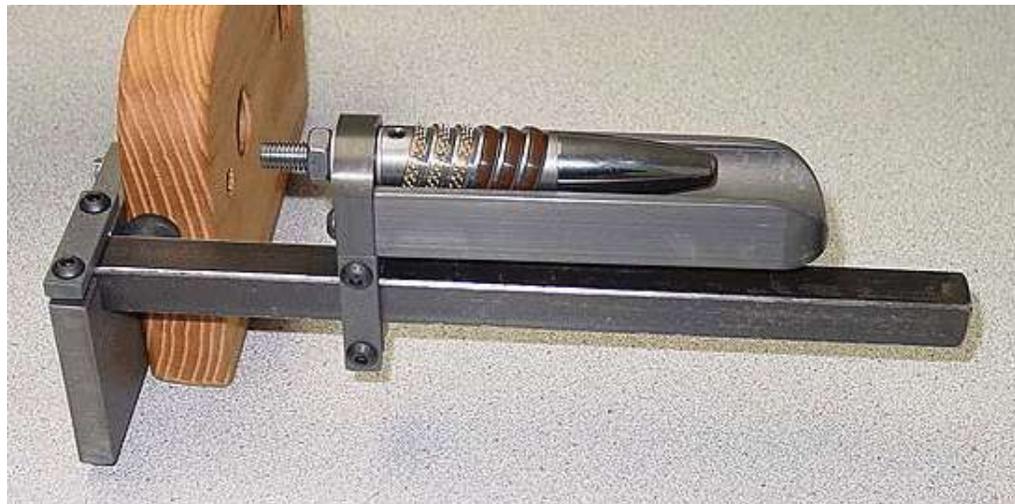




VIEW FROM FRONT

FIG. RT-4

This makes it easier for you to adjust your brackets as needed. Keep the screws a little loose so you can adjust the guide to the necessary position. Your fabric should then rest on top of the guide and come near the end of the temple mount bracket. Once this is in place, it's time to put on the ring temples. Make sure to have one washer on the rod, place the rod through the slot of the mount bracket. This slot gives you the choice of how much tension is needed depending on the type of fabric you're weaving. Now on goes another washer and then the nut. Leave a little loose and mount the other side following the same procedure. Once both sides are in place, you're ready to adjust to the perfect tension.



VIEW FROM REAR

FIG. RT-5

Press down on the ring temple until you're comfortable with the tension and tighten the nut securely. Now the other side. When all is set, take a quick look (and feel) and make sure everything is very tight. This is very important in order to not have it loosen later.

Using a temple system is somewhat of an art and opinion varies amongst weavers about things like the choice of rings. In fact, there are many rings to choose from -- some with large spikes, some with shorter. Call AVL for details.

ASSEMBLY AND
ROUTING OF THE CLOTH
STORAGE SYSTEM

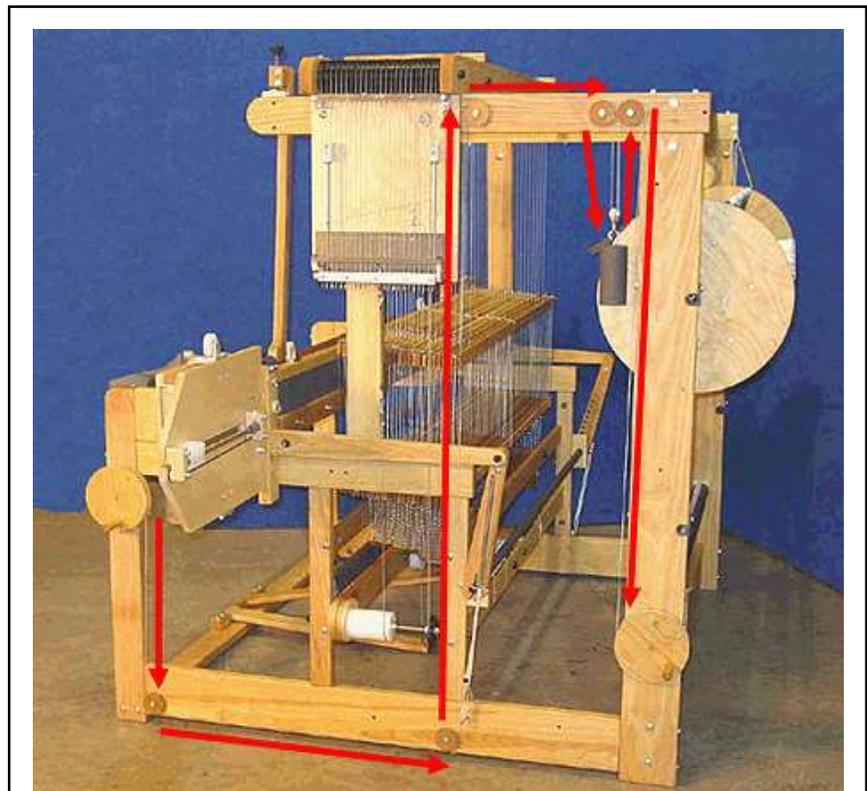
1. Cloth Take-Up Handle Assembly

Locate the Cloth Take-Up Drum Assembly (#30). There is a metal ratchet and shaft attached to it. Using your Allen wrench, loosen the set screw inside the ratchet and remove the ratchet and one washer. From the outside of the loom, insert the shaft that's coming out from the center of the drum, into the hole in the right front vertical side frame member (see Figure CSS-1 for relative position). Slide the washer, then the ratchet, back onto the shaft. The ratchet should be facing so that the large flat face is toward the loom. Now tighten the set screw and flip the wooden ratchet dog (that's already mounted on the loom for you) around to intersect with the ratchet teeth.

2. Locate the Cloth Storage Drum Assembly (#29)

There is a cloth storage drum with roller tube end and shaft attached to it. It will be mounted to the bottom of the right rear vertical on the outside of the loom. Loosen the set screw inside the tube end and remove it with one washer from the shaft. Insert the shaft through the rear vertical from the outside. Replace the washer and the tube end. Tighten the set screw.

Route the cord from the cloth storage drum around the pulleys as shown in the photo.



ROUTING THE CORD

FIG. CSS-1

When the end of the cord is between the two pulleys that are side-by-side on the upper horizontal, insert the cord through the metal counterweight pulley and continue routing over the last pulley on the upper horizontal. Then take it all the way down to the pulley on the lower horizontal. Continue on past the next pulley on the lower horizontal, then up to the concave surface of the cloth take-up drum/handle assembly.

Thread the cord end through the hole at the base of the concave surface of the drum and tie a double-knot on the outside.

There is a retention pin affixed to the rear vertical. Insert it through the hole in the cloth storage drum and the corresponding hole in the rear vertical of your side frame.

Attach the counterweight (a black cylindrical weight) to the loop on the counterweight pulley.

STORAGE ROLLER

When weaving long lengths of fabric, the material is taken around the front cloth beam and through the loom to the rear cloth storage roller which can accommodate a roll up to 20" in diameter. The cloth storage system is designed to automatically wind the cloth onto the storage roller as the warp is advanced. A looser tension is maintained on the storage roller than on the weaving. This eliminates any unnecessary strain or matting of the fabric.

The special abrasive surface of the cloth beam (either sandpaper, SoftGrip™ or SmoothGrip™) holds the proper weaving tension while allowing a lighter tension to be maintained for cloth storage. This also makes it possible to weave long lengths of fabric that have an uneven surface which would ordinarily cause poor tension because of the uneven build-up on the front beam.

You will need the long apron for this purpose. Stick the Velcro® (loop side) edge of the apron to the Velcro (hook side) on the storage roller.

Then wind the apron once around itself so that it holds itself in place. Then simply route the apron over the rear cloth storage roller, under the lower roller, over the upper roller, and under the cloth beam, then up and over the top of the cloth beam. Insert the apron rods and allow enough room between the reed and the cloth beam. If necessary, gently wind the apron up until the metal apron bar is in the proper position for tying on to insert the retainer pin. After tying on your warp, be sure to put on the weight before removing the retainer pin from the drum and rear vertical before weaving.

As the weaving proceeds and the cloth is wound forward, the weight on the pulley will gradually descend. Before the weight hits bottom, wind it back up to the top using the take-up drum. This will happen about every 1-1/2 to 2 yards.

ASSEMBLING THE BENCH

The bench comes disassembled to facilitate shipping. The contents of the box should be:

- ◆ one bench top with two metal brackets attached
- ◆ two legs
- ◆ two feet
- ◆ one lower cross piece
- ◆ one hardware package
- ◆ instructions

Refer to Figure #B-1 for help with the assembly of your bench.



BENCH ASSEMBLY

FIG. #B-1

1. Assemble the feet to the legs using the 3" bolts.
2. Bolt the crosspiece to the legs using the 3-1/4" bolts (the square nuts should go into the nut access holes of the crosspiece and the bolts should be tightened securely once you've made sure the assembly is fairly square).
3. Attach the bench top to the legs with the 2-1/4" bolts.

You will notice that there are two holes on one edge of the bench top. Locate these holes to the rear of the bench assembly. These holes are used to mount the AVL bench bag. This bag, which can be ordered separately from AVL, gives you a handy place to store shuttles, bobbins, and other weaving accessories. Notice that there are several holes near the top of each leg. Choose which holes are best for your particular height.

The angle of the bench top is also adjustable. Just set it to the amount of tilt that you prefer and tighten the two nuts and bolts that attach the brackets to each (these are the four remaining bolts from your hardware package).

Now your bench is fully assembled and ready to use. If you are using the bench along with an AVL loom, you will notice that the feet of the bench are designed to interlock with the lower front cross member of your loom. When used in such a way, it will add stability to the loom by adding the weight of the bench and the weaver to that of the loom. If you want to use the bench on another loom or for some other purpose, you can tilt the bench top the other way and short end of the feet will then become the front of the bench.

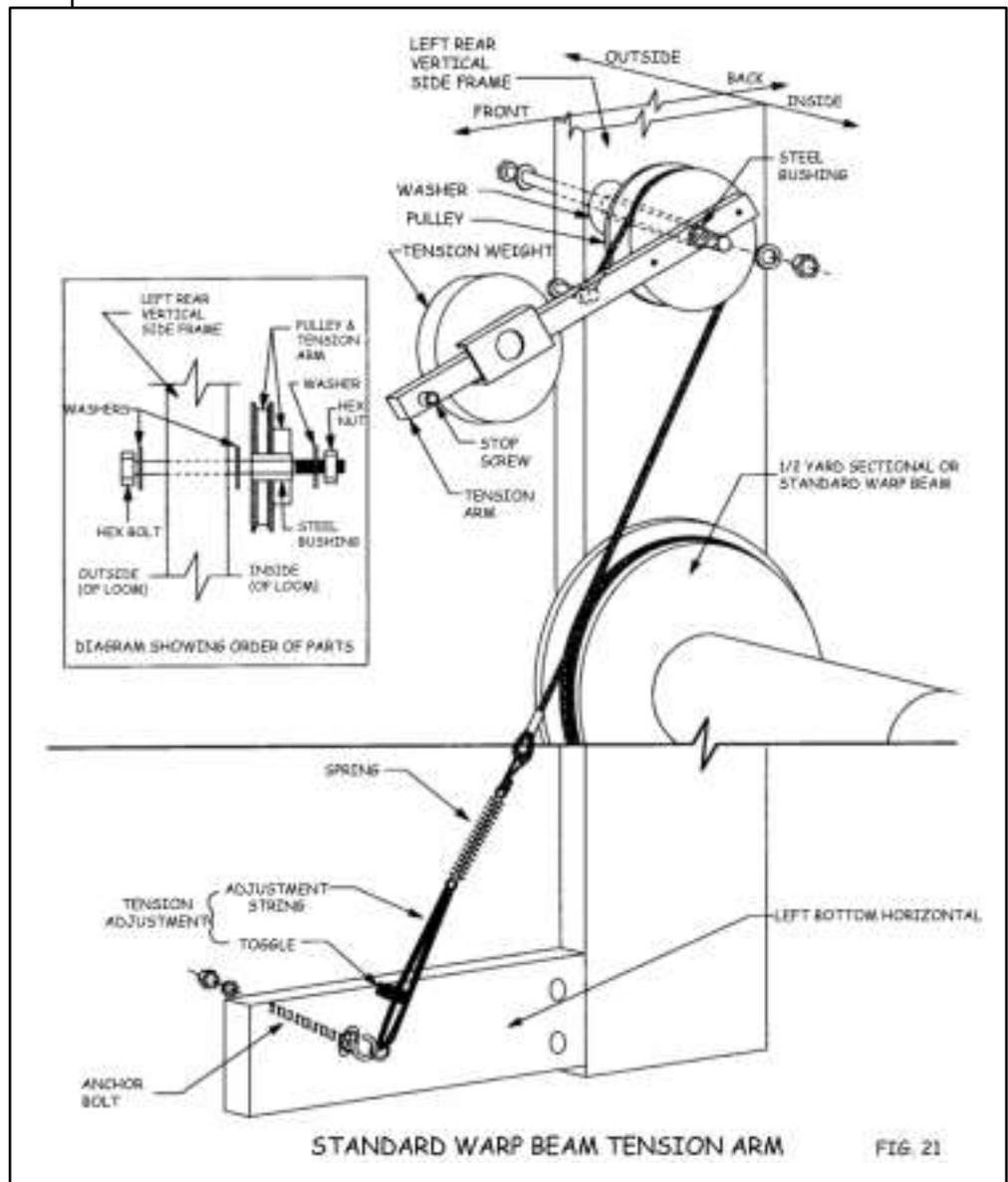
TENSION ARM INSTALLATION

1. Standard Warp Beam and 1/2 Yard Sectional Beam Tension Arm

If you have ordered a standard warp beam or a 1/2 yard sectional beam, proceed with this section.

If you have ordered only one beam and it is a one yard sectional beam, please skip this section and go to 3. One yard sectional beam tension arm (upper position).

Orient the arm so that the face of the pulley will lie against the inside of the left rear vertical (as shown in Figure #21; refer to Figure #1 to locate the relative position of the lower tension arm).



Remove the long bolt from the pulley end of the tension arm. Keeping one washer on the bolt, push the bolt through the lower hole in the rear vertical from the outside. (Unless you are putting on a 1/2 yard sectional beam. In this case, you will need to insert the bolt from the inside to provide rotation clearance for the beam.) Now put another washer on and slip the tension arm, with its metal bushing, onto the bolt. Now another washer and the hex nut, tighten it down, and it's on.

After tightening, check to make sure the arm swings freely.

Now the cord tie-up can be attached.

The tension arm comes without the cord attached. Locate the tension arm cord labeled #16. Attach this cord to the tension arm by removing the shoulder bolt (the bolt near the wooden pulley) using a 5/32" Allen wrench and place this bolt through the looped end of the cord and replace the bolt into the tension arm. Now (referring to Figure #21) complete the cord tie-up. The cord comes away from the bolt in the tension arm, over the top of the pulley, and down to meet the front side of the drum on the warp beam. Now wrap the cord around the warp beam drum three times with the first wrap toward the outside of the loom. OK, so far so good.

The last portion of this tie-up is the tension cord adjustment. At the very end of this cord assembly is an eyebolt. Remove one hex nut and washer from the eyebolt and insert it from the inside of the loom through the hole located in the upper rear portion of the left bottom horizontal (see Figure #21). Replace the hex nut and washer on the outside of the loom and tighten the eyebolt, placing it so that it sets as far inward as possible (no threads protruding beyond the nut on the outside of the loom).

Now locate the tension arm weight. It is a heavy black disk with a wooden bracket on one side of it. To attach the weight to the arm, you will need to remove the black knobs and wooden bracket from the weight. Position the weight so it is on the same side of the arm as the wooden disk is. Slide the wooden bracket and bolts back through the weight (the arm should be in between the weight and bracket).

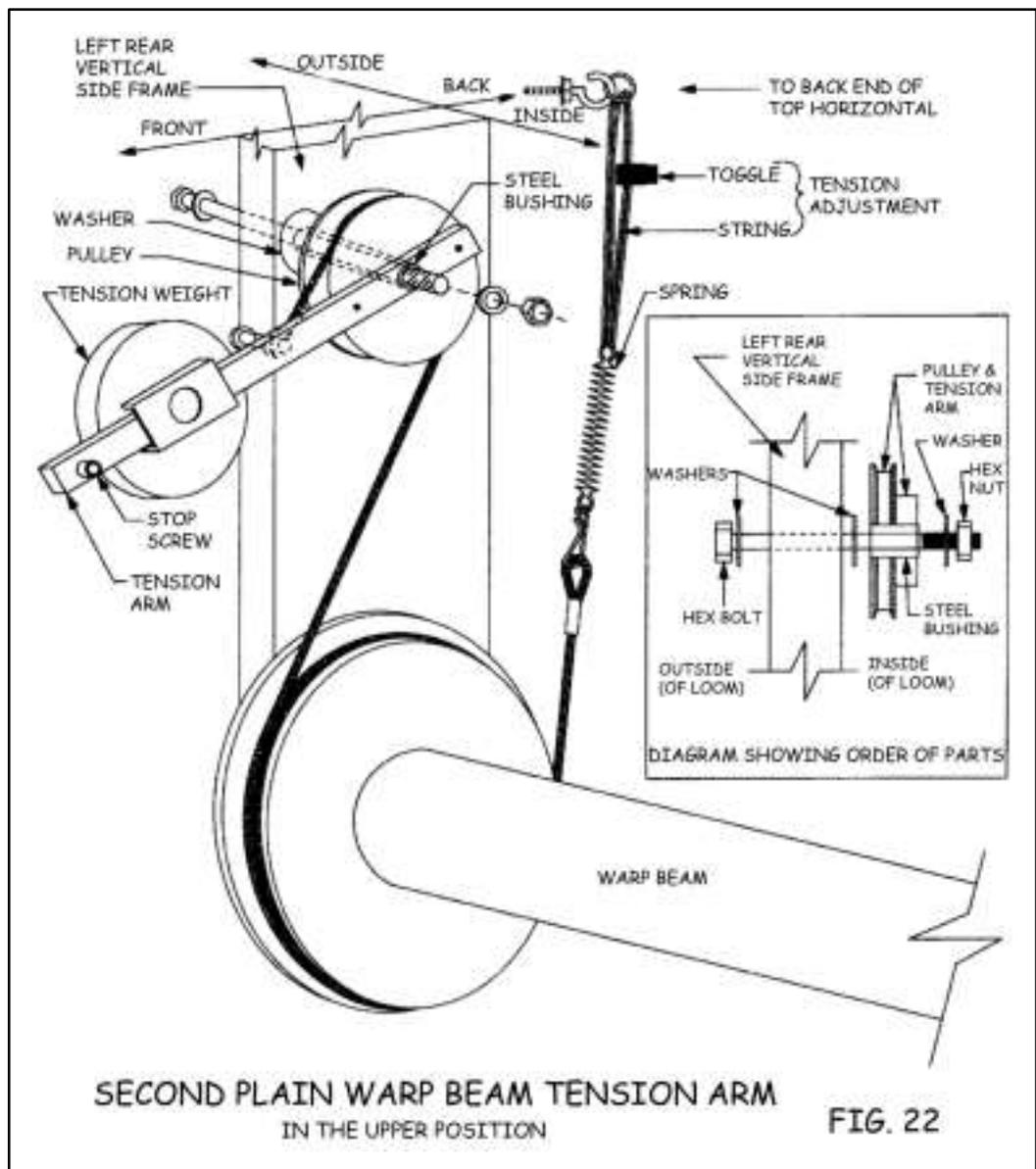
Re-attach the two black knobs and tighten down. The weight will stay anywhere on the tension arm that you place it as long as you tighten the knobs on the weight. The screw at the end of the arm serves as a stop to keep the weight from accidentally slipping off. Proper adjustment of the tension arm will be covered later in the Weaving Section of the manual.

Tension Arm Weight
Instructions

2. Second Standard or Second 1/2 Yard Sectional Warp Beam Tension Arm (upper position) (optional equipment)

If you have not ordered a second beam, proceed to the next section, bottom swing beater assemblies. If you have ordered a second beam and it is a one yard sectional beam, proceed to section 3. One-Yard Sectional Beam Tension Arm (upper position). If you have ordered a second beam and it is a standard beam or a 1/2 yard sectional beam, proceed from here.

Locate the tension arm. Orient the arm so that the face of the pulley will lie against the inside of the left rear vertical (as shown in Figure #22; refer to Figure #1 to locate the relative position of the upper tension).



Remove the long bolt (with its nut and washers) from the pulley end of the tension arm. Put one of the washers back on the bolt and push the bolt through the upper hole in the left rear vertical side frame member from the outside. Now put another washer on and slip the tension arm (with its metal bushing) onto the bolt. Now another washer, the hex nut, tighten it down, and it's on.

After tightening, check to make sure the arm swings freely. Now the cord tie-up can be made. The tension arm comes without the cord attached.

Locate the tension arm cord (#38P). Attach this cord to the tension arm by removing the shoulder bolt (the bolt near the wooden pulley) using a 5/32" Allen wrench and place this bolt through the looped end of the cord and replace the bolt into the tension arm.

Now (referring to Figure #22) complete the cord tie-up. The cord comes away from the bolt in the tension arm, over the top of the tension arm pulley, then down to meet the front of the second warp beam drum. Now wrap the cord around the warp beam drum three times (as shown) with the first wrap toward the outside of the loom.

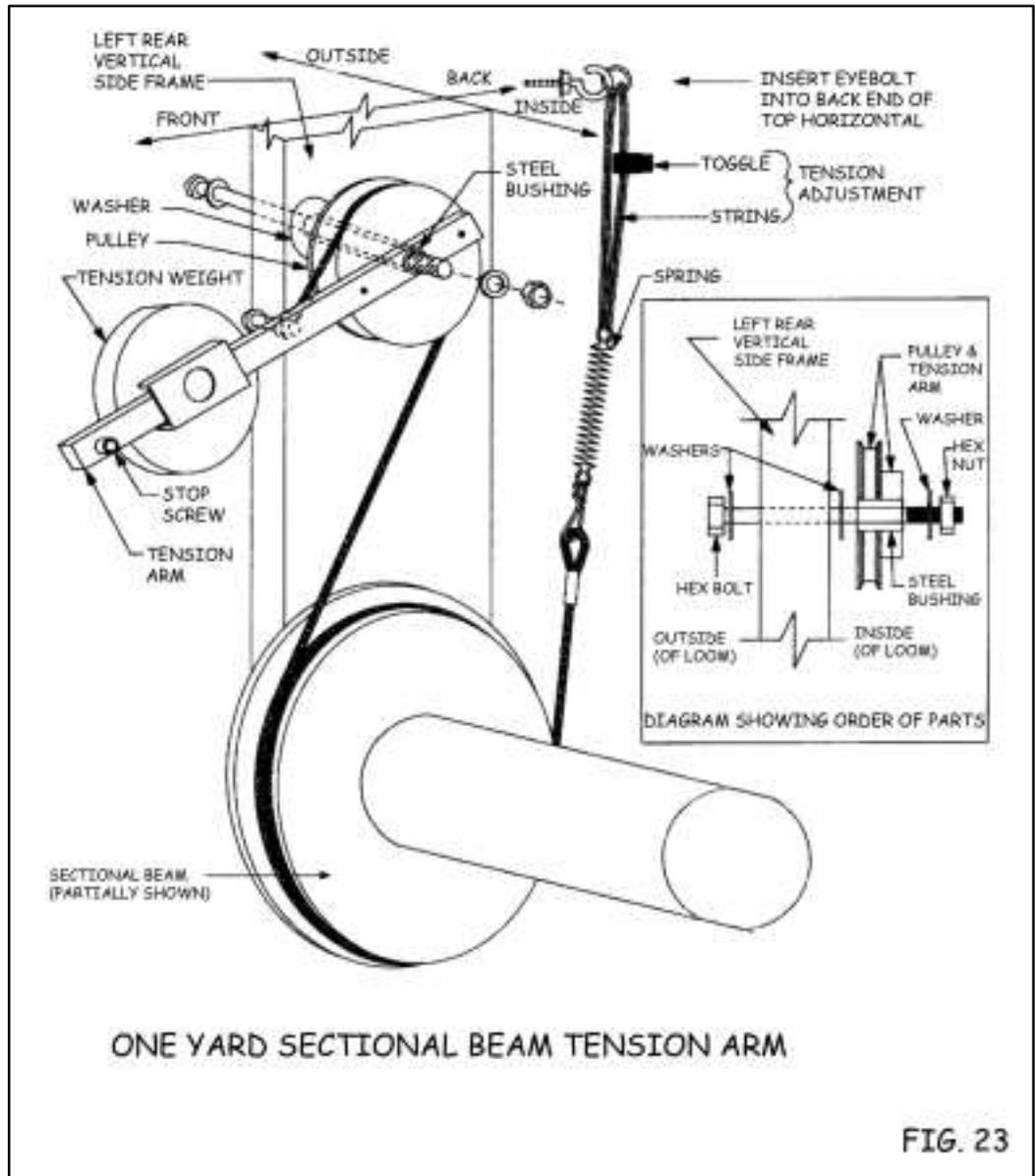
The last portion of this tie-up is the tension cord adjustment. At the very end of this assembly is an eyebolt. Remove one hex nut and washer from the eyebolt and insert it (from the inside of the loom) through the hole located at the very back of the left top horizontal frame piece. Replace and tighten the hex nut and washer on the eyebolt.

Now locate the tension arm weight. It is a heavy black disk with a wooden bracket on one side of it. To attach the weight to the arm, you will need to remove the black knobs and wooden bracket from the weight. Position the weight so it is on the same side of the arm as the wooden disk is. Slide the wooden bracket and bolts back through the weight (the arm should be in between the weight and bracket). Re-attach the two black knobs and tighten down. The weight will stay anywhere on the tension arm that you place it as long as you tighten the knobs on the weight. The screw at the end of the arm serves as a stop to keep the weight from accidentally slipping off. Proper adjustment of the tension arm will be covered later in the Weaving Section of the manual.

3. One Yard Sectional Beam Tension Arm (upper position)

Locate the tension arm. It is a long, black bar with a wooden disk at one end.

Orient the arm so that the face of the pulley will lie against the inside of the left rear vertical (as shown in Figure #23; refer to Figure #1 to locate the relative position of the upper tension arm).



TENSION ARM INSTALLATION (Upper Position)

Remove the long bolt (with its nut and washers) from the pulley end of the tension arm. Put one of the washers back on the bolt and push the bolt through the upper hole in the left rear vertical from the outside. Now put another washer on and slip the tension arm (with its metal bushing) onto the bolt. Now another washer, the hex nut, and tighten it down.

After tightening, check to make sure the arm swings freely.

Now the coated cable tie-up can be made. The tension arm comes without the cable and tension adjustment attached.

Locate the tension arm cable (#38S). Attach this cable to the tension arm by removing the shoulder bolt (the bolt near the wooden pulley) using a 5/32" Allen wrench and place this bolt through the looped end of the cable and replace the bolt into the tension arm.

Now (referring to Figure #23) complete the cable tie-up. The cable comes away from the bolt in the tension arm, over the top of the tension arm pulley, and down to meet the front of the sectional beam brake drum. Now wrap the cable around the sectional beam drum three times (as shown) with the first wrap toward the outside of the loom.

The last portion of this tie-up is the tension cord Adjustment. At the very end of this assembly is an eyebolt. Remove one hex nut and washer from the eyebolt and insert it (from the inside of the loom) through the hole located at the very back of the upper left horizontal frame piece. Replace and tighten the hex nut and washer on the eyebolt.

Now locate the tension arm weight. It is a heavy black disk with a wooden bracket on one side of it. To attach the weight to the arm, you will need to remove the black knobs and wooden bracket from the weight. Position the weight so it is on the same side of the arm as the wooden disk. Slide the wooden bracket and bolts back through the weight (the arm should be in between the weight and bracket). Re-attach the two black knobs and tighten down. The weight will stay anywhere on the tension arm that you place it as long as you tighten the knobs on the weight. The screw at the end of the arm serves as a stop to keep the weight from accidentally slipping off. Proper adjustment of the tension arm will be covered later in the Weaving Section of the manual.

Now it's time to sit back, have a cup of tea, and admire your loom. Coming along quite nicely, isn't it? Very good, now back to the fun.

BOTTOM SWING BEATER ASSEMBLIES

Beater Supports

If your beater is of the “overhead” type, proceed to the next section titled OVERHEAD BEATER ASSEMBLIES.

NOTE: Since the beater system uses a lot of carriage bolts, the following information may be helpful. There is a square shape below the head of each carriage bolt. This square portion does not fit easily into the pre-drilled holes. You will find it necessary to tap these bolts into place to properly seat the bolts. This will cause the bolt to “bite” into the wood and stay in place while you tighten the nut.

The beater supports can now be bolted to the loom. First locate your beater supports (#34). There’s one for each side of the loom, so we’ll start on the right side and you can refer to Figures #1 and #24 for correct placement.

Orient one of them so that the round spacers and metal pins are facing toward the loom and the spacer with the threaded rod and metal bracket is toward the front of the loom.

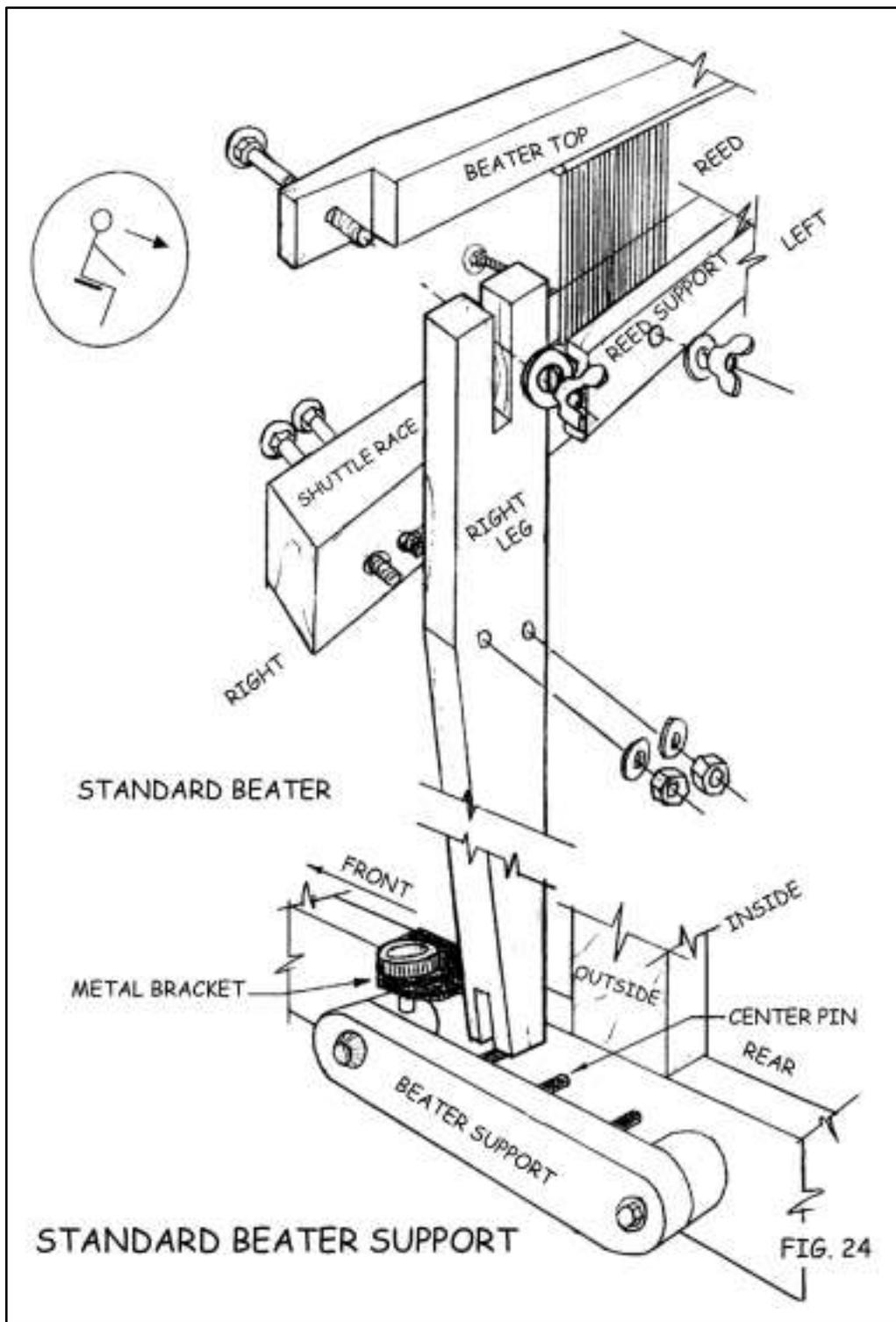
Remove the hex nut and washer from the rear spacer and insert the bolt through the right lower horizontal. Slip the washer and nut back on and tighten the nut just to the point where it almost cinches the two parts together. You want to leave it a little bit loose so that the beater supports can pivot during adjustment. Since the nut is a locknut, it will not loosen. Now locate two 1-1/2' long screws located in the beater hardware package. Position the metal bracket that’s attached to the front of the beater support over the two holes and insert the screws. Tighten them down. Repeat this process for the left side.

1. Standard Beater

If you have ordered a single-box flyshuttle beater, proceed to 2. Single-Box Flyshuttle Beater (optional equipment).

Locate the following (see Figure #24):

- ◆ shuttle race
- ◆ beater top
- ◆ two legs
- ◆ reed
- ◆ reed support
- ◆ hardware



Now pick up the shuttle race and orient it so that the lengthwise groove is to the top and is facing toward the rear of the loom.

Position it in the loom so that it is resting on the cloth beam supports between the cloth beam and the harnesses. Now empty your hardware bag onto a table top. Pick up the four 5/16" x 3-1/2" carriage bolts with washers and hex nuts.

Now locate the beater legs. Notice that they have been marked to designate left and right. Using each leg, orient them so that, with the bottom slot riding in the center pin on the beater support, the tapered side of each leg faces away from the loom. Insert the bolts, from the front of the race, through the race, and into the corresponding holes in the beater leg. These are the two innermost holes. The two outer holes on each end will not be used on this assembly. They are for a single- or multiple-box flyshuttle beaters should you ever care to adapt your loom. Attach the washers and nuts and tighten slightly. Repeat this procedure for the other side of the loom making sure that the tapered side of the leg is always facing away from the loom. Attach the washers and nuts leaving them loose for the moment.

From your hardware package, locate either six, seven, or nine (depending upon the width of your loom) 5/16" x 3-1/4" carriage bolts with washers and wing nuts attached. Remove the washers and wing nuts. Push the carriage bolts through the race so that their heads sit flat on the front of the beater race (don't be afraid to use a hammer to tap these bolts in place). Now carefully slide the reed support onto these bolts so that the lengthwise groove in it faces the groove in the race. Leave enough room so that you can fit the reed between the race and the reed support. Once the reed is in and centered, the washers and wing nuts can be fitted onto the carriage bolts and tightened.

Now orient your beater top so that the groove is facing down and the cut outs at either end are facing toward the rear of the loom. Insert 1/4" x 2-1/4" carriage bolts into the holes located at each end, starting them from the front. Placing the beater top over the race and reed, slide the bolts into the slots at the top of the beater legs and once the reed is securely inside the groove in the beater top, attach the washers and wing nuts and tighten them.

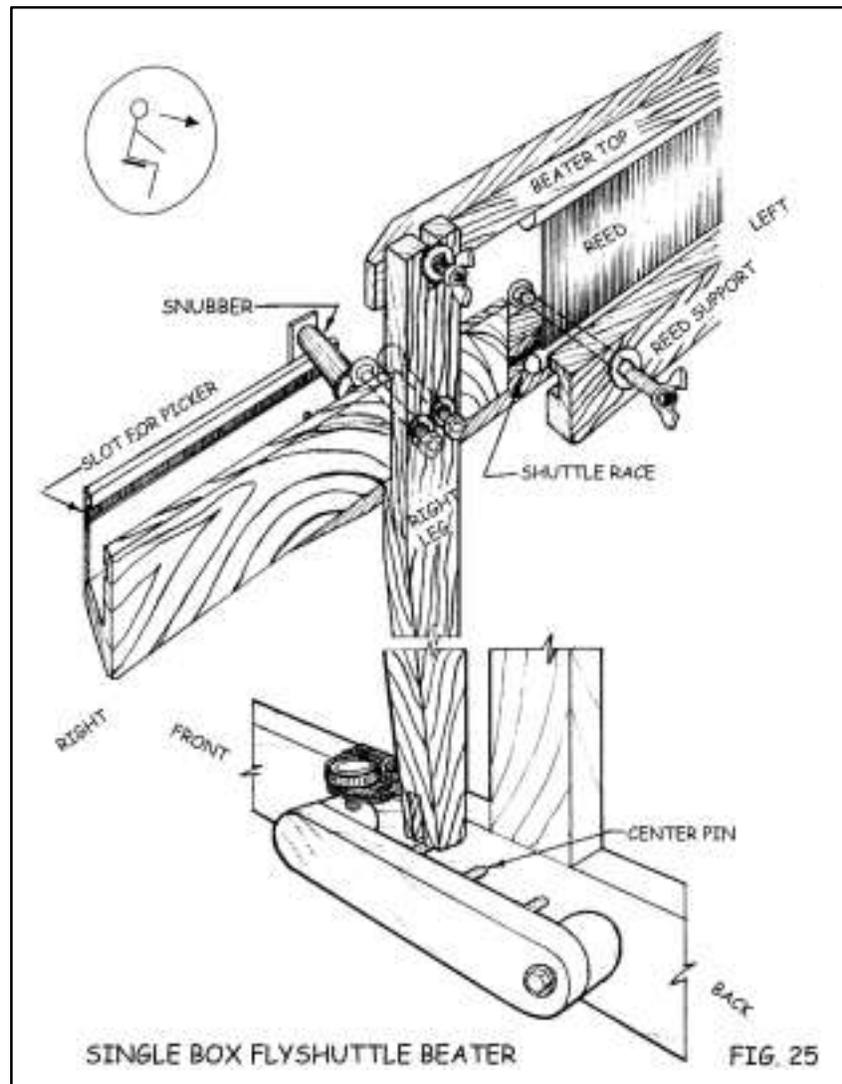
At this point, you should center the beater assembly in the loom and tighten the bolts that attach the beater legs to the shuttle race. Centering the beater will insure that the legs will not rub on the loom frame.

2. Single-Box Flyshuttle Beater (optional equipment)

NOTE: The single-box flyshuttle beater system now incorporates removable shuttle boxes. This allows the weaver to completely remove the boxes and flystring tie-up from the loom any time that an extensive amount of handshuttle weaving becomes necessary. It also makes it much easier to convert any other AVL beater system to a single-box flyshuttle beater.

Locate the following (see Figure #25):

- ◆ shuttle race
- ◆ beater top
- ◆ two legs
- ◆ hardware
- ◆ string tie-up
- ◆ reed
- ◆ reed support



Pick up the race and orient it so that the lengthwise groove is facing toward the rear of the loom and the shorter flyshuttle box sides are towards the front. Now lay the race across the loom in the approximate position it will be when in use.

Empty your hardware bag on a table top. Separate the 5/16" x 3-1/2" carriage bolts, washers, and hex nuts. Look at your beater legs. They are identified as to left and right by a stamp. Orient it so that the cut out section faces the front of the loom and the tapered side of the leg is to the outside. Position the small notch located at the bottom end of the leg over the center pin in the beater support. Now attach the race to the leg using two of the 5/16" x 3-1/2" carriage bolts. Slip on the washers and nuts and attach loosely. Repeat the procedure above for the left side making sure the tapered side of the beater leg faces away from the loom. Leave these nuts loose for the moment.

From your hardware package, locate either six, seven, or nine (depending upon the width of your loom) 5/16" x 3-1/4" carriage bolts with washers and wing nuts attached. Remove the washers and wing nuts. Push the carriage bolts through the race so that their heads sit flat on the front of the beater race (don't be afraid to use a hammer to tap these bolts in place). Now carefully slide the reed support onto these bolts so that the lengthwise groove in it faces the groove in the race. Leave enough room so that you can fit the reed between the race and the reed support. Once the reed is in and centered, the washers and wing nuts can be fitted onto the carriage bolts and tightened.

Now orient your beater top so that the groove is facing down and the cut outs at either end are facing toward the rear of the loom. Insert 1/4" x 2-1/4" carriage bolts into the holes located at each end, starting them from the front. Placing the beater top over the race and reed, slide the bolts into the slots at the top of the beater legs and, once the reed is securely inside the groove in the beater top, attach the washers and wing nuts and tighten. Now securely tighten the carriage bolts that attach the legs to the race.

At this point, you should center the beater assembly in the loom and tighten the bolts that attach the beater legs to the shuttle race. Centering the beater will insure that the legs will not rub on the loom frame.

Take the string tie-up and handle from its bag. As you can see, there are three screweyes coming out of the handle. One at the top and two at the sides. Hold the handle up by the clip attached to the string at the top of the handle. This clip will get attached to the screweye that is located in the beater hardware package. However, the screweye must first be screwed into the center hole on the underside of the front harness pulley support. Now screw the screweye in so that no screw threads are showing. Then attach the clip to it.

At this point, there are two pickers hanging below the handle. Take one of these and orient it so that the leather loop is toward the bottom. Now take it to the very outside of the race on the right side. Slide the picker with the leather loop down and toward the outside into the slots between the box sides. Repeat for the other side making sure that the left picker loop is down and toward the outside.

Now locate the flystring supports (#43). These are two small, wooden bars that each have a screweye at one end. These flystring supports should be attached to the inside face of each top horizontal side frame piece. Insert two 5/16" x 2-1/4" carriage bolts from the outside of the two holes on each top horizontal directly above the beater assembly. These supports should hang down from the top horizontal with the screweye end on the bottom. Tighten the supports securely with washers and hex nuts.

Attach the clip at the end of the cord coming from the picker to the screweye on the left and right flystring supports that you just installed. Now notice that there is a snubber attached to the front box on each side of the race (the snubbers are the small, round, plastic pieces above each shuttle box). The cord should go over each snubber.

This completes the assembly of the single-box flyshuttle beater.

OVERHEAD STANDARD BEATER

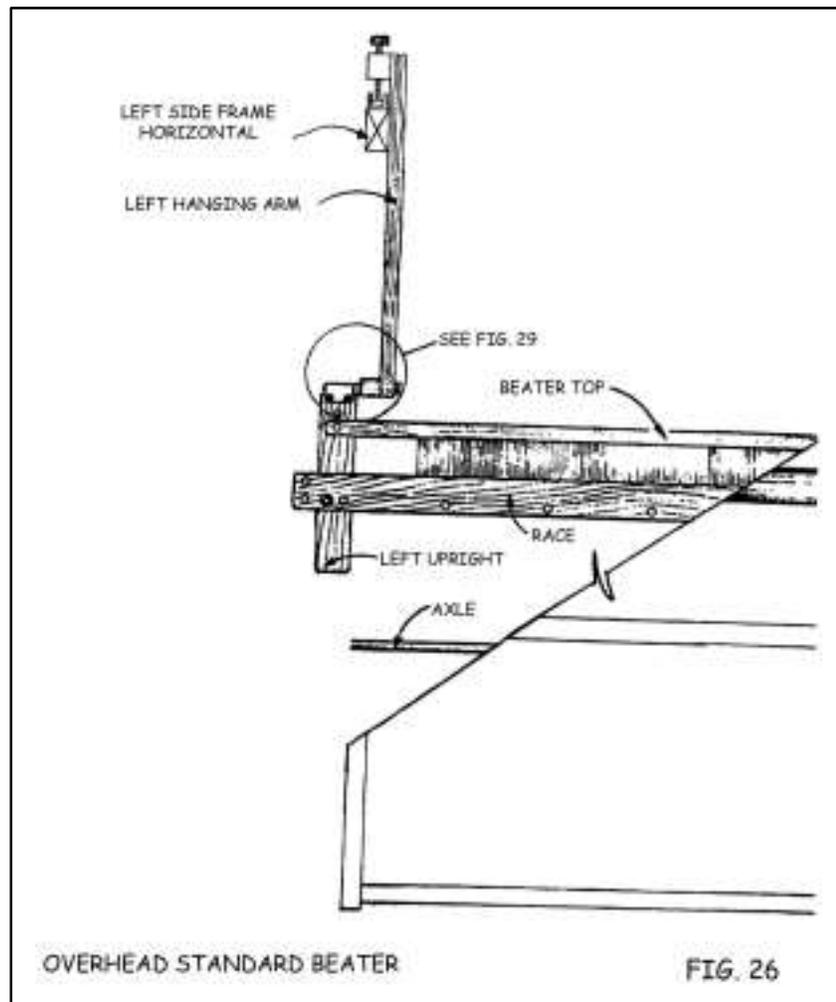
OVERHEAD STANDARD BEATER (optional equipment)

Overhead Standard Beater (optional equipment)

NOTE: Since the beater system uses a lot of carriage bolts, the following information may be helpful. There is a square shape below the head of each carriage bolt. This square portion does not fit easily into the pre-drilled holes. You will find it necessary to tap these bolts into place to properly seat the bolts. This will cause the bolt to "bite" into the wood and stay in place while you tighten the nut.

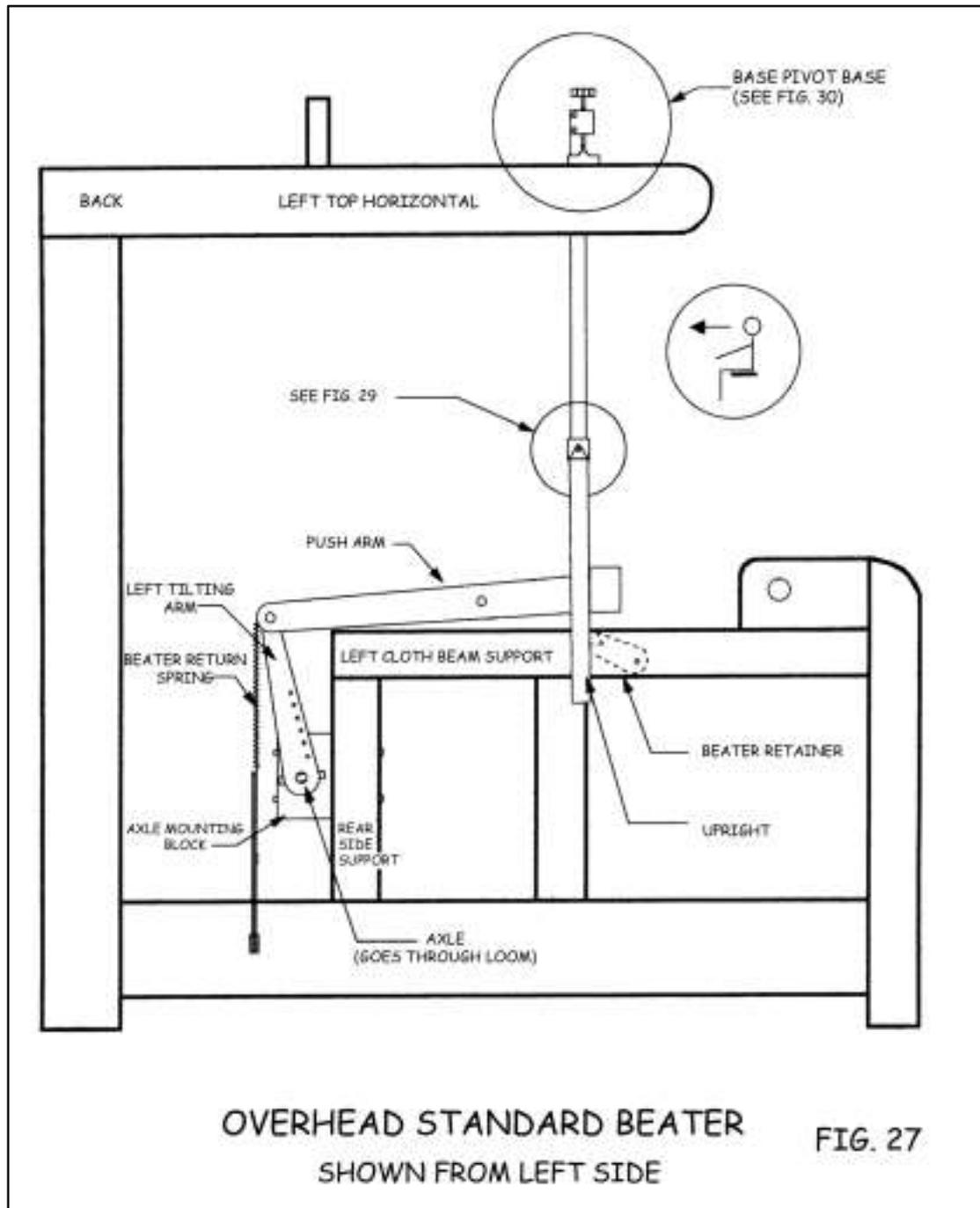
If you have ordered the overhead single-box flyshuttle beater, proceed to section 2. Overhead Single-Box Flyshuttle Beater (optional equipment). If you have ordered the overhead double-box flyshuttle beater, proceed to section 3. Overhead Double-Box Flyshuttle Beater (optional equipment). If you have ordered the overhead four-box flyshuttle beater, proceed to section 4. Overhead Four-Box Flyshuttle Beater (optional equipment).

This system is shipped partially disassembled to facilitate packing. Follow the instructions below to complete the assembly (please refer to Figures #26, #27, #29, #30 and #31 for help with terminology and locations). They are all located together for ease in locating them as they will need to be referred to many times.



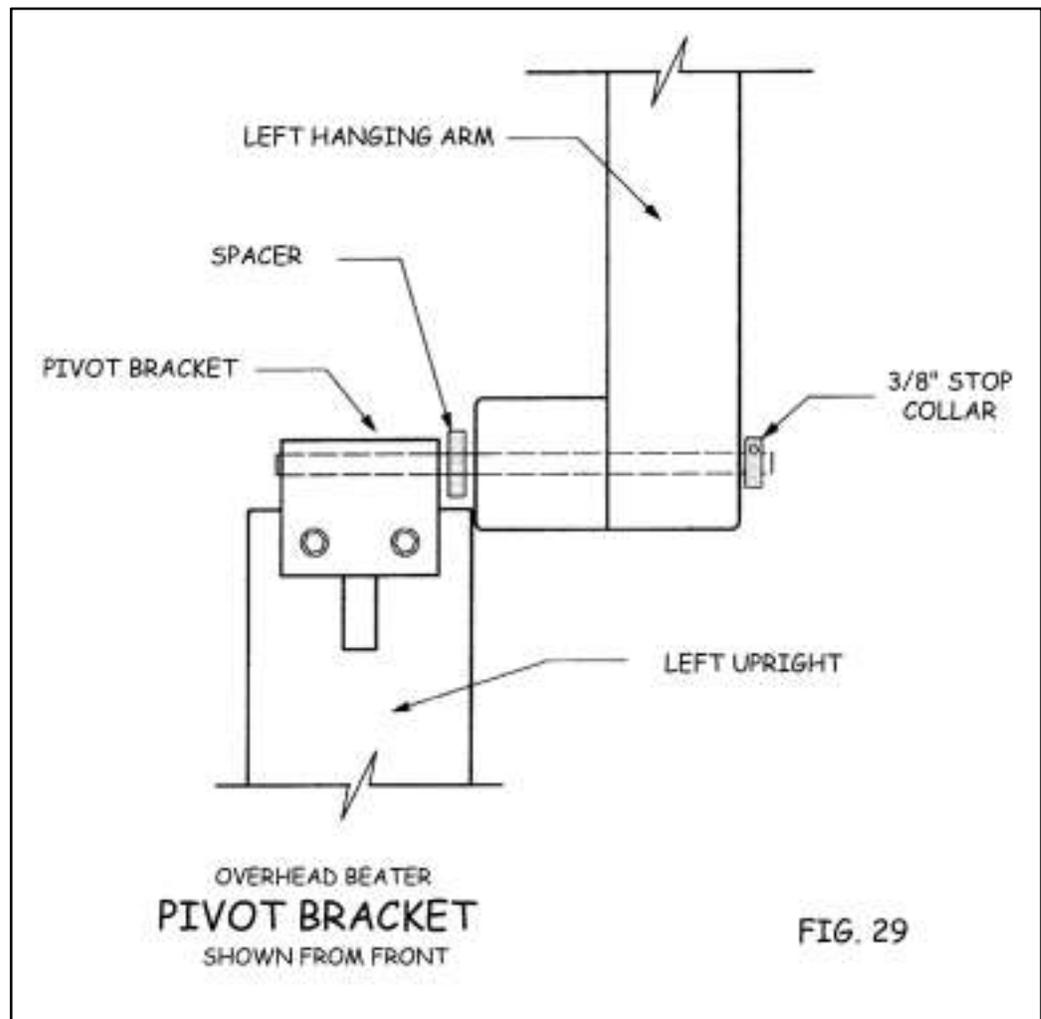
OVERHEAD STANDARD BEATER (optional equipment)

- A. The first step of this assembly is to mount the beater retainer to the inside face of the left cloth beam support. Insert the #12 x 1-1/2" flat head wood screw through the beater retainer and into the pre-drilled hole on the inside of the left cloth beam support (see Figure #27). Leave the screw just loose enough so that the retainer is allowed to pivot around the screw.



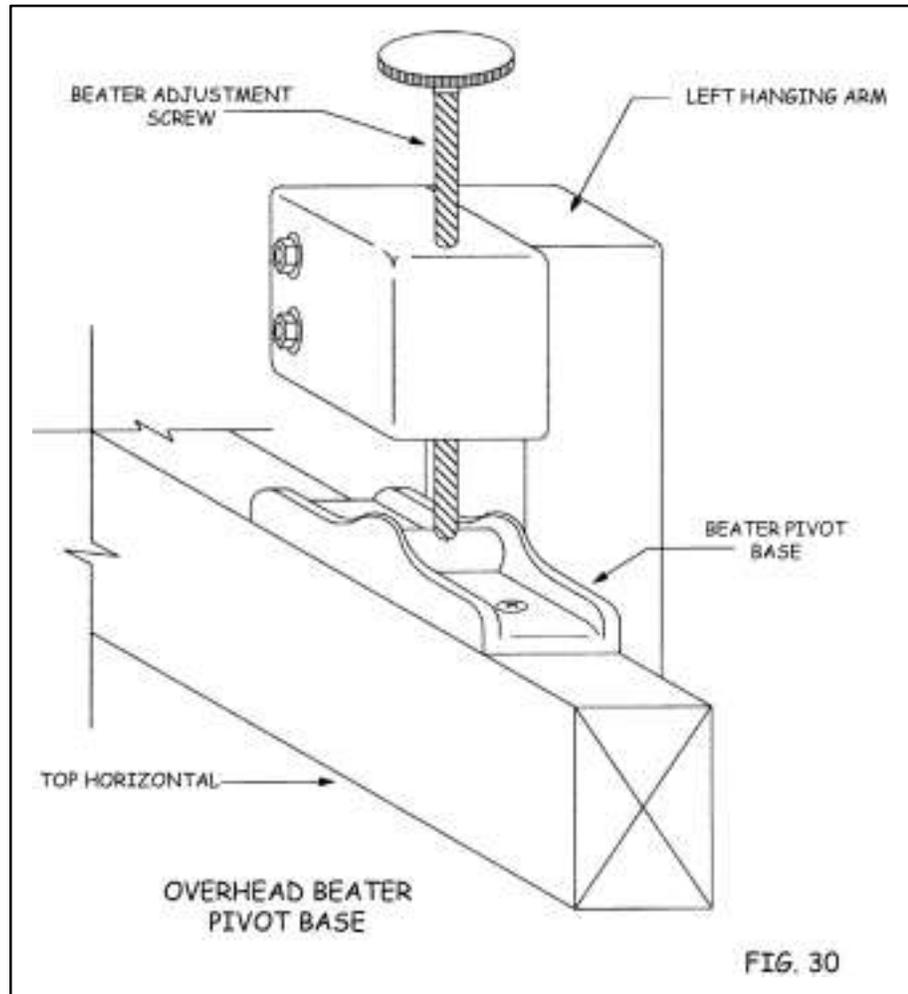
OVERHEAD STANDARD BEATER (optional equipment)

- B. The next step of this assembly is to mount the beater pivot bases to the upper edge of each top horizontal on the assembled side frames of your loom (see Figures #27 and #30). Attach these parts using the four #8 x 3/4" pan head wood screws. Making sure that the notched ends of these parts face upward, insert the screws from the top of the beater pivot bases and screw them into the pre-drilled holes on the top edge of each top horizontal (see Figure #30). Tighten the four screws securely.
- C. Locate the two uprights (see Figures #26 and #29). Lay the uprights on the floor spaced apart a distance that is approximately equal to the width of your loom. The ends with the metal brackets will be the top of this assembly. Now lay the shuttle race on top of the two uprights so that it covers the two holes in the face of each upright as shown in Figure #26.



OVERHEAD STANDARD BEATER (optional equipment)

There is a groove cut in one side of the shuttle race which must be oriented to the top and back of the race which means that it should (for now) be facing down toward the floor. Attach the shuttle race to the uprights with two 5/16" x 3-1/2" carriage colts (one on each side). You will see that there are two holes on each end of the shuttle race that correspond with the two holes on either upright. For now, only the innermost hole on each end will be used. The outer holes take a different bolt and will be used later. Attach the washers and hex nuts to these carriage bolts, but do not tighten them just yet as you will be making some adjustments shortly.



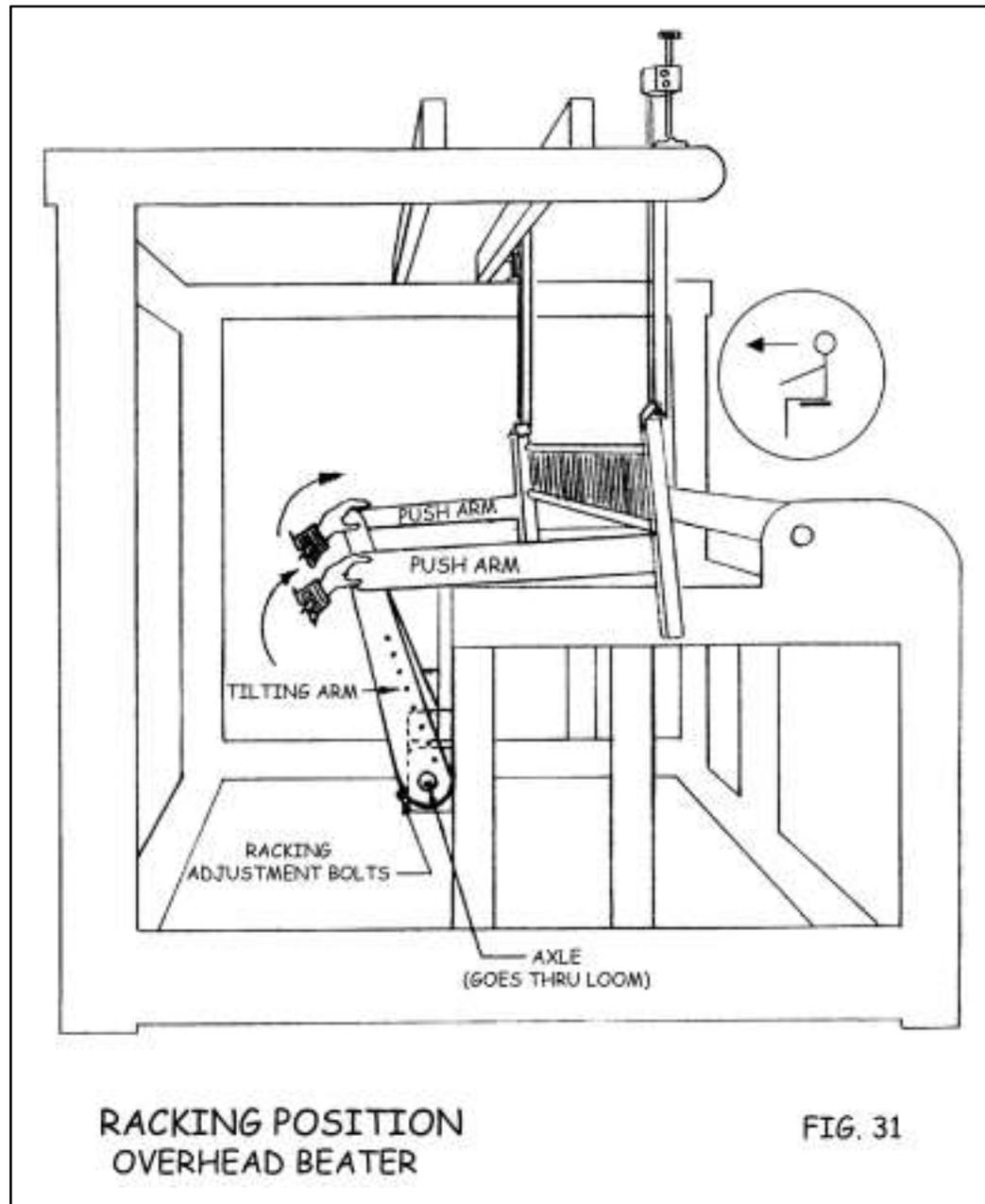
- D. Temporarily attach the beater top to the uprights with two 1/4" x 2-1/4" carriage bolts with washers and wing nuts behind the uprights. The beater top should be attached to the same side of the uprights as the shuttle race with the long groove facing downward. Insert the carriage bolts through the holes near each end of the beater top and then through the slots that are located just below the metal bracket of each upright. You do not need to put the beater top on now, but if you do, it will help in creating proper alignment of the beater parts.

OVERHEAD STANDARD BEATER (optional equipment)

- E. Place the beater in the loom. For now, it will just sit in the loom resting on top of the cloth beam supports just in front of the harnesses. The assembly may tend to fall forward or backward, but don't worry about that. You now have some other assemblies to complete before actually attaching the beater.
- F. The next step is to mount the hanging arms to the uprights on the shuttle race assembly (see Figures #26 and #29). Using an 1/8" Allen wrench, remove the 3/8" stop collars from the metal shafts at the tops of each upright and install the hanging arms onto these shafts making sure that the right and left hanging arms are in their proper positions. Also, be certain to include the small spacer as shown. The stop collars are then replaced and tightened making sure to leave enough clearance for this pivot point to swing freely. Now look at the other end (the top) of one of the hanging arms. Notice that there is a block of wood at this end that the beater adjustment screw goes through. As shown in Figure #30, the foot at the bottom end of the beater adjustment screw should be set into the notch in the center of the beater pivot base which you attached to the loom in step B. of this assembly. Once you have both of the beater adjustment screws in place, the assembly of the hanging arms is complete.
- G. Now you can insert the axle (a long, black pipe with holes at each end) through each of the axle mounting blocks (see Figure #27) so that the axle goes all of the way through the loom. There is no particular right or left orientation for this axle as it is the same on both ends. Now you can center the axle in the loom and place an axle spacer (a round, plastic piece) on each exposed end of the axle.
- H. Now locate the two tilting arm assemblies. They are stamped "L" and "R" and are to be mounted at each end of the axle as shown in Figures #27 and #31. It is important to mount this assembly correctly as shown with the push arms to the outside and the tilting arms to the inside. The tilting arms are attached to the ends of the axle with 5/16" x 3" hex bolts with washers and hex nuts provided. Do not tighten these bolts yet. They will be part of a critical adjustment coming up shortly. You will see a spring/cord/eyebolt assembly hanging from each tilting arm. Just let them hang for now. They will be attached later.

OVERHEAD STANDARD BEATER (optional equipment)

- I. Next, mount each push arm to the back face of each upright (see Figure #27) using two 5/16" x 5" hex bolts, washers, and square nuts. These bolts go through the shuttle race and uprights and end up in a square nut in the nut access hole of each push arm. You can go ahead and tighten these bolts making sure that the outer face of each push arm is relatively flush with the outer edge of their mating uprights. This is also a good time to go ahead and tighten the other bolts that we previously told you to leave loose. While tightening these bolts, you should see that the beater is relatively square and centered in the loom.



The last bolts to tighten are the hex bolts that we shall, for now, call the “racking adjustment bolts” that connect the tilting arms to the axle (see Figure #31). These bolts should be tightened while the entire beater is being held firmly against the beater bumpers. Figure #31 shows the beater being pushed toward the front of the loom. In reality, you can align the beater by pushing the tilting arms toward the front or the rear bumpers. The important thing is to have the beater touching both the left and the right bumpers at the same time.

As shown in Figure #31, push on the upper end of each tilting arm and while the beater is in contact with both of the bumpers, securely tighten the “racking adjustment bolts”. This operation will take two people (unless you have a well-trained dog who is not sleeping). If the beater should come “out of square” in the future, if it should hit one bumper before the other, you will need to repeat this adjustment, loosening the bolts before you start and tightening them securely after.

- J. Now is a good time to attach the beater return spring assembly. This is the previously mentioned spring/cord/eyebolt assembly that hangs from each tilting arm. To attach this assembly, simply remove one hex nut and washer from each eyebolt and place the eyebolt through the hole provided on each bottom horizontal of the side frame assembly (see Figure #27). The eye of the bolt should be to the outside of the side frame. Replace the washer and hex nut and tighten securely.

This assembly is used to assist the weaver in returning the beater to the back position. It is not necessarily intended to hold the beater in this position as that is the purpose of the beater retainer.

The beater return spring assembly is adjustable. It is tightened by pulling on the ends of the white cord while squeezing the black, mini cord lock on the assembly. Whenever an adjustment is made on one side of the beater, a similar adjustment should be made on the other side as well. The amount of tension you set these springs at is strictly a matter of preference. Generally speaking, the stronger the tension, the harder you will have to pull against these springs during the beat. At the same time, however, it will be easier to hold the beater away from you while opening a shed and throwing the shuttle. You may wish to experiment with these adjustments in order to come up with a setting that works best for you and any particular warp.

- K. Locate the reed support (the long, thin, wooden part with several holes and a slot similar to the one in the shuttle race). Attach the reed support to the back of the shuttle race with the slot to the top and facing the shuttle race using the 5/16" x 3-1/4" carriage bolts inserted from the front with washers and wing nuts behind. Before attaching the nuts, install the bottom edge of your reed in the void created by the slots in the reed support and shuttle race. Center the reed between the two uprights and tighten the wing nuts.
- L. There is a slot in the underneath side of the beater top which slides over the top edge of the reed. Push the beater top down on the reed and tighten the wing nuts which hold it in place.

This completes the assembly of your standard beater. Check your assembly with Figures #26, #27, #29, #30 and #31 to be certain you've gotten everything correct.

OVERHEAD SINGLE-BOX FLYSHUTTLE BEATER

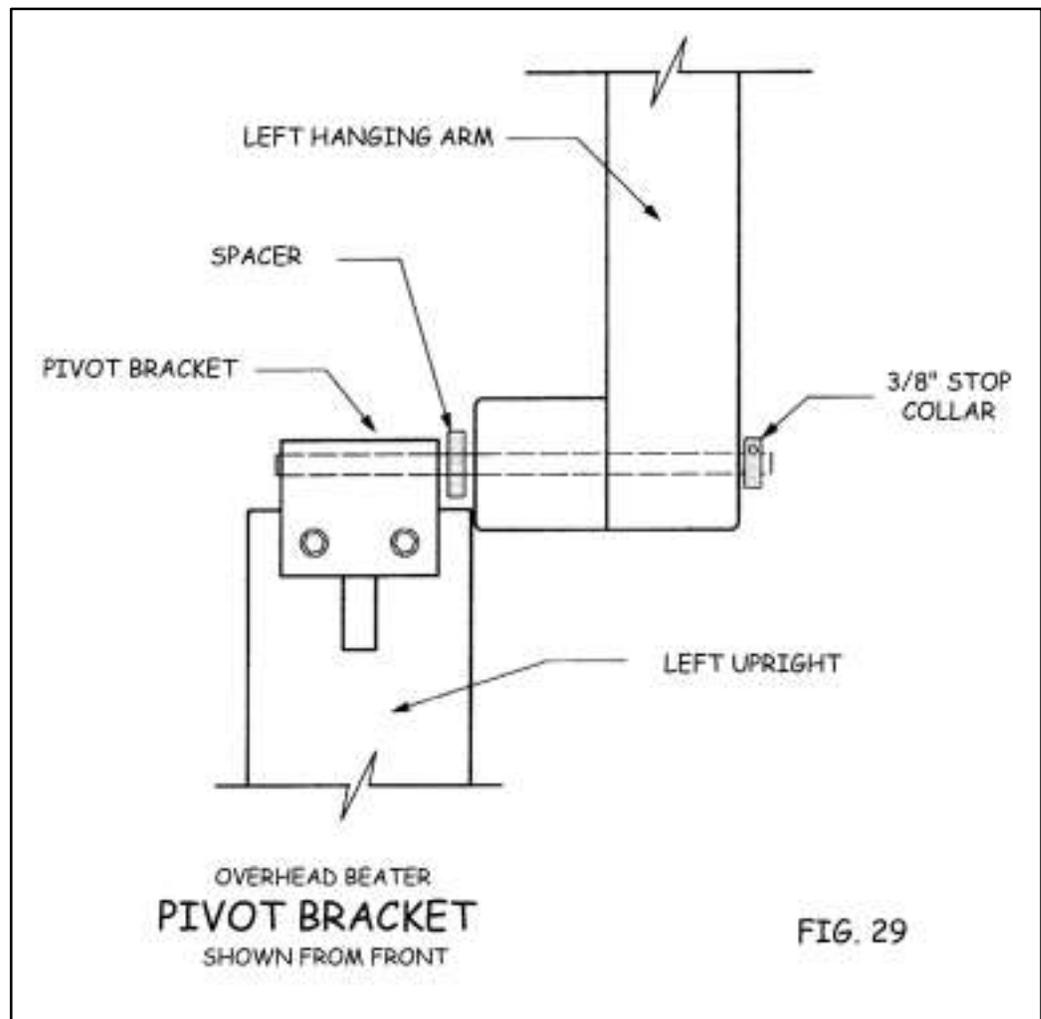
OVERHEAD SINGLE-BOX FLYSHUTTLE BEATER (optional equipment)

Overhead Single-Box Flyshuttle Beater (optional equipment)

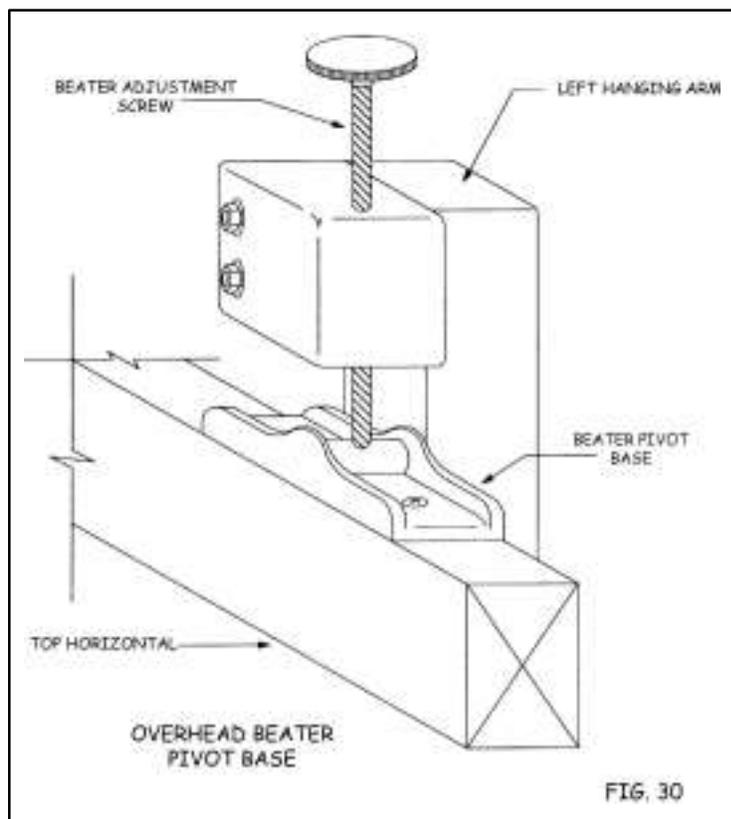
NOTE: Since the beater system uses a lot of carriage bolts, the following information may be helpful. There is a square shape below the head of each carriage bolt. This square portion does not fit easily into the pre-drilled holes. You will find it necessary to tap these bolts into place to properly seat the bolts. This will cause the bolt to “bite” into the wood and stay in place while you tighten the nut.

NOTE: The single-box flyshuttle system now incorporates removable shuttle boxes. This allows the weaver to completely remove the boxes and flystring tie-up from the loom any time that handshuttle weaving becomes necessary. It also makes it much easier to convert any other AVL beater system to a single-box flyshuttle beater.

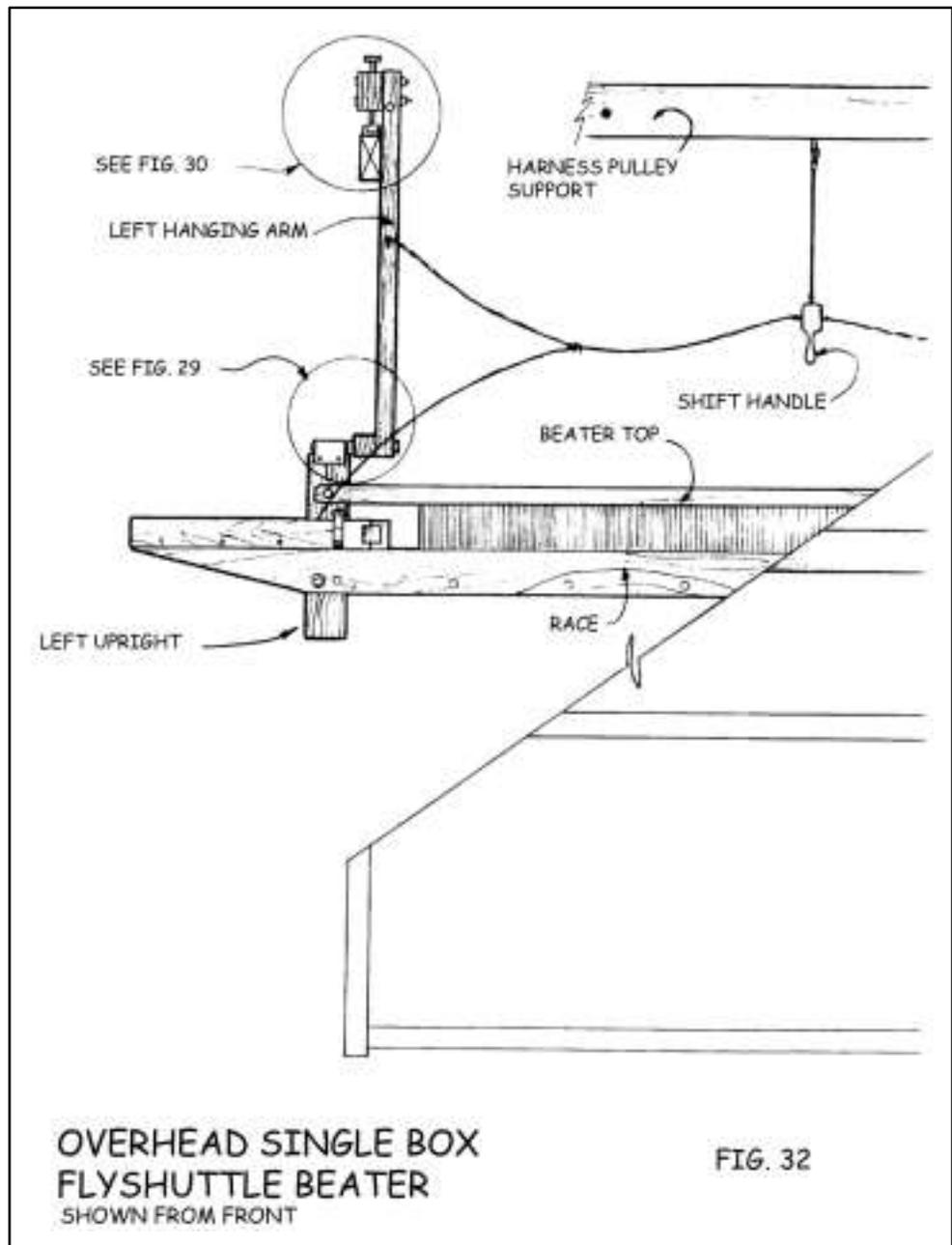
This system is shipped partially disassembled to facilitate packing. Follow the instructions below to complete the assembly. Please refer to Figures #29, #30, #32, #33, and #35 for help with terminology and locations. These are all located in one place for easy retrieval.



- A. The first step of this assembly is to mount the beater retainer to the inside face of the left cloth beam support. Insert the #12 x 1-1/2" flat head wood screw through the beater retainer and into the pre-drilled hole on the inside of the left cloth beam support (see Figure #33). Leave the screw just loose enough so that the retainer is allowed to pivot around the screw.



- B. The next step of this assembly is to mount the beater pivot bases to the upper edge of each top horizontal on the assembled side frames of your loom (see Figures #30 and #33). Attach these parts using the four #8 x 3/4" pan head wood screws. Insert the screws from the top of the beater pivot bases and screw them into the pre-drilled holes on the top edge of each top horizontal (see Figure #30). Tighten the four screws securely.
- C. Locate the two uprights (see Figure #32). Lay the uprights on the floor with the notched sides facing up. Space them apart a distance that is approximately equal to the width of your loom. The ends with the metal brackets will be the top of this assembly. The metal rods should be pointing inward or toward each other. Now lay the shuttle race assembly on top of the two uprights so that it covers the two holes in the face of each upright as shown in Figure #32.



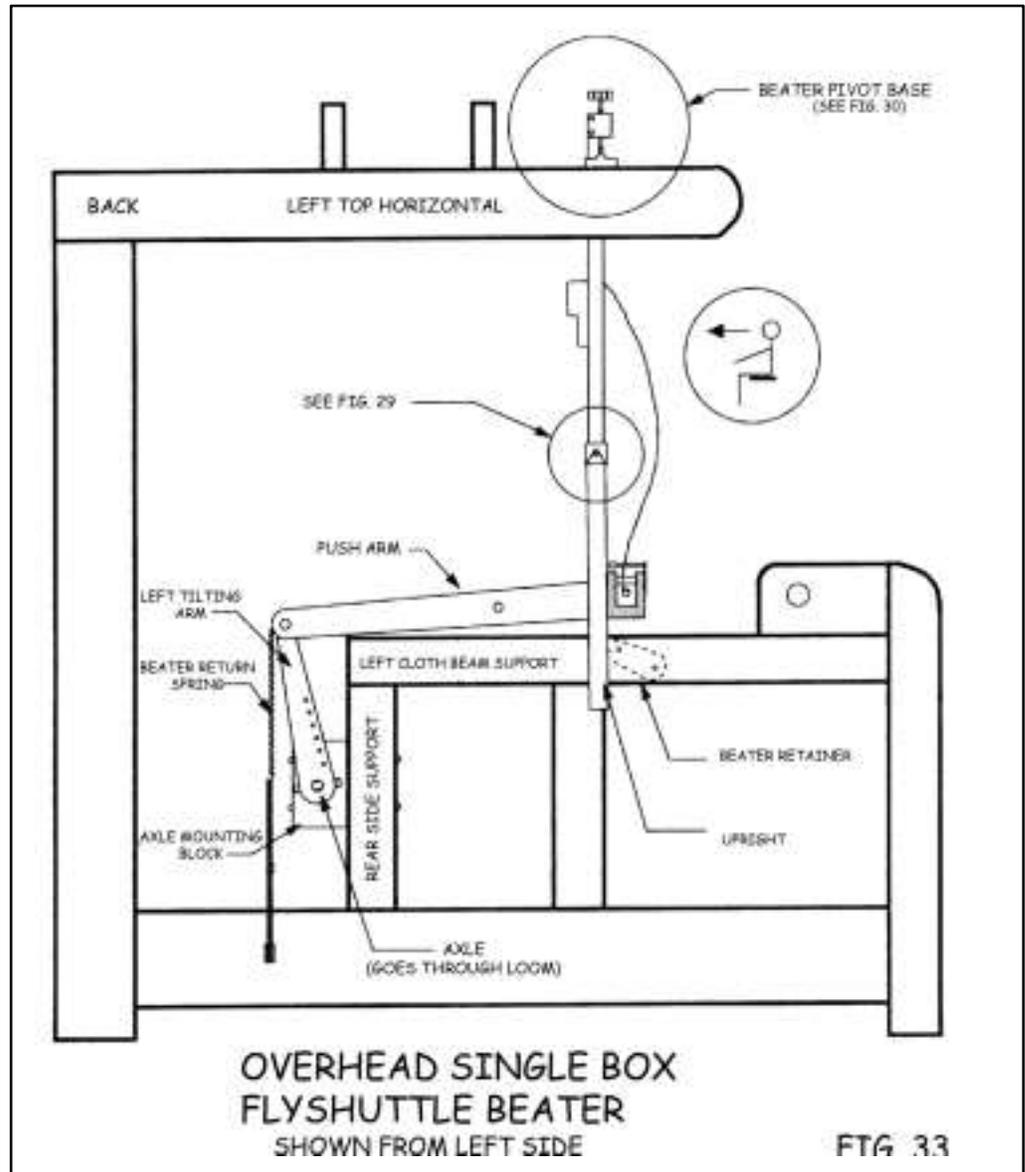
There is a groove cut in one side of the shuttle race which must be oriented to the top and back of the race which means that it should (for now) be facing the floor. The two rear plywood box sides should fit into the notches on the front face of each upright. Attach the shuttle race to the uprights with two 5/16" x 3-1/2" carriage bolts (one on each side). You will see that there are two holes a foot or so from each end of the shuttle race that correspond with the two holes on either upright. For now, only the innermost hole on each side will be used. The outer holes take a different bolt and will be used later. Attach the washers and hex nuts to these carriage bolts, but do not tighten them just yet as you will be making some adjustments shortly.

- D. Temporarily attach the beater top to the uprights with two 1/4" x 2-1/4" carriage bolts with washers and wing nuts behind the uprights. The beater top should be attached to the same side of the uprights as the shuttle race with the long groove facing downward. Insert the carriage bolts through the holes near each end of the beater top and then through the slots that are located just below the metal brackets of each upright. You do not need to put the beater top on now, but if you do, it will help in creating proper alignment of the beater parts.
- E. Place the beater in the loom. For now, it will just sit in the loom resting on top of the cloth beam supports just in front of the harnesses. The assembly may tend to fall forward or backward, but don't worry about that. You now have some other assemblies to complete before actually attaching the beater.
- F. The next step is to mount the hanging arms to the uprights on the shuttle race assembly (see Figures #29 and #32). Using an 1/8" Allen wrench, remove the 3/8" stop collars from the metal shafts at the tops of each upright and install the hanging arms onto these shafts making sure that the right and left hanging arms are in their proper positions. There is a screw eye that has been mounted near the middle of each hanging arm. These screw eyes should face the front of the loom. Also, be certain to include the small spacer as shown in Figure #29. The stop collars are then replaced and tightened making sure to leave enough clearance for this pivot point to swing freely. Now look at the other end (the top) of one of the hanging arms. Notice that there is a block of wood at this end that the beater adjustment screw goes through. As shown in Figure #30, the foot at the bottom end of the beater adjustment screw should be set into the notch in the center of the beater pivot base which you attached to the loom in step B. of this assembly. Once you have both of the beater adjustment screws in place, the assembly of the hanging arms is complete.
- G. The next step is to mount the axle. To do this, you will need to locate the axle mounting blocks that were installed previously onto the rear side supports.

Now you can insert the axle (a long, black pipe with holes at each end) through each of these blocks so that the axle goes all of the way through the loom. There is no particular right or left orientation for this axle as it is the same on both ends. Now you can center the axle in the loom and place an axle spacer (a round, plastic piece) on each exposed end of the axle.

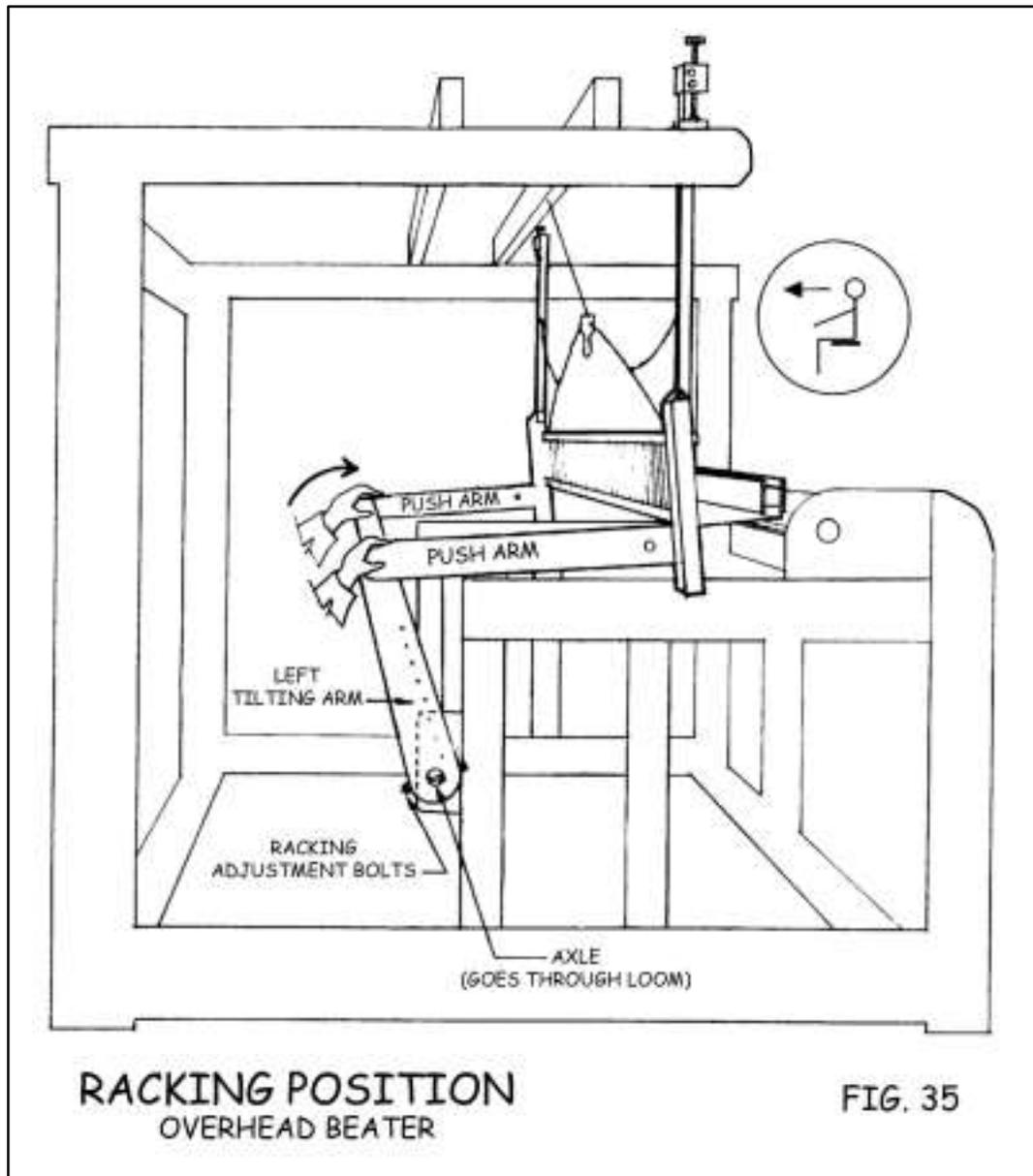
OVERHEAD SINGLE-BOX FLYSHUTTLE BEATER (optional equipment)

- H. Now locate the tilting arm assemblies (#2). They are stamped “L” and “R” and are to be mounted at each end of the axle as shown in Figures #33 and #35. It is important to mount this assembly correctly as shown with the push arms to the outside and the tilting arms to the inside. The tilting arms are attached to the ends of the axle with 5/16" x 3" hex bolts with washers and hex nuts provided. Do not tighten these bolts yet. They will be part of a critical adjustment coming up shortly. You will see a spring/cord/eyebolt assembly hanging from the end of each tilting arm. Just let them hang for now. They will be attached later.



OVERHEAD SINGLE-BOX FLYSHUTTLE BEATER (optional equipment)

- I. Next, mount each push arm to the back face of each upright (see Figure #33) using two 5/16" x 5" hex bolts, washers, and square nuts. These bolts go through the shuttle race and uprights and end up in a square nut in the nut access hole of each push arm. You can go ahead and tighten these bolts making sure that the outer face of each push arm is relatively flush with the outer edge of their mating uprights. This is also a good time to go ahead and tighten the other bolts that we previously told you to leave loose. While tightening these bolts, you should see that the beater is relatively square and centered in the loom. The last bolts to tighten are the hex bolts that we shall (for now) call the “racking adjustment bolts” that connect the tilting arms to the axle (see Figure #35).



These bolts should be tightened while the entire beater is being held firmly against the beater bumpers. (Figure #35 shows the beater being pushed toward the front of the loom. In reality, however, you can align the beater by pushing the tilting arms toward the front or by pushing the race against the rear bumpers. The important thing is to have the beater touching both the left and right bumpers at the same time.)

As shown in Figure #35, push the tilting arms so that the beater race contacts both front beater bumpers. Now tighten the “racking adjustment bolts” securely. This operation will take two people. If, in the future, the beater comes “out of square” - the beater contacts one bumper before the other - you will need to loosen the “racking adjustment bolts”, push the beater against both bumpers, and securely tighten the nuts.

- J. Now is a good time to attach the beater return spring assembly. This is the previously mentioned spring/cord/eyebolt assembly that hangs from the end of each tilting arm. To attach this assembly, simply remove one hex nut and washer from each eyebolt and place the eyebolt through the hole provided on each bottom horizontal of the side frame assembly (see Figure #33). The eye of the bolt should be to the outside of the side frame.

This assembly is used to assist the weaver in returning the beater to the back position. It is not necessarily intended to hold the beater in this position as that is the purpose of the beater retainer.

The beater return spring assembly is adjustable. It is tightened by pulling on the ends of the white cord while squeezing the black mini cord lock on the assembly. Whenever an adjustment is made on one side of the beater, a similar adjustment should be made on the other side as well. The amount of tension you set these springs at is strictly a matter of preference. Generally speaking, the stronger the tension, the harder you will have to pull against these springs during the beat.

At the same time, however, it will be easier to hold the beater away from you while opening a shed and throwing the shuttle. You may wish to experiment with these adjustments in order to come up with a setting that works best for you and any particular warp.

- K. Locate the reed support (the long, thin, wooden part with up to seven holes and a slot similar to the one in the shuttle race). Attach the reed support to the back of the shuttle race with the slot to the top and facing the shuttle race using seven 5/16" x 3-1/4" carriage bolts inserted from the front with washers and wing nuts behind. Before attaching the nuts, install the bottom edge of your reed in the void created by the slots in the reed support and shuttle race. Center the reed between the two uprights and tighten the wing nuts.
- L. There is a slot in the underneath side of the beater top which slides over the top of the reed. Push the beater top down on the reed and tighten the wing nuts which hold it in place.
- M. Take the string tie-up and handle from its bag. As you can see, there are three screweyes coming out of the handle. One at the top and two at the sides. Hold the handle up by the clip attached to the string at the top of the handle. This clip will get attached to the screweye that is taped to the bottom or side of the front harness pulley support (see Figure #32). However, the screweye must first be screwed into the hole on the underside of the harness pulley support. Screw the screweye in so that no screw threads are showing. Then attach the clip to it.

At this point, there are two pickers hanging below the handle. Take one of these and orient it so that the leather loop is toward the bottom. Now take it to the very outside of the race on the right side. Slide the picker (with the leather loop down and toward the outside) into the slots between the box sides.

Now look up at the right hanging arm. About halfway down, there is a screweye on the front face of the arm. The clip at the end of the cord that attaches to the picker should be clipped to the screweye at this point.

Pick up the left picker. With the leather loop down and toward the outside, slide it into the grooves in the left box sides from the very outside of the race. Attach the clip at the end of the cord to the screweye on the left hanging arm. Notice that there is a snubber attached to the front box on each side of the race. The cord should go over the snubbers (small, plastic spools above each shuttle box) on each side of the loom.

This completes the assembly of your single-box flyshuttle beater. Check your assembly with Figure #32 to be certain you've gotten everything correct.

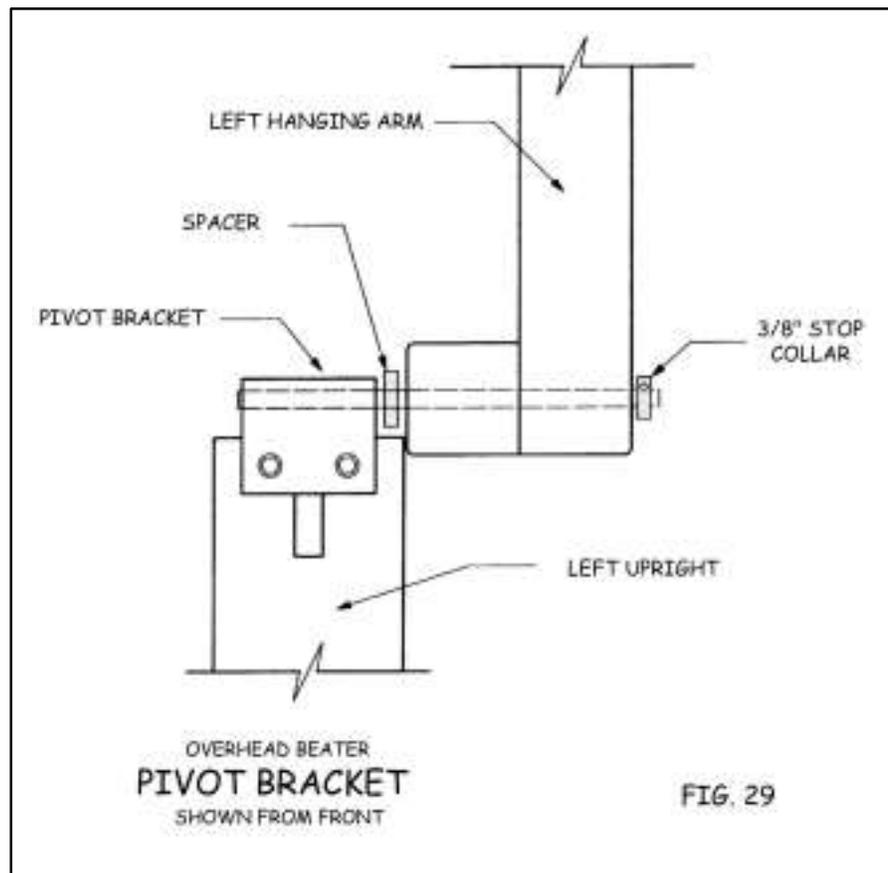
OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER

OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER (optional equipment)

Overhead Double-Box Flyshuttle Beater (optional equipment)

NOTE: Since the beater system uses a lot of carriage bolts, the following information may be helpful. There is a square shape below the head of each carriage bolt. This square portion does not fit easily into the pre-drilled holes. You will find it necessary to tap these bolts into place to properly seat the bolts. This will cause the bolt to “bite” into the wood and stay in place while you tighten the nut.

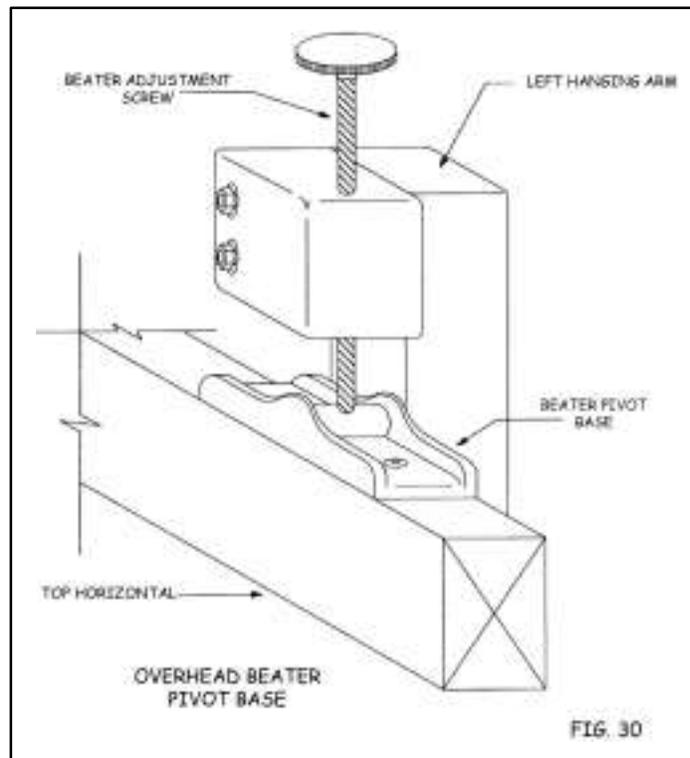
This system is shipped partially disassembled to facilitate packing. Follow the instructions below to complete the assembly. Please refer to Figures #29, #30, #36, #37, #39, #40, and #41 for help with terminology and locations. These drawings are located in one place for easy retrieval.



- A. The first step of this assembly is to mount the beater retainer to the inside face of the left cloth beam support. Insert the #12 x 1-1/2" flat head wood screw through the beater retainer and into the pre-drilled hole on the left cloth beam support (see Figure #37). Leave the screw just loose enough so that the retainer is allowed to pivot around the screw.
- B. The next step of this assembly is to mount the beater pivot bases to the upper edge of each top horizontal on the assembled side frames of your loom (see Figures #30 and #37).

OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER (optional equipment)

Attach these parts using the four #8 x 3/4" pan head wood screws. Insert the screws from the top of the beater pivot bases and screw them into the pre-drilled holes on the top edge of each top horizontal (see Figure #30). Tighten the four screws s e c u r e l y .

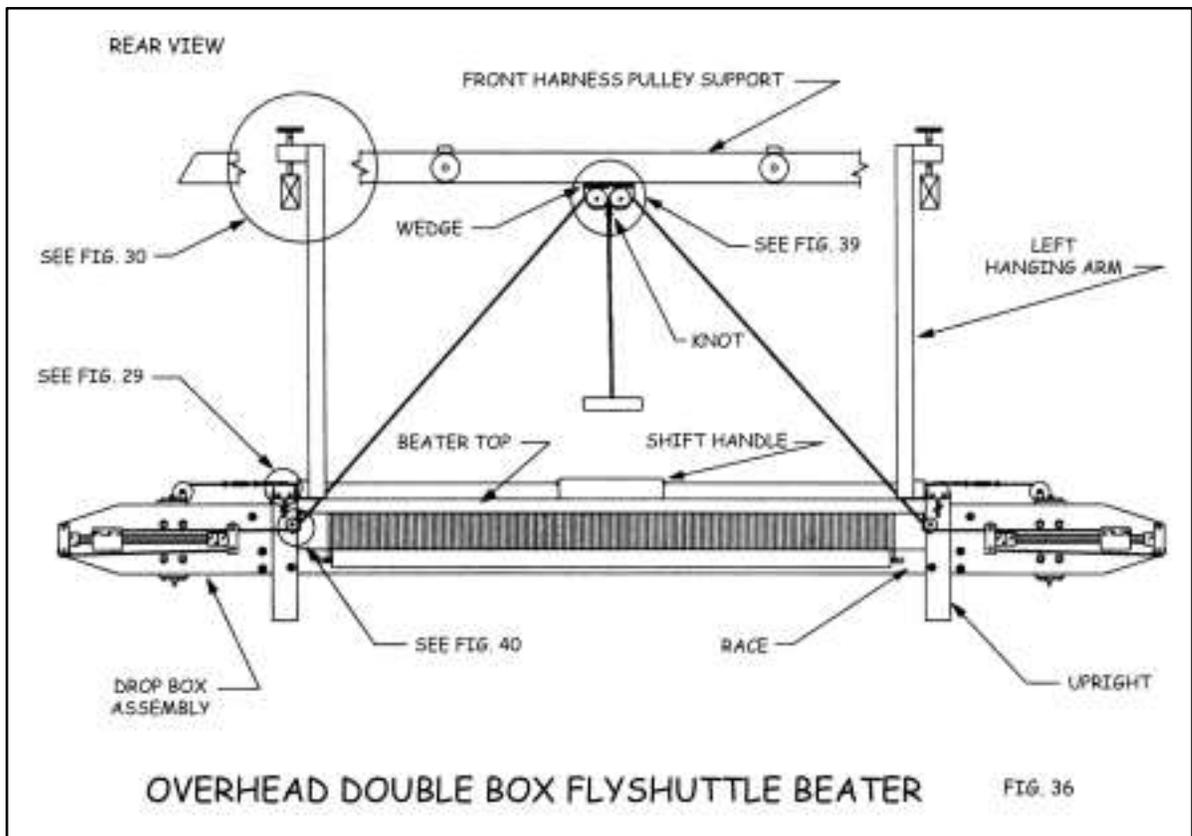


Next, you will need to mount the upper pulley assembly to the bottom front of your harness pulley support (see Figure #39). Use the two #10 x 1" pan head screws to attach this assembly. Make sure the white plastic pulleys face the rear of the loom.

- C. Locate the two uprights (see Figure #36). Lay the uprights on the floor spaced apart a distance that is approximately equal to the width of your loom. These uprights are labeled left and right and it is important that they be properly oriented. The ends of the uprights with the metal brackets will be the top of this assembly. The metal rods should be pointed inward or toward each other. There is a metal pulley attached to the back face of each upright. These pulleys should now be touching the floor. Lay the shuttle race on top of the two uprights so that it covers the two holes in the face of each upright. There is a groove cut in one side of the shuttle race which must be oriented to the top and back of the race which means that it should (for now) be facing down toward the floor. Attach the shuttle race to the uprights with two 5/16" x 3-1/2" carriage bolts, one on each side. You will see that there are two holes on each end of the shuttle race that correspond with the two holes on either upright.

OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER (optional equipment)

For now, only the innermost hole on each end will be used. The outer holes take a different bolt and will be used later. Attach the washers and hex nuts to these carriage bolts, but do not tighten them just yet as you will be making some adjustments shortly.



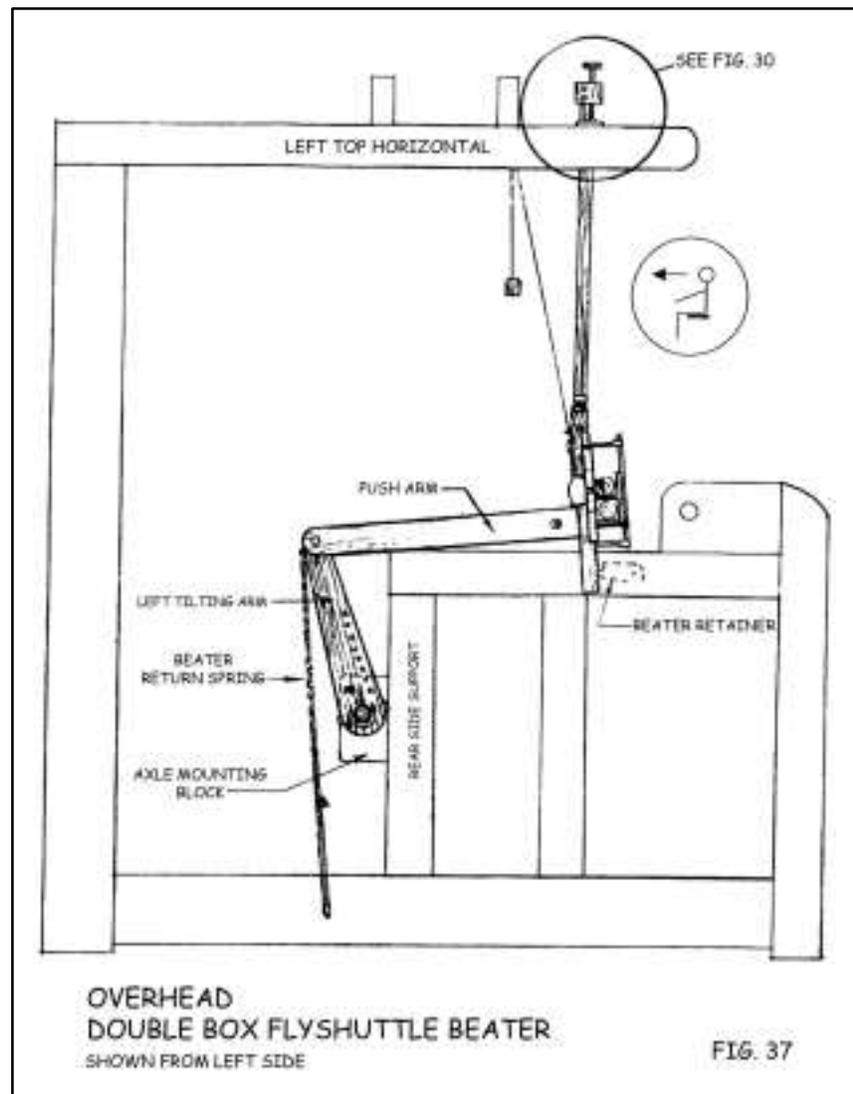
- D. Temporarily attach the beater top to the uprights with two 1/4" x 2-1/4" carriage bolts with washers and wing nuts behind the uprights. The beater top should be attached to the same side of the uprights as the shuttle race with the shift handle on top. You do not need to put the beater top on now, but if you do, it will help in creating proper alignment of the beater parts.
- E. Place the beater in the loom. For now it will just sit in the loom resting on top of the cloth beam supports just in front of the harnesses. The assembly may tend to fall forward or backward, but don't worry about that. You now have some other assemblies to complete before actually attaching the beater.
- F. The next step is to mount the hanging arms to the uprights on the shuttle race assembly (see Figure #29). Using a 1/8" Allen wrench, remove the 3/8" stop collars from the shafts at the tops of each upright and install the hanging arms onto these shafts making sure to put the right and left hanging arms in their proper positions.

OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER (optional equipment)

Also be certain to include the small spacer as shown in Figure #29. The stop collars are then replaced and tightened making sure to leave enough clearance for this pivot point to swing freely. Now look at the other end (the top) of one of the hanging arms. Notice that there is a block of wood at this end that the beater adjustment screw goes through.

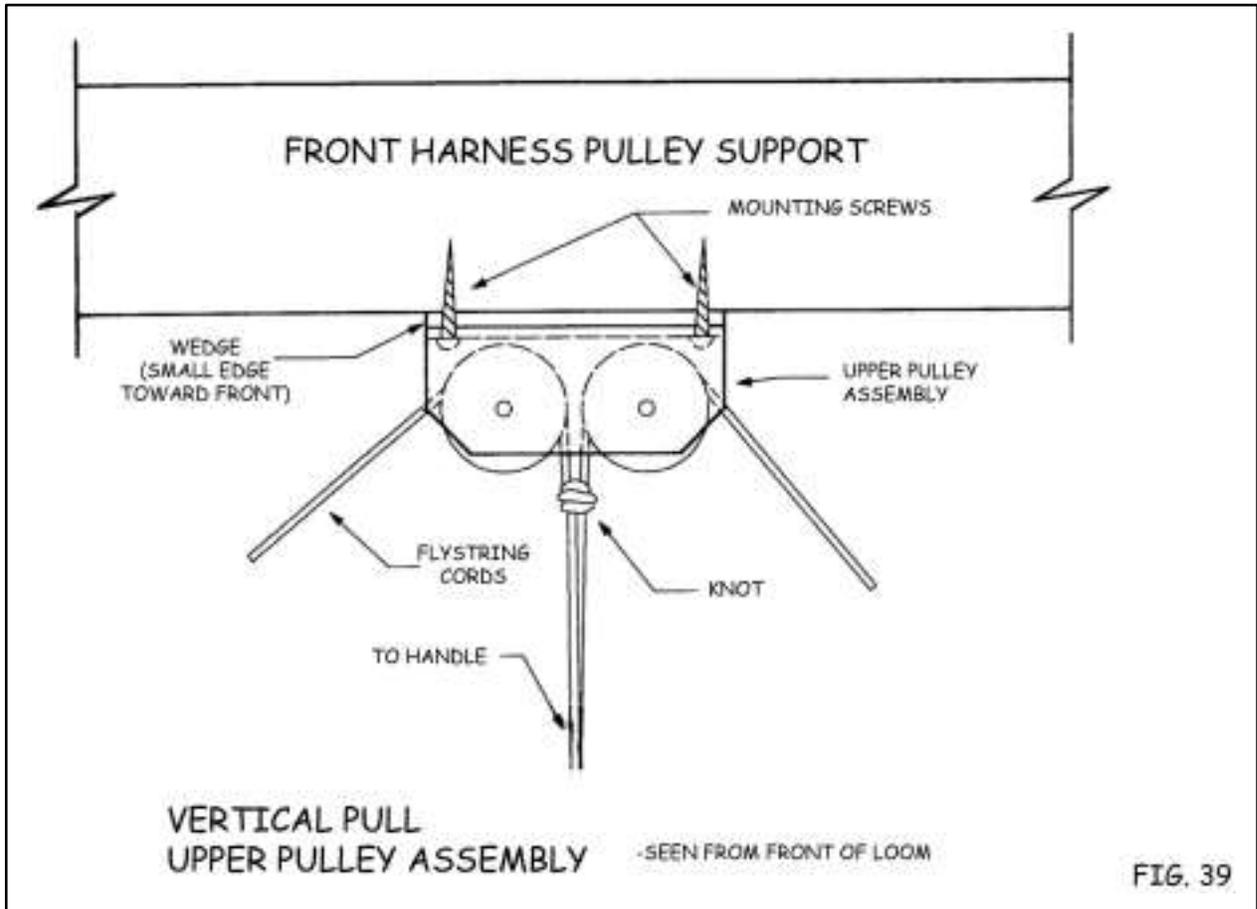
As shown in Figure #30, the foot at the bottom end of the beater adjustment screw should be set into the notch in the center of the beater pivot base which you attached to the loom in step B. of this assembly. Once you have both of the beater adjustment screws in place, the assembly of the hanging arms is complete.

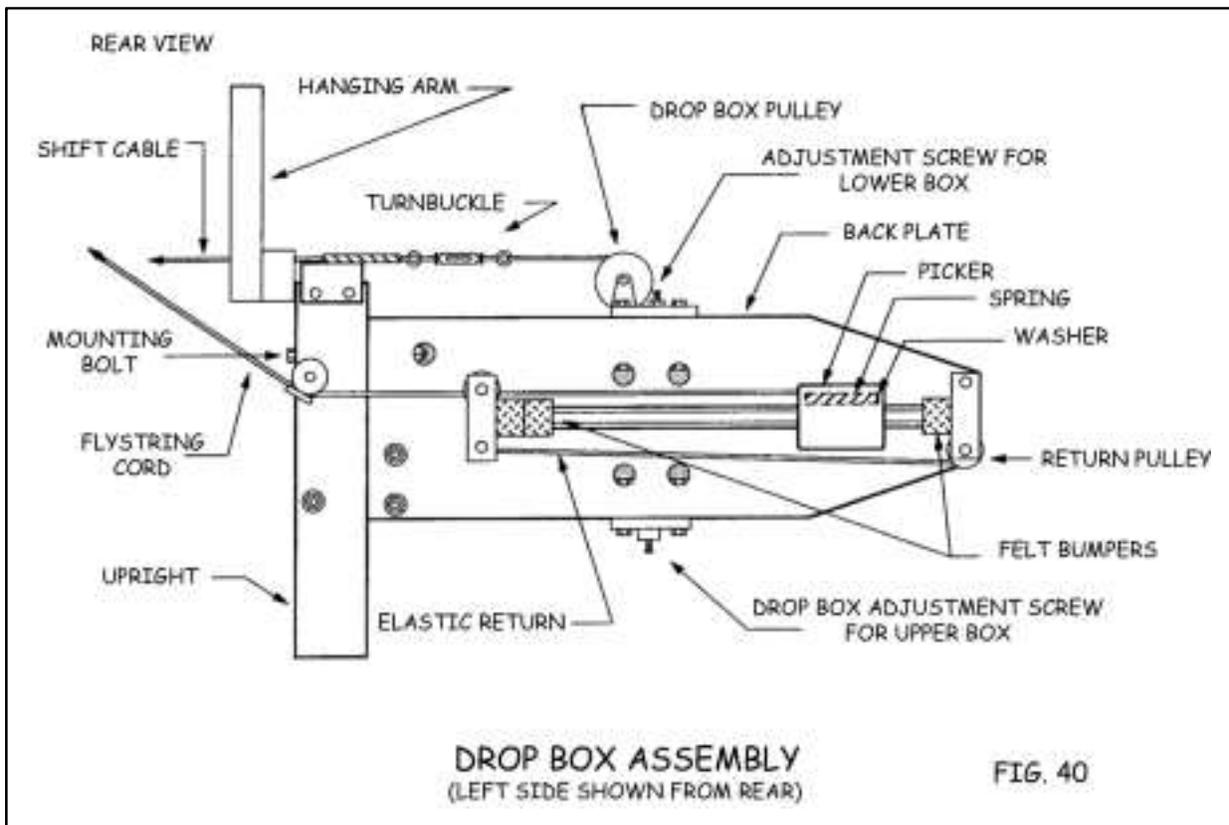
- G. The next step is to mount the axle. To do this, you will need to locate the axle mounting blocks attached previously to each rear side support. Make certain that the axle hole is in the lower position as shown in Figure #37 before you do this assembly.



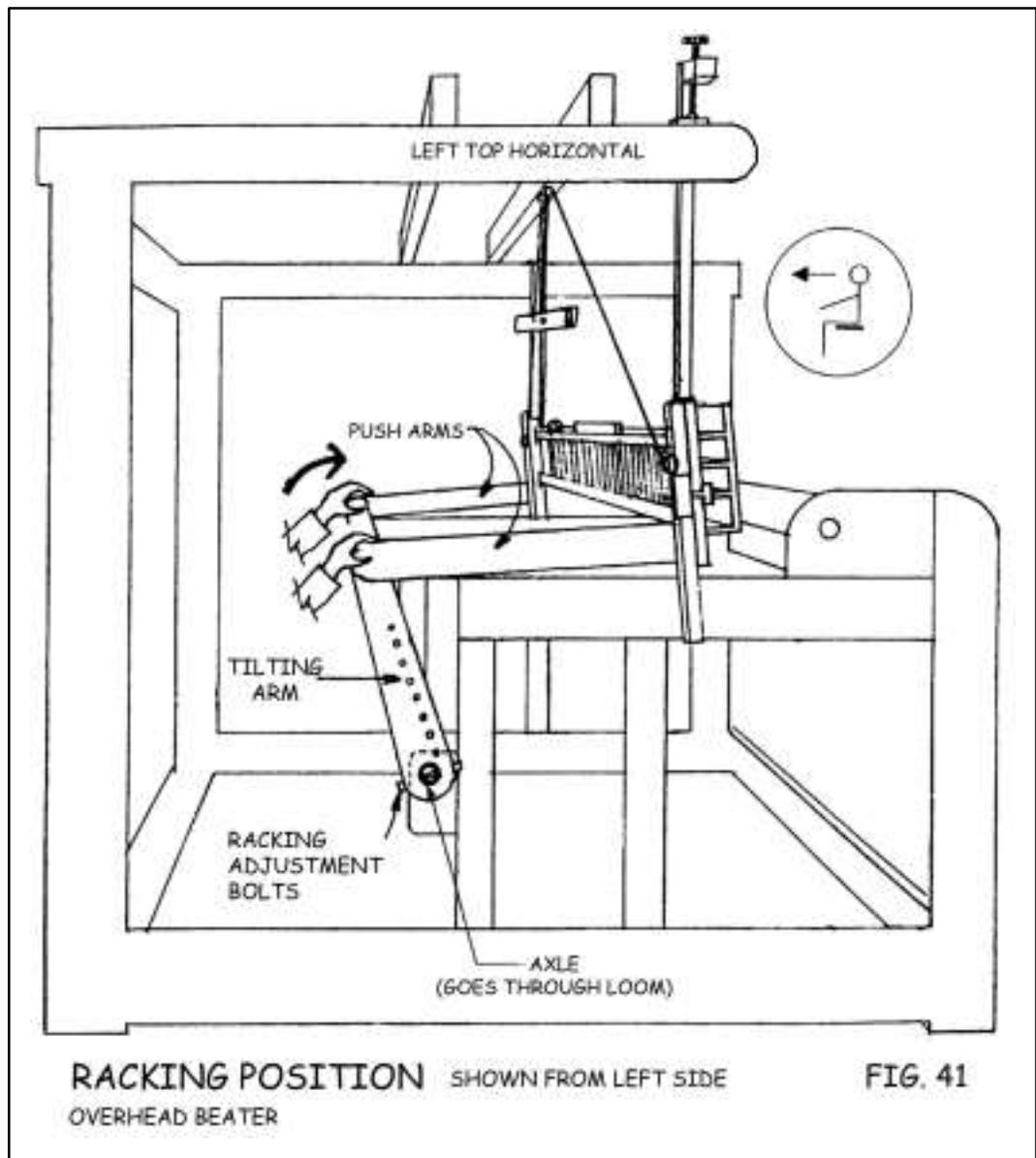
OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER (optional equipment)

Now you can insert the axle (a long, black pipe with holes at each end) through each of these blocks so that the axle goes all of the way through the loom. There is no particular right or left orientation for this axle as it is the same on both ends. Now you can center the axle in the loom and place an axle spacer (a round, plastic piece) on each exposed end of the axle.





- H. Now locate the two tilting arm assemblies. They are stamped “L” and “R” and are to be mounted at each end of the axle as shown in Figure #37. It is important to mount this assembly correctly as shown, with the push arms to the outside and the tilting arms to the inside. The tilting arms are attached to the ends of the axle with 5/16" x 3" hex bolts with washers and hex nuts provided. Do not tighten these bolts yet. They will be part of a critical adjustment coming up shortly. You will see a spring/cord/eyebolt assembly hanging from the end of each tilting arm. Just let them hang for now. They will be attached later.
- I. Next mount each push arm to the back face of each upright (See Figure #37) using two 5/16" x 5" hex bolts, washers, and square nuts. These bolts go through the shuttle race and uprights and end up in a square nut in the nut access hole of each push arm. You can go ahead and tighten these bolts making sure that the outer face of each push arm is relatively flush with the outer edge of their mating uprights. This is also a good time to go ahead and tighten the other bolts that we previously told you to leave loose. While tightening these bolts, you should see that the beater is relatively square and centered in the loom. The last bolts to tighten are the hex bolts that we shall (for now) call the “racking adjustment bolts” that connect the tilting arms to the axle (see Figure #41).



These bolts should be tightened while the entire beater is being held firmly against the beater bumpers. Figure #41 shows the beater being held against the front bumpers, although you may use either the front or back bumpers for this adjustment. The important this is that both bumpers are in contact with the beater at the same time.

Push the tilting arms toward the front of the loom so that both bumpers contact the beater race. Now tighten the “racking adjustment bolts” securely. This operation will take two people. If, in the future, the beater comes “out of square” - the beater contacts one bumper before the other - you will need to loosen the “racking adjustment bolts”, push the beater against both bumpers and securely tighten the nuts.

J. (See Figure #40) Locate your left drop box assembly (they are marked "L" and "R"). You will notice that there are two holes through the back plate in the lower right corner and one in the upper right corner with an intersecting hole coming from the right edge. Looking at the left upright, you will find a horizontal hole through the width of the upright just below the slot for the beater top. This hole should be offset to the front of the shuttle race side of the upright. Take a 5/16" x 5" hex bolt with a washer on it, insert it through the hole in the upright from the inside through the hole in the edge of the upper right corner of the drop box assembly and thread it onto a square nut inserted in the nut access hole in the back plate. Do not tighten this yet. Your drop box assembly should now be attached to the upright with this one bolt with the moveable boxes in the front.

K. Attach the drop box assembly to the shuttle race with two 5/16" x 3" carriage bolts inserted from the front washers and hex nuts behind the back plate. Now tighten all bolts holding the drop box assembly to the beater.

IMPORTANT: The face of the back plate must be precisely flush with the face of the upright. Check this alignment by laying a straight edge across the two surfaces.

L. Repeat this procedure for the right drop box assembly.

Vertical Pull Flystring Tie-Up

M. Notice that there is a hole in each picker that is larger on the outside than it is on the inside. Now locate the flystring tie-up cord. Notice that there is a small spring and washer at the knotted end of this cord. Take the unknotted end of the cord and thread it through the hole at the outer end of one of the pickers. This hole is about 3/8" in diameter on the outer side of the picker and only about 1/8" in diameter on the inner side. Once you have threaded the cord through this hole, pull all of the remaining cord through the picker until the spring and washer become seated inside of the larger (outer) part of the hole.

Now thread the cord under the pulley on the inner picker rod support, then thread it under the pulley that is on the back face of the beater upright. Next, route the cord upward and over the two pulleys that are mounted on the bottom edge of the harness pulley support. Pull a large loop of cord down between these two upper pulleys and route the remaining cord through the pulleys and picker on the other side of the beater in a way that matches the side that you just did.

After the cord has gone through the remaining picker, make sure to include the small spring and washer on the cord before tying the final knot. The positioning of this knot will determine the operating height of the flystring handle, so make sure that you are satisfied with its position before tying the knot. If there is more than an inch or so of cord left beyond the knot, you may want to snip off the excess cord.

At this point, you are ready to attach the flystring handle to the cord and tie the knot that will go between the two upper pulleys. Refer to the last two paragraphs in the beater section of your manual for assistance.

- N. Your new picker system should now be ready to use. Try pulling on the handle a few times to see if everything is functioning properly. If all seems well, put in a shuttle and see how it works. This system is much quieter than the previous design. Many of the components are also more durable, so less maintenance will be required. The looped configuration of the picker should also give the weaver a higher degree of control over shuttle travel and recoil.

This assembly is used to assist the weaver in returning the beater to the back position. It is not necessarily intended to hold the beater in this position as that is the purpose of the beater retainer.

The beater return spring assembly is adjustable. It is tightened by pulling on the ends of the white cord while squeezing the black mini cord lock on the assembly. Whenever an adjustment is made on one side of the beater, a similar adjustment should be made on the other side as well. The amount of tension you set these springs at is strictly a matter of preference. Generally speaking, the stronger the tension, the harder you will have to pull against these springs during the beat. At the same time, however, it will be easier to hold the beater away from you while opening a shed and throwing the shuttle. You may wish to experiment with these adjustments in order to come up with a setting that works best for you and any particular warp.

- O. Locate the reed support (the long, thin, wooden part with up to seven holes and a slot similar to the one in the shuttle race). Attach the reed support to the back of the shuttle race with the slot to the top and facing the shuttle race using seven 5/16" x 3-1/4" carriage bolts inserted from the front with washers and wing nuts behind. Before attaching the nuts, install the bottom edge of your reed in the void created by the slots in the reed support and shuttle race. Center the reed between the two uprights and tighten the wing nuts (if your beater top is in place, you will need to remove it to install the reed).

P. There is a slot in the underneath side of the beater top which slides over the top edge of the reed. Push the beater top down on the reed and tighten the wing nuts which hold it in place.

Q. The next thing is to adjust the movement of the drop boxes themselves (see Figure #40). You will notice that the boxes slide up and down on a metal rod which is fixed at both ends to cast metal pieces. In each of these cast metal pieces, you will find a brass adjustment screw with a lock nut. These brass screws provide a stop for the boxes at their upper and lower extremes of movement. Adjust the top screw so that when the boxes are all the way up, the lower box is in precise alignment with the shuttle race. Adjust the bottom screw so that when the boxes are all the way down, the upper box is in precise alignment with the shuttle race. This adjustment is critical. Please make it carefully. It is wise to lay a straight edge across the shuttle race and drop box when doing this to assist you in getting the two perfectly aligned. When you have it properly adjusted, secure the lock nuts on the brass screws. Do these adjustments on both the left and right drop boxes. If your shuttle flight is erratic, re-check these adjustments.

To make sure that the adjustment screws stay in place, you might want to purchase a small tube of a thread locking agent (such as Loctite) and apply a drop or two to each of these screws where the screws go into the cast metal brackets.

R. The final step is to attach the drop boxes to the shift handle and adjust the cable lengths. On each side there is a cable attached to the drop box which has an eyebolt on the end. This cable is routed over the top of the drop box pulley and the eyebolt threads into the turnbuckle on the end of the cable coming from the shift handle. Once you have both sides attached, they are adjusted as follows:

With the shift handle shifted to its rightmost, adjust the left drop box turnbuckle so that the box is against its top stop and the spring at the turnbuckle is slightly extended. Shift the handle to the left and adjust the right turnbuckle in the same manner.

OVERHEAD DOUBLE-BOX FLYSHUTTLE BEATER (optional equipment)

ATTENTION! When shifting, the leading end of the handle must be raised first. If the trailing end of the handle is lifted first, the handle will lock up and not shift. Also, you want to make sure that the turnbuckles are not adjusted so tightly as to not allow the boxes to drop to their full down position. Once properly adjusted, tighten the lock nut of each turnbuckle to keep them from moving.

That completes the assembly of your double-box flyshuttle beater. Check your assembly with Figure #36 to be certain you've gotten everything correct.

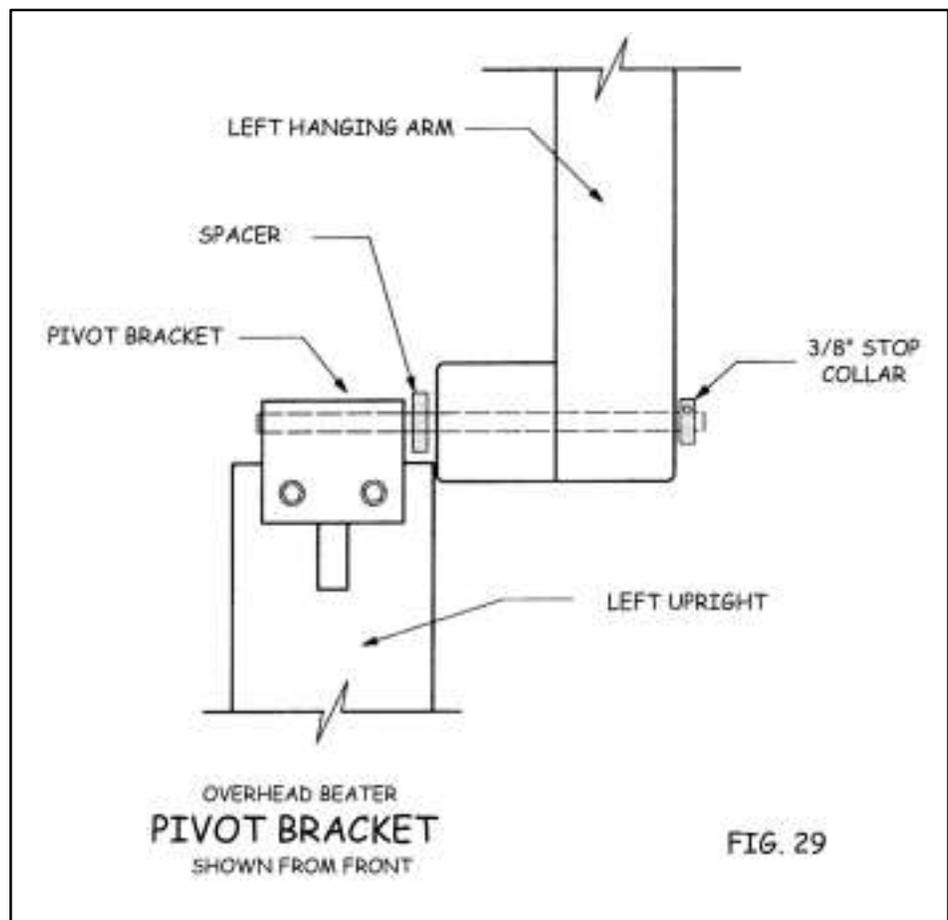
OVERHEAD FOUR-BOX FLYSHUTTLE BEATER

OVERHEAD FOUR-BOX FLYSHUTTLE BEATER (optional equipment)

Overhead Four-Box Flyshuttle Beater (optional equipment)

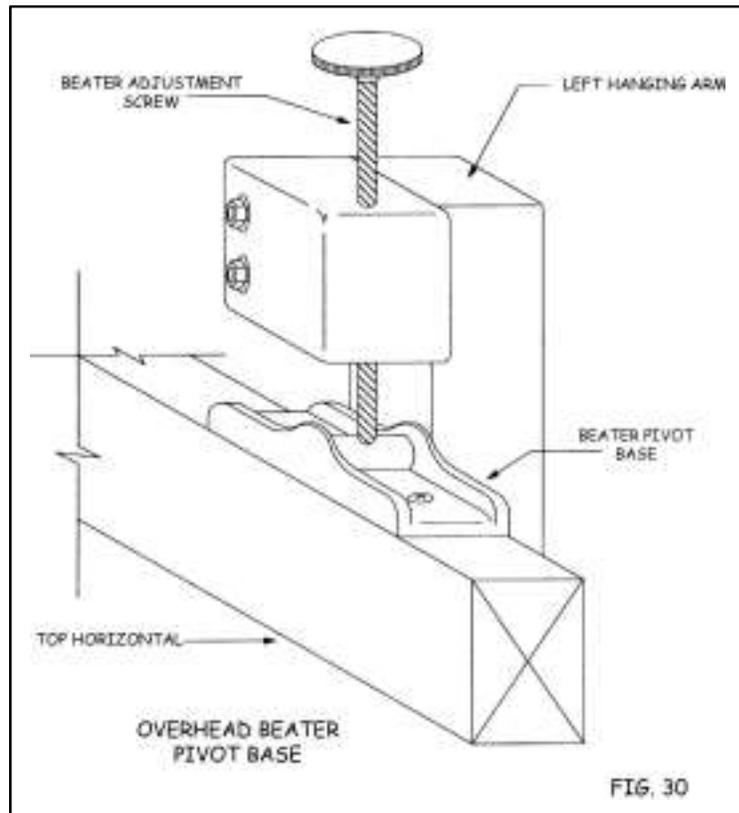
NOTE: Since the beater system uses a lot of carriage bolts, the following information may be helpful. There is a square shape below the head of each carriage bolt. This square portion does not fit easily into the pre-drilled holes. You will find it necessary to tap these bolts into place to properly seat the bolts. This will cause the bolt to "bite" into the wood and stay in place while you tighten the nut.

This system is shipped partially disassembled to facilitate packing. Follow the instructions below to complete the assembly. Please refer to Figures #29, #39, #39, #41, #42, #43, #44, #46, #47, and #48 for help with terminology and locations. These drawings are all located in one place for easy retrieval.



- A. The first step of this assembly is to mount the beater retainer to the inside face of the left cloth beam support. Insert the #12 x 1-1/2" flat head wood screw through the beater retainer and into the pre-drilled holes on the left cloth beam support (see Figure #44). Leave the screw just loose enough so that the retainer is allowed to pivot around the screw.

- B. The next step of this assembly is to mount the beater pivot bases to the top edge of each top horizontal on the assembled side frames of your loom (see Figures #44 and #30). Attach these parts using the four #8 x 3/4" pan head wood screws. Insert the screws from the top of the beater pivot bases and screw them into the pre-drilled holes on the top edge of each top horizontal (see Figure #30). Tighten the four screws *securely*.

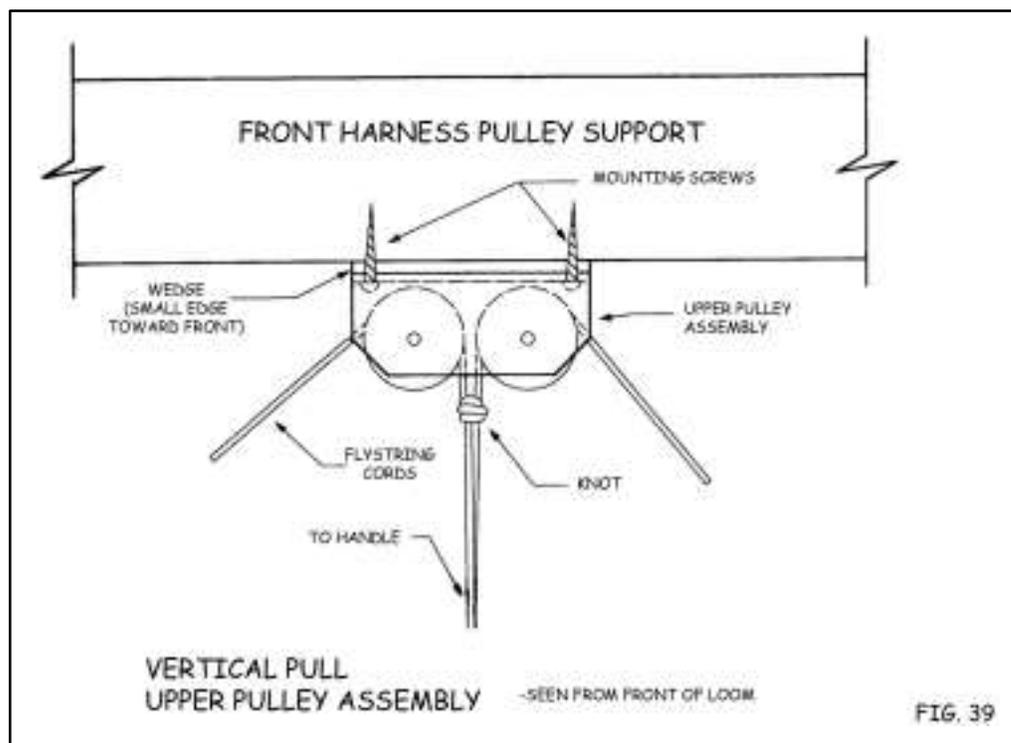


Next, you will need to mount the upper pulley assembly to the bottom front of your harness pulley support (see Figure #39). Use the two #10 x 1" pan head screws to attach this assembly. Make sure the white plastic pulleys face the rear of the loom.

- C. Locate the two uprights (see Figures #42 and #43). Lay the uprights on the floor spaced apart a distance that is approximately equal to the width of your loom. These uprights are labeled left and right and it is important that they be properly oriented. The ends of the uprights with the metal brackets will be the top of this assembly. The metal rods should be pointed inward or toward each other. There is a metal pulley attached to the back face of each upright. These pulleys should now be touching the floor.

OVERHEAD FOUR-BOX FLYSHUTTLE BEATER (optional equipment)

Lay the shuttle race on top of the two uprights so that it covers the two holes in the face of each upright. There is a groove cut in one side of the shuttle race which must be oriented to the top and back of the shuttle race which means that it should (for now) be facing down toward the floor. Attach the shuttle race to the uprights with two 5/16" x 3-1/2" carriage bolts (one on each side). You will see that there are two holes on each end of the shuttle race that correspond with the two holes on either upright. For now, only the innermost hole on each end will be used. The outer holes take a different bolt and will be used later. Attach the washers and hex nuts to these carriage bolts, but do not tighten them just yet as you will be making some adjustments shortly.

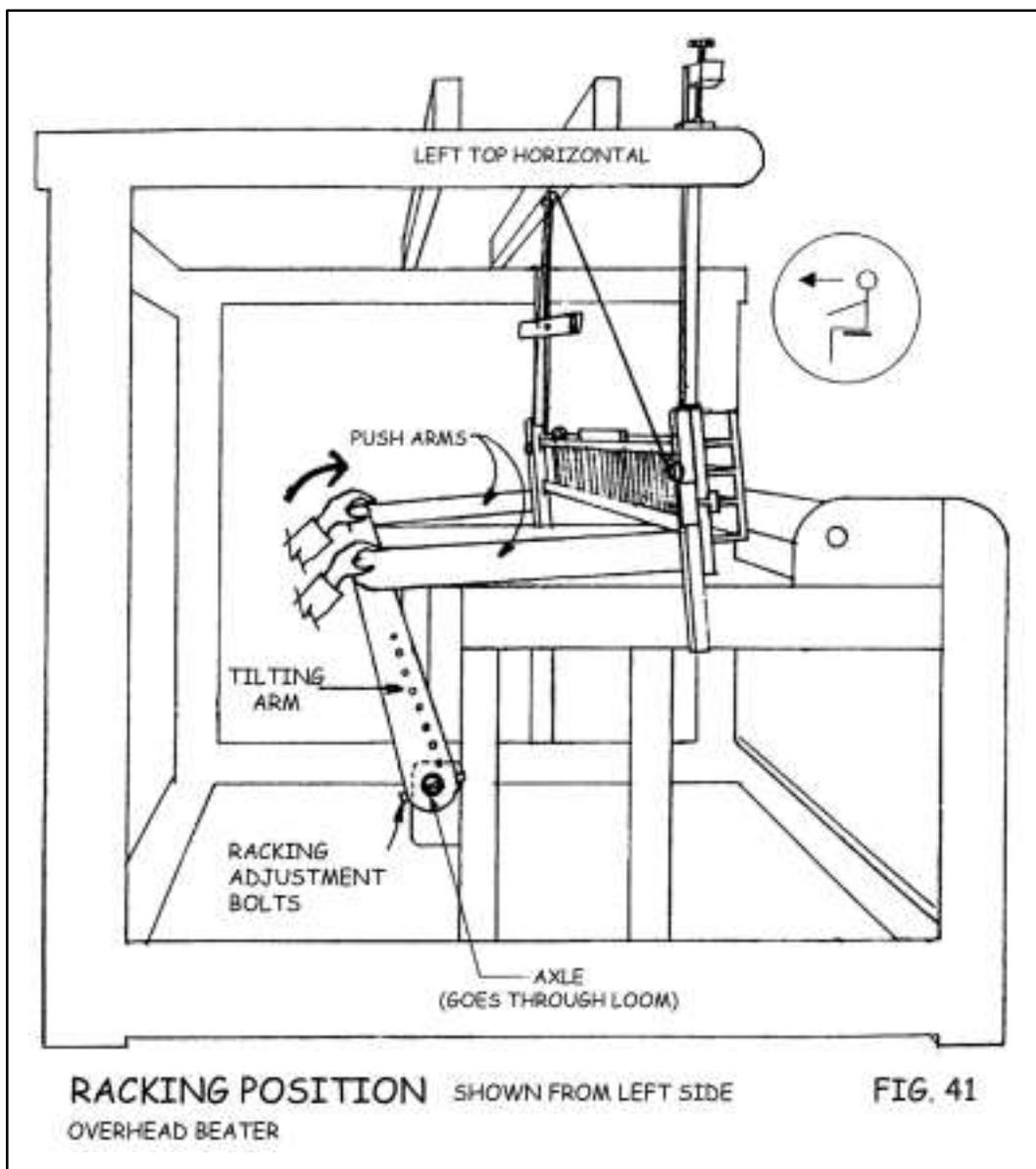


- D. Temporarily attach the beater top to the uprights with two 1/4" x 2-1/4" carriage bolts with washers and wing nuts behind the uprights. The beater top should be attached to the same side of the uprights as the shuttle race with the shift handle on top. You do not need to put the beater top on now, but if you do, it will help in creating proper alignment of the beater parts.
- E. Place the beater in the loom. For now, it will just sit in the loom resting on top of the cloth beam supports just in front of the harnesses. The assembly may tend to fall forward or backward, but don't worry about that. You now have some other assemblies to complete before actually attaching the beater.

- F. The next step is to mount the hanging arms to the uprights on the shuttle race assembly (see Figures #42 and #29). Using a 1/8" Allen wrench, remove the 3/8" stop collars from the shafts at the tops of each upright and install the hanging arms onto these shafts making sure to put the right and left hanging arms in their proper positions. Also, be certain to include the small spacer as shown in Figure #29. The stop collars are then replaced and tightened making sure to leave enough clearance for this pivot point to swing freely. Now look at the other end (the top) of one of the hanging arms. Notice that there is a block of wood at this end that the beater adjustment screw goes through. As shown in Figure #30, the foot at the bottom end of the beater adjustment screw should be set into the notch in the center of the beater adjustment base which you attached to the loom in step B. of this assembly. Once you have both of the beater adjustment screws in place, the assembly of the hanging arms is complete.
- G. The next step is a simple one. Insert the axle (shown in Figure #44) into the loom. It will go through the large holes in your rear side supports of the side frame assembly. There is no particular right or left orientation for this axle as it is the same on both ends. After the axle is inserted, place an axle spacer on each exposed end of the centered axle.
- H. Now locate the tilting arm assemblies (#2). They are stamped "L" and "R" and are to be mounted at each end of the axle as shown in Figures #44 and #41. It is important to mount this assembly correctly as shown with the push arms to the outside and the tilting arms to the inside. The tilting arms are attached to the ends of the axle with 5/16" x 3" hex bolts with washers and hex nuts provided. Do not tighten these bolts yet. They will be part of a critical adjustment coming up shortly. You will see a spring/cord/eyebolt assembly hanging from the end of each tilting arm. Just let them hang for now. They will be attached later.
- I. Next, mount each push arm to the back face of each upright (see Figure #44) using two 5/16" x 5" hex bolts, washers, and square nuts. These bolts go through the shuttle race and uprights and end up in a square nut in the nut access hole of each push arm. You can go ahead and tighten these bolts making sure that the outer face of each push arm is relatively flush with the outer edge of their mating uprights. This is also a good time to go ahead and tighten the other bolts that we previously told you to leave loose.

OVERHEAD FOUR-BOX FLYSHUTTLE BEATER (optional equipment)

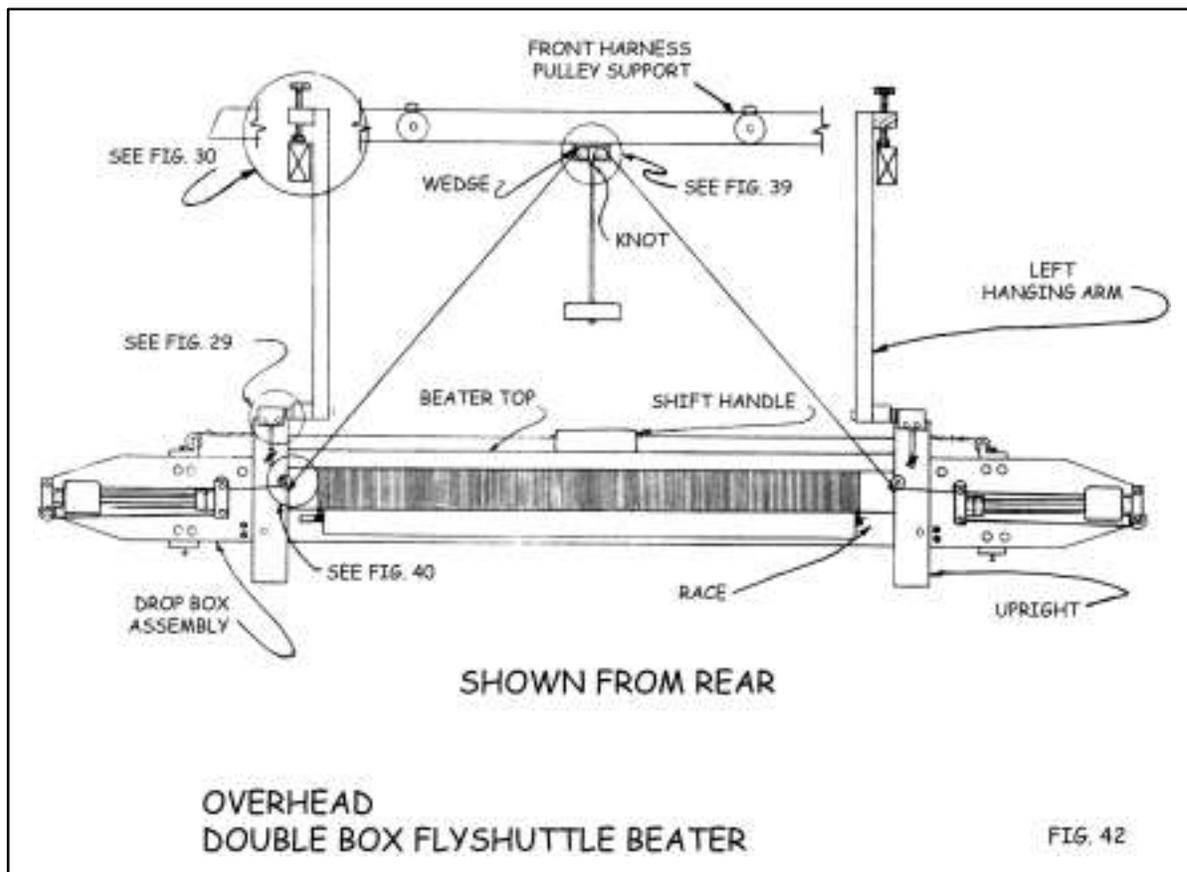
While tightening these bolts, you should see that the beater is relatively square and centered in the loom. The last bolts to tighten are the hex bolts that we shall (for now) call the “racking adjustment bolts” that connect the tilting arms to the axle (see Figure #41). (Figure #41 shows the beater being pushed toward the front of the loom. In reality, however, you can align the beater by pushing the tilting arms toward the front or by pushing the race against the rear bumpers. The important thing is to have the beater touching both the left and right bumpers at the same time.)



OVERHEAD FOUR-BOX FLYSHUTTLE BEATER (optional equipment)

As shown in Figure #41, push the tilting arms so that the beater race contacts both front beater bumpers. Now tighten the “racking adjustment bolts” securely. This operation will take two people. If, in the future, the beater comes “out of square” - the beater contacts one bumper before the other - you will need to loosen the “racking adjustment bolts”, push the beater against both bumpers, and securely tighten the nuts.

- J. Locate your left drop box assembly (these assemblies are marked “L” and “R”). You will notice that there are two holes through the back plate in the lower right corner and one in the upper right corner with an intersecting hole coming from the right edge. Looking at the left upright, you will find a horizontal hole through the width of the upright just below the slot for the beater top. This hole should be offset to the front of the shuttle race side of the upright. Take a 5 / 16" x 5" hex bolt with a washer on it, insert it through the hole in the upright from the inside, through the hole in the edge of the upper right corner of the drop box assembly and thread it onto a square nut inserted in the nut access hole in the back plate. Do not tighten this yet. Your drop box assembly should now be attached to the upright with this one bolt with the moveable boxes in the front.

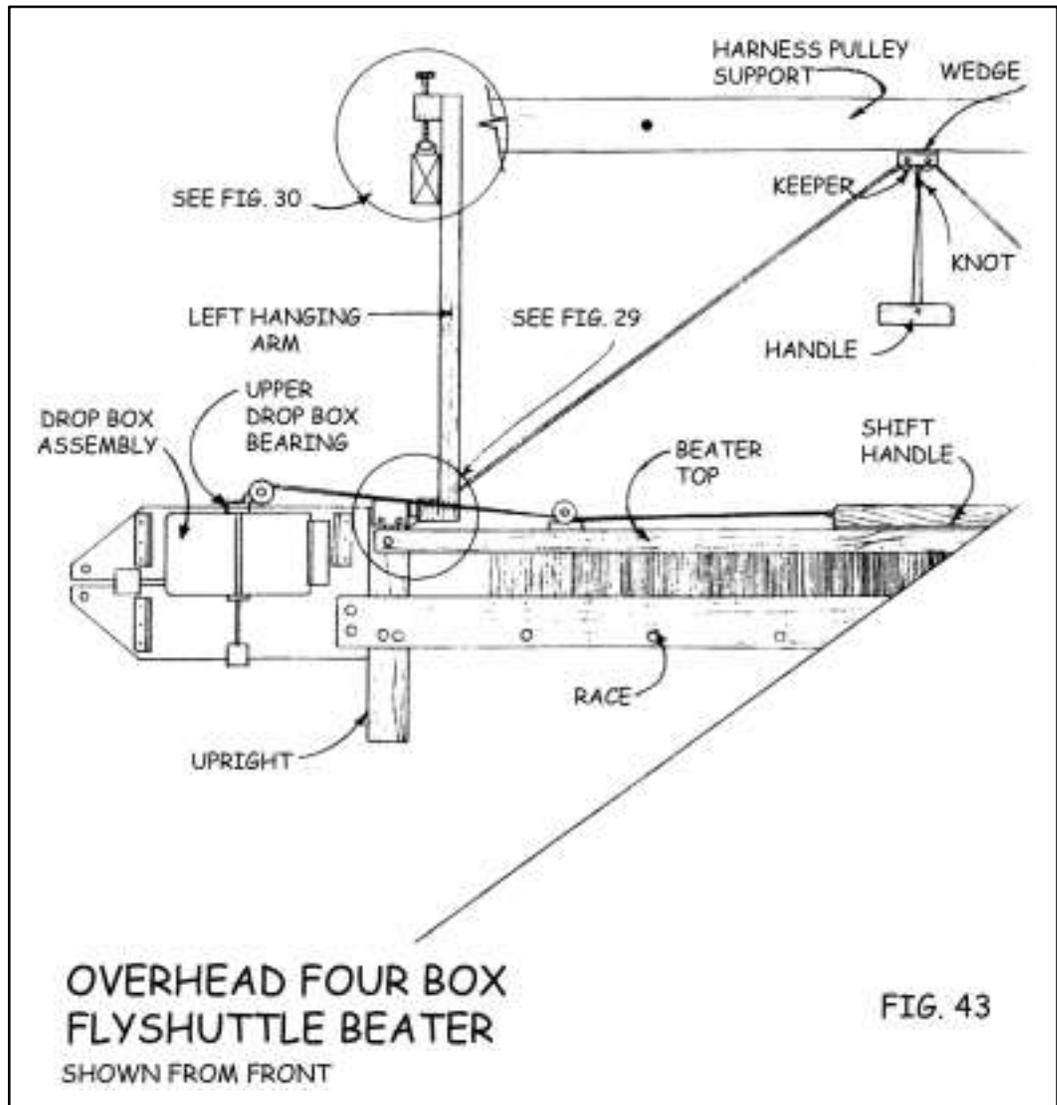


OVERHEAD FOUR-BOX FLYSHUTTLE BEATER (optional equipment)

- K. Attached the drop box assembly to the shuttle race with two 5/16" x 3" carriage bolts inserted from the front with washers and hex nuts behind the back plate. Now tighten all bolts holding the drop box assembly to the beater.

IMPORTANT: The face of the back plate must be precisely flush with the face of the upright. Check this alignment by laying a straight edge across the two surfaces.

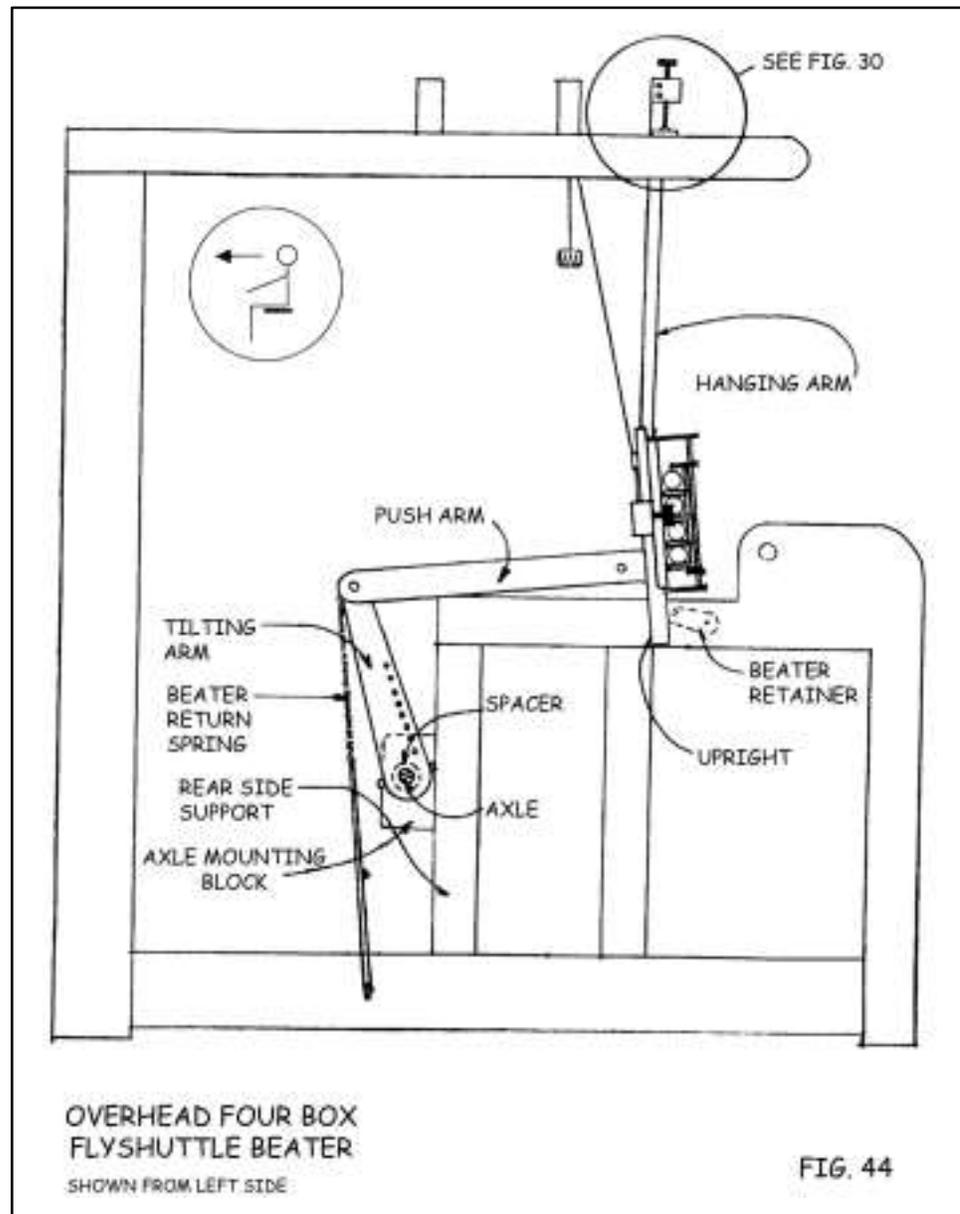
- L. Repeat this procedure for the right drop box assembly.



OVERHEAD FOUR-BOX FLYSHUTTLE BEATER (optional equipment)

Vertical Pull Flystring Tie-Up

- M. Notice that there is a hole in each picker that is larger on the outside than it is on the inside. Now locate the flystring tie-up cord. Notice that there is a small spring and washer at the knotted end of this cord. Take the unknotted end of the cord of the cord and thread it through the hole at the outer end of one of the pickers. This hole is about 3/8" in diameter on the outer side of the picker and only about 1/8" in diameter on the inner side. Once you have threaded the cord through this hole, pull all of the remaining cord through the picker until the spring and washer become seated inside of the larger (outer) part of the hole.



Now thread the cord under the pulley on the inner picker rod support, then thread it under the pulley that is on the back face of the beater upright. Next, route the cord upward and over the two pulleys that are mounted on the bottom edge of the harness pulley support. Pull a large loop of cord down between these two upper pulleys and route the remaining cord through the pulleys and picker on the other side of the beater in a way that matches the side that you just did.

After the cord has gone through the remaining picker, make sure to include the small spring and washer on the cord before tying the final knot. The positioning of this knot will determine the operating height of the flystring handle, so make sure that you are satisfied with its position before tying the knot. If there is more than an inch or so of cord left beyond the knot, you may want to snip off the excess cord.

At this point, you are ready to attach the flystring handle to the cord and tie the knot that will go between the two upper pulleys. Refer to the last two paragraphs in the beater section of your manual for assistance.

- N. Your new picker system should now be ready to use. Try pulling on the handle a few times to see if everything is functioning properly. If all seems well, put in a shuttle and see how it works. This system is much quieter than the previous design. Many of the components are also more durable, so less maintenance will be required. The looped configuration of the picker should also give the weaver a higher degree of control over shuttle travel and recoil.

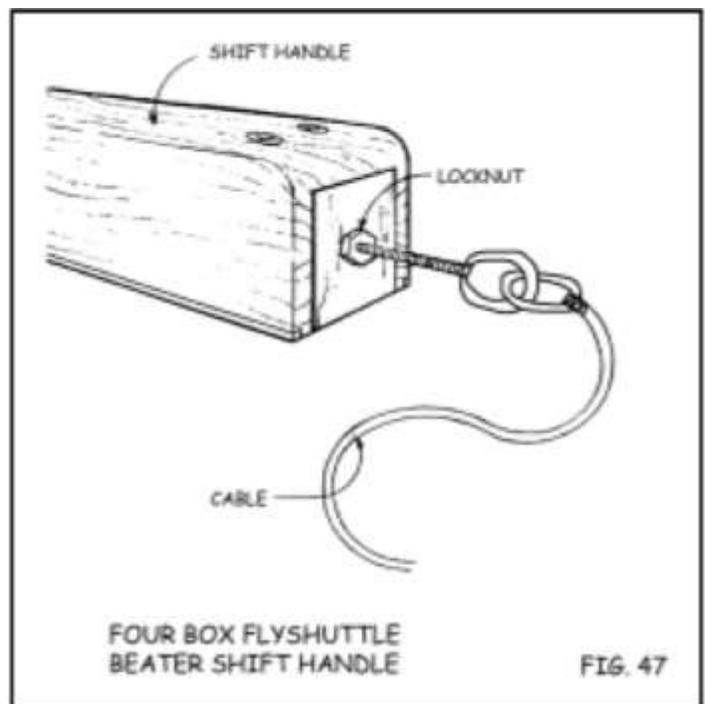
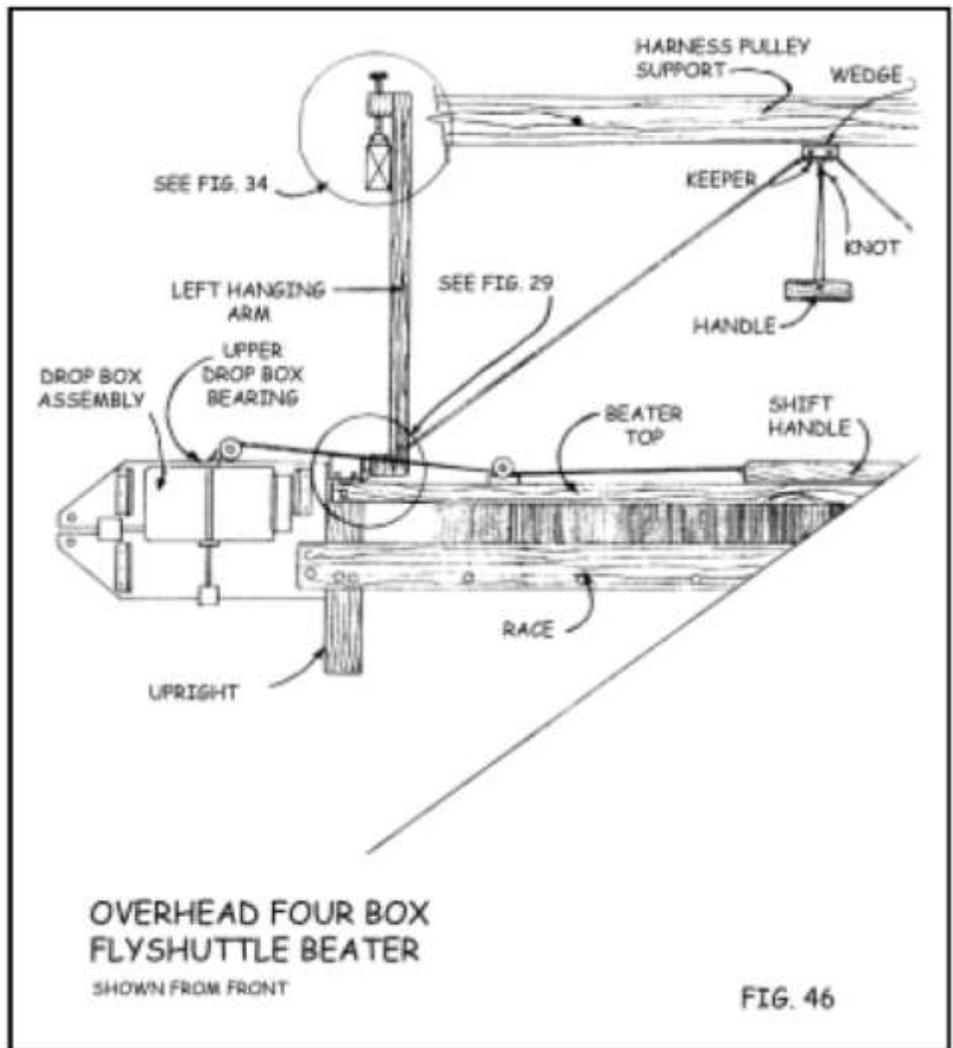
This assembly is used to assist the weaver in returning the beater to the back position. It is not necessarily intended to hold the beater in this position as that is the purpose of the beater retainer.

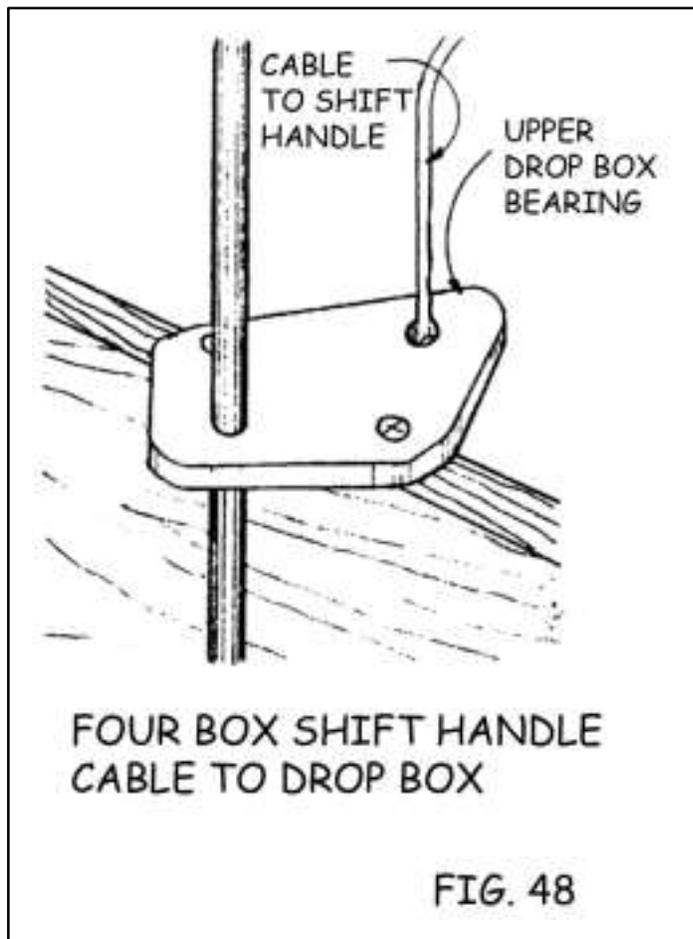
The beater return spring assembly is adjustable. It is tightened by pulling on the ends of the white cord while squeezing the black mini cord lock on the assembly. Whenever an adjustment is made on one side of the beater, a similar adjustment should be made on the other side as well. The amount of tension yet set these springs at is strictly a matter of preference.

Generally speaking, the stronger the tension, the harder you will have to pull against these springs during the beat. At the same time, however, it will be easier to hold the beater away from you while opening a shed and throwing the shuttle. You may wish to experiment with these adjustments in order to come up with a setting that works best for you and any particular warp.

- O. Locate the reed support (the long, thin, wooden part with seven holes and a slot similar to the one in the shuttle race). Attach the reed support to the back of the shuttle race using seven 5/16" x 3-1/4" carriage bolts inserted from the front with washers and wing nuts behind. Before attaching the nuts, install the bottom edge of your reed in the void created by the slots in the reed support and shuttle race. Center the reed between the two uprights and tighten the wing nuts (if your beater top is in place, you will need to remove it to install the reed).
- P. There is a slot in the underneath side of the beater top which slides over the top edge of the reed. Push the beater top down on the reed and tighten the wing nuts which hold it in place.
- Q. The final step is to attach the drop boxes to the shift handle and adjust the cable lengths. There is a long, dark, wooden handle located at the top and center of the beater top. This is the shift handle. By moving this handle laterally, you will be able to shift from one shuttle box to another, but first you will have to attach the handle to each set of drop boxes. This is accomplished by unwrapping the cable that is attached to the top of each drop box and running each cable over to the shift handle. At the end of each cable, you will find a threaded eyebolt with a lock nut. To attach the cable, you will need to thread each eyebolt into the metal bracket on the ends of the shift handle. Once the cable is attached to the drop box assembly, you can run the cable over the drop box pulley that is located on the larger cast metal piece directly above the drop box assembly. Also make sure that the cable runs under the small pulley that is attached near the end of the beater top (see Figures #42 and #43). Repeat this procedure on the other side of the loom. You may find it handy to use the following trick when attaching or adjusting the drop box cable:

To give yourself some slack in the cable, it may be helpful to raise the drop box on the side you are working on to its uppermost position. To hold it in this position, you can insert one of your shuttles halfway into the box that is now aligned with the shuttle race. This will hold the box in the upper position and both of your hands will be free to fiddle with the cable.





- R. Once both cables are attached, you will need to adjust the cable lengths. Loosen the lock nut and you can shorten or lengthen the cable by screwing this threaded end into or out of the plate at the end of the shift handle. When you slide the shift handle back and forth, notice that there are four detents (or places where the shift handle can be stopped). Each of these four detents corresponds to the four shuttle boxes.

The best way to adjust these cables is to slide the shift handle to either the far left or far right detent position. This will put one drop box in the upper position and the other one in the lower position. Now all you have to do is adjust the cable as mentioned above so that the drop box shelf is at the same height as the top of the shuttle race. It may help you to lay a straight edge across the shuttle race and drop box when doing this to assist you in getting the two perfectly aligned.

When you have it properly adjusted, secure the lock nuts. Once you have adjusted both cables, it's a good idea to put the shift handle in each detent position and check the boxes on each side for alignment. It is possible that there will be some slight variation in the spacing of the drop box shelves, so you may not get absolutely perfect alignment. If this is the case for you, go for an average adjustment.

That completes the assembly of your four-box flyshuttle beater. Check your assembly with Figures #42 and #43 to be certain you've gotten everything correct.

RADDLE AND
TENSION BOX

RADDLE (optional equipment)

The raddle (#41) is inserted into the holes in the back edge of the rear vertical side frame members (see Figure #1 for relative position). These holes are used to mount the raddle for warping both the standard beam and the second beam. Be certain that the removable portion of the raddle is to the top. Once mounted into the holes, the raddle is not only held firmly in place, but is also perfectly centered and can be left in place while weaving.

TENSION BOX (optional equipment)

Locate your tension box track, hardware, and tension box (refer back to Figure #16).

1. Mounting the Track Arms

If you have ordered a sectional beam and have been following the directions, you'll have already mounted the tension box track arm mounting studs. If you ordered a tension box and no sectional beam, here's how to install the track arms.

2. Mounting the Track

Mount the track to the brackets on the track arms using the four 5/16" x 2-1/2" hex bolts, washers, and square nuts. Orient the track so that the lengthwise groove is on top (you may wish to refer back to Figure #16 to clarify this procedure).

3. Mounting the Tension Box

The AVL tension box track mounting system now employs a quick release advantage. To install the track/arm assembly, you simply place the track arms between the two externally mounted studs that you attached to each rear vertical of the loom earlier. The track arms should initially go in at an angle with the front stud fit into the notch on the upper edge of the track arm. Then lower the track/arm assembly to a horizontal position at which point the lower notch on the track arm should align with the rear stud. This will hold your tension box in place while warping your loom. When you are finished with the tension box, the track can be removed easily if it is in the way while you are weaving.

INSTALLING AN E-LIFT

The E-Lift replicates the action of treading. When you activate the foot switch, the motor turns and selected harnesses rise or fall. The motion is smooth, quick, and precise and does not jar the harnesses.

Review Contents and Hardware. Please check that you were shipped all parts and hardware listed here.

Package Contents

- ◆ E-Lift motor-controller (1)
- ◆ mounting blocks (2)
- ◆ foot switch and attached cord (1)
- ◆ power cord (1)
- ◆ hardware package (1)

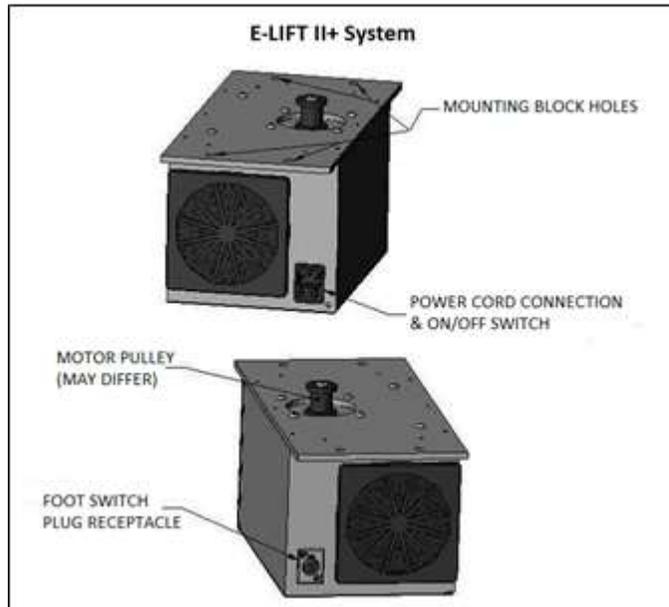


FIGURE EL-1: E-Lift II+ System

INSTALLATION

Installing the E-Lift Motor-Controller Assembly

1. The E-Lift will be mounted to the previously installed #12 Treadle Pulley Crossmembers. (See FIGURE EL-2). Position the E-Lift under the treadle pulley support crossmembers to align the holes in the E-Lift mounting plate with the vertical holes in #12 crossmembers. The E-Lift should be 12" from the inside edge of the right side frame. Ensure that the E-Lift power switch faces to the rear of the loom and the round foot switch connector faces the front of the loom. The motor box is quite heavy, so if you have a couple of pieces of 2" x 4" to slip under the motor box, this will help elevate it into position while getting the bolts and blocks in place.



FIGURE EL-2: E-Lift on A-Series

2. Place one 5/16" x 6 1/2" hex bolt and flat washer, from the top of the crossmember, into each of the four holes and let them hang with the exposed ends pointing to the floor. Thread a mounting block onto each set of bolts and then engage the bolts in the corresponding holes in the E-Lift mounting plate. Apply the remaining washers, lock washers, and hex nuts and tighten thoroughly.

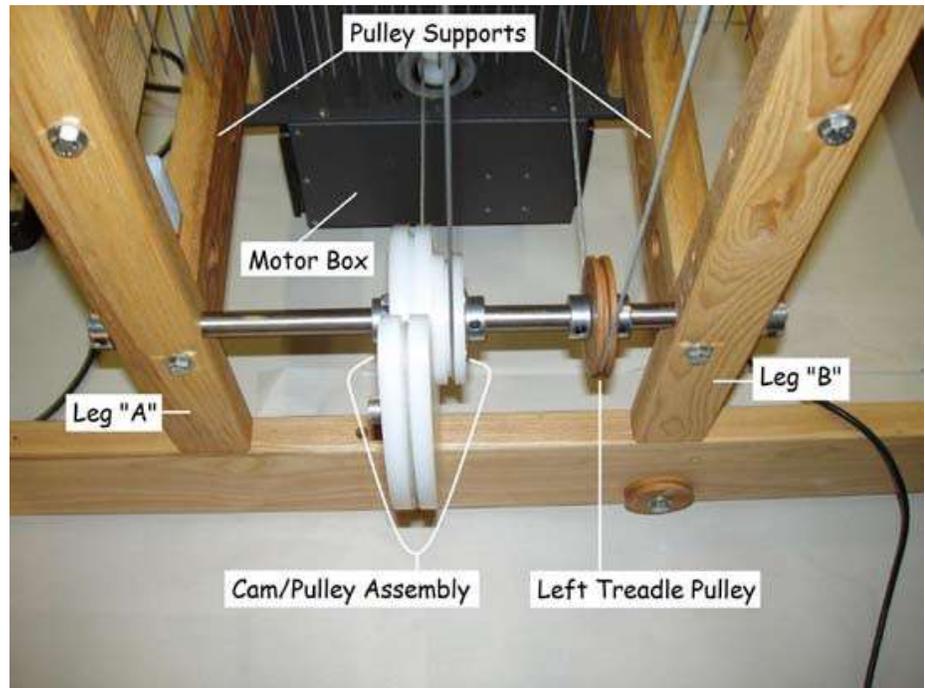


FIGURE EL-3: Cam and Pulleys (Right Side View)

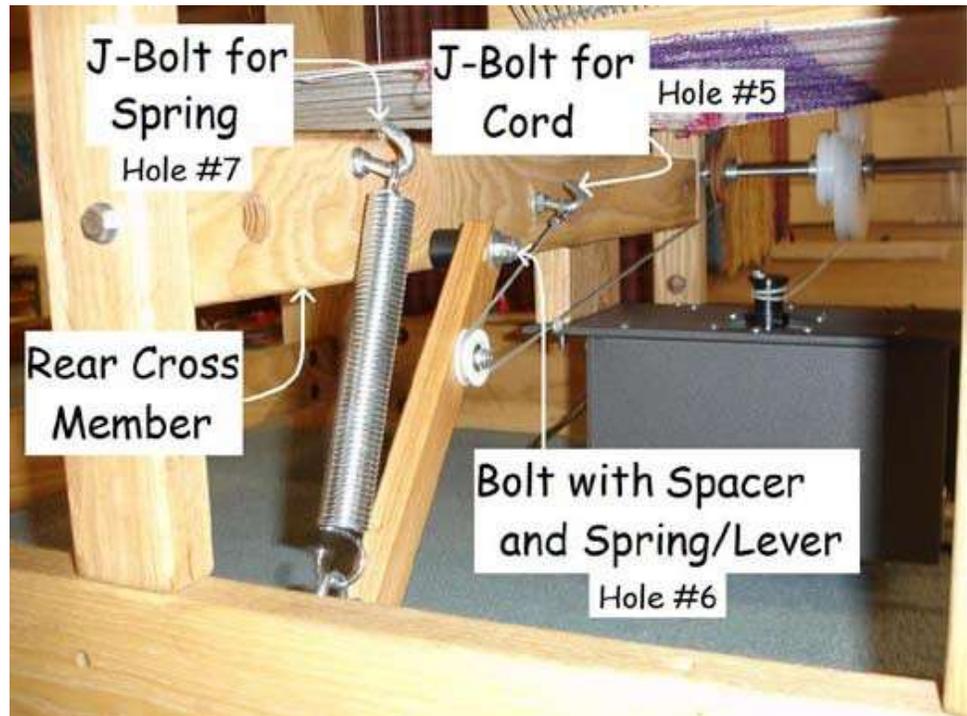


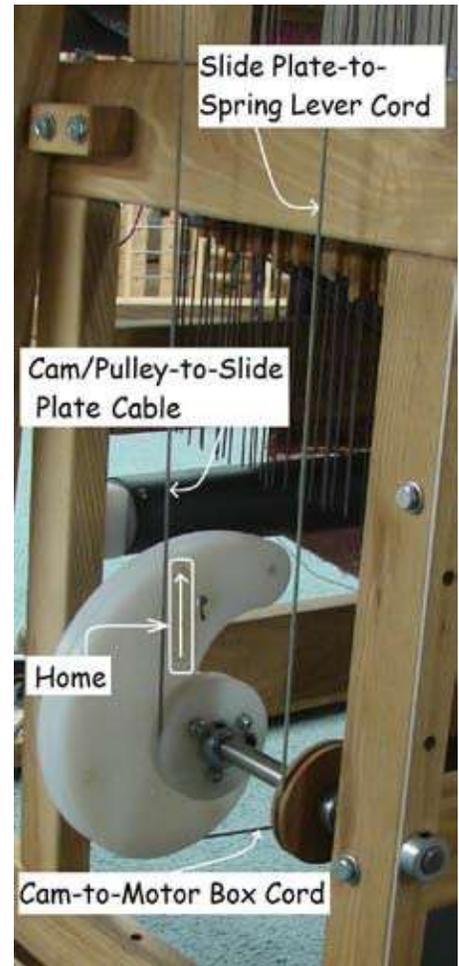
FIGURE EL-4: Spring Lever and Cables Installed

Installing the Cam-Pulley Cables

3. Route the cam/pulley-to-dobby-slide-plate cable around and under the pulley, as seen in Figure #EL-5, then up the outside of the loom, to the dobbie slide plate (or dobbie arm). If you have a slide plate, slip the cable end and through the hole in the bottom plate and connect the cable end to the lower eyebolt on the slide late.

The cable should be vertically aligned between the pulley and the slide plate (or dobbie arm) above. Adjust the cam-pulley axle stop collars to position the cam-pulley to achieve this alignment. Tighten the stop collars.

FIGURE EL-5: Cable Installation and Home Position



4. The dobbie slide plate-to-spring lever cable will attach to the slide plate with a quicklink in the eyebolt located on the upper back right corner of the slide plate. Route the cable over the small white plastic pulley located on the dobbie back, directly above the eyebolt. The cable needs to be in the slot of the pulley and under the retainer mounted with this Pulley. Please check to see that the pulley and retainer are secured by the hex bolt. The retainer must be adjusted to secure the cable onto the pulley, but not impede the rotation of the pulley. Now, the cable will go down the right side of the dobbie back. Guide the cable around the return pulley on the cam-pulley axle, then into the center of the loom.

Bring this cable over to the spring lever and loop it around the pulley on the side of the lever. Now, you will need to pull against the spring in order to bring the looped end of the cable around the pulley on the lever and back toward the right side of the loom, to anchor it at the open J-Bolt.



FIGURE EL-6: Path of Motor-To-Cam Cable

6. Untape the E-Lift motor-to-cam cable, which is wound around the cam. One end of the cable is secured to the cam in such a way that it is angled toward the floor. Continue this path, guiding the free end of the cable down and out of the loom and around the bottom of the nautilus lobe, and across to the motor box. Run the cable across the front of the motor pulley and into the small hole located in the pulley race. Secure the copper crimp inside motor pulley with a hitch pin by inserting it into the access hole on top of the pulley. (See Figure #EL-6). When you have finished the tip of the cam should point to the two o'clock position, as viewed from the rear of the loom.
7. Turn off the E-Lift power switch. Connect the foot switch cable to the front of the E-Lift motor box. Connect the female end of the power cable at the back of the housing (be sure it's completely inserted). Plug the male end of the power cable into a surge-protected surge protector / power strip, preferably the same one as used for your Compu-Dobby as this will allow you to turn on the loom more easily.

OPERATION

Setting Home Position and Adjusting Return Cable Tension

Before you use the E-Lift you must set the "home" position. Home position is the position of the E-Lift motor spindle at power up and it relates to programmed starting position. Everything the E-Lift does will be in relationship to this home position.

IMPORTANT: When you set home position you need to ensure that dobbie slide plate is located in the correct position for harness selection. If the slide plate is set too high or low, it will cause incorrect harness selection and possibly motor stalling.

Adjusting the Cable Turnbuckle on Return Spring

1. Turn off the E-Lift power switch. Unwind the E-Lift pulley to allow the dobbie slide plate (or arm) to move to its upper most position. Note: Viewing is achieved through the side windows on the Compu-Dobby. However, you may want to remove the Compu-Dobby from the loom in order to more clearly see the slide plate positioning.
2. If the slide plate does not move up to the upper slide plate bumpers, the turn buckle on the return cable will need adjustment.
 - a. Loosen the jam nut on the turnbuckle.
 - b. Rotate the turnbuckle while holding the cables on each end to draw the eye bolts in the turnbuckle closer together. It is best to iterate this step with one turnbuckle rotation and then test, repeating until the slide plate will move up to the slide plate bumpers after pulling it down ½ inch.
 - c. Tighten the jam nut to lock in this turnbuckle position.



Figure EL-7: Spring Lever Position at Slide Plate Up (Left) & at Down (Right)

Spring Lever Return System

3. Rotate the E-Lift motor pulley clockwise to take the slack out of the cable. Ensure the cable does not overlap onto itself. Continue rotating the pulley while observing the slide plate, whose position should be set where:
 - a. The slide plate is no more than 1/16 inch off the upper slide plate bumpers.
 - b. The dobbie insert is at least 1/8 inch above the highest dobbie cable ball.

When you have finished, the tip of the nautilus will be facing two o'clock when viewed from the rear of the loom. Power on the E-Lift to set this position as your home position. Customers have found it advantageous to create a visual cue on the Cam to identify Home position. This enables you to more quickly and easily set it without having to look up to the dobbie. To begin, note the vertical arrow on the Cam in Figure 5. It represents the Home marking. Now, set the Home position using the procedure above. Using a 2" strip of masking tape, apply the tape vertically at the 12 o'clock position on the rear of the Cam. Then draw a vertical arrow on the tape pointing to 12 o'clock.

Mode Selection

The E-Lift is programmed with two modes: double or single shed selection. At power on, the E-Lift begins in the Double-Shed™ mode. Double-Shed ends every lifting cycle with the shed open with one tap of the foot or hand switch. For example, you've just completed a pick and the shed is still open. You depress the foot switch, this initiates the shed to close, the dobbie to advance to the next pick, and the shed to re-open in the next pick -- all as a single continuous movement. This is the best mode for developing a weaving rhythm.

In Single Mode, you activate the foot switch once to open the shed; and again to close the shed. In other words, you achieve one action per activation.

Switching Modes

Switching modes is accomplished by pressing the foot switch with a hold for 10 seconds *only* during an activation which transitions to an open shed.

MAINTENANCE

Periodically clean the air filters, which is located on the front and rear of the E-Lift housing. To clean, unsnap and remove the plastic baffle. Remove the foam element and carefully wash it in warm soapy water. Be sure the element is completely dry before you replace it.

Inspect and tighten hardware monthly when in regular use, and immediately before use upon prolonged idleness.

Inspect the cable and cables for wear, especially where they move over a pulley. Do this monthly when in regular use, and immediately before use upon prolonged idleness.

INSTALLING AN A-LIFT

<p>Air Requirements</p>	<p>The A-Lift replicates the action of treadling. When you activate the foot switch, the cylinder retracts and selected harnesses rise or fall. The motion is smooth, quick, and precise and does not jar the harnesses.</p> <p>In order for this air-activated system to work, you will, of course, need to have compressed air available at the loom. The A-Lift will consume approximately 1.25 CFM (Cubic Feet per Minute) of air at 100 PSI (pounds per square inch) when weaving a maximum speed. We recommend a compressor rated at double this consumption with a minimum 5 gallon tank.</p> <p>This system has been designed to operate from a line pressure between 60 PSI and 100 PSI. The pressure within the system can be adjusted depending upon how many harnesses you will be lifting within a given weave. This will be discussed in greater detail later.</p>
<p>Contents</p>	<p>Remove all the contents from the shipping box and check to see that you have the following items:</p> <ul style="list-style-type: none">◆ filter/regulator (FR) with mounting bracket and hardware package◆ foot pedal with tubing attached
<p>INSTALLATION</p>	<p>1. You should have already assembled the #12 Treadle Pulley Crossmembers (with A-Lift cylinder and mounting plate pre-assembled) onto the loom frame during step 4 in section 2. (See FIGURE AL-1). If not, do so now.</p> 



FIGURE AL-1: A-Lift on A-Series Loom (front)

**Installing the
FRL**

2. Install the Filter / Regulator / Lubricator (FRL) in the pre-drilled holes using the screws provided onto the left rear side support as shown in Figures #AL-2. Connect the FRL to the correct color coded air line from the coil of tubing with the air cylinder.
The air lines have been connected to their fittings by pushing them into place. They will not come out. In fact, the harder you pull, the harder it will hold. Try it!



FIGURE AL-2: FRL Placement (Left Side of Loom)

Foot Pedal

3. Place the foot pedal under the loom near where your feet will be when you're sitting on the bench. Connect the correct color coded air lines to the foot pedal. (See Figure AL-1)

Return Cable

4. The dobbie slide plate-to-spring lever cable will attach to the slide plate with a quicklink in the eyebolt located on the back upper right corner of the slide plate. Route the cable over the small white plastic pulley located on the dobbie back, directly above the eyebolt. The cable needs to be in the slot of the pulley and under the retainer mounted with this Pulley. Please check to see that the pulley and retainer are secured by the hex bolt. The retainer must be adjusted to secure the cable onto the pulley, but not impede the rotation of the pulley. Now, the cable will go down the right side of the dobbie back. Guide the cable around the return pulley on the cam-pulley axle, then into the center of the loom.

Bring this cable over to the spring lever and loop it around the pulley on the side of the lever. Now, you will need to pull against the spring in order to bring the looped end of the cable around the pulley on the lever and back toward the right side of the loom, to anchor it at the open J-Bolt.

The line of the cable from the dobbie to the pulley to the second pulley to the weight should be straight. The cable should not be at a diagonal from any point to point. Therefore, you can slide the pulley into position on the axle and secure it into place by tightening a stop collar on either side of the pulley.



FIGURE AL-3: Cable Routing (Right Side of Loom)



FIGURE AL-4: Spring Lever with Cable Routing

Return Spring Adjustment

5. If the slide plate does not move up to the upper slide plate bumpers, the turn buckle on the return cable will need adjustment.
 - a. Loosen the jam nut on the turnbuckle.
 - b. Rotate the turnbuckle while holding the cables on each end to draw the eye bolts in the turnbuckle closer together. It is best to iterate this step with one turnbuckle rotation and then test, repeating until the slide plate will move up to the slide plate bumpers after pulling it down ½ inch.
 - c. Tighten the jam nut to lock in this turnbuckle position.

Lift Cable

6. Guide the lift cable attached to the bottom center of the slide plate down to the left pulley on the axle. Clip the end of the cable to the rod end of the cylinder.

The line of the cable from the dobbie to the pulley should be straight. The cable should not be at a diagonal from any point to point (See Figure #AL-4). Therefore, you can slide the pulley into position on the axle and secure it into place by tightening a stop collar on either side of the pulley. You can also adjust the tension of the cable by turning the turnbuckle on the cable.

7. Your loom is now ready to be hooked up to a compressed air line. This line will be connected to the FRL unit. You need to purchase a fitting to hook up to your air line. For convenience, we suggest that you use a "quick disconnect" type fitting which can easily be released from the loom without any tools.

8. Once the loom has been hooked up to an air line, set the regulator to a pressure range that will operate the cylinder to your satisfaction.

Start at 40 to 50 PSI. You may wish to change this adjustment when you change weaving patterns as you will find that a higher pressure is needed when you are lifting more harnesses. The cylinder can now be activated by depressing the foot valve. The speed of how quickly the harnesses lift (your weaving speed) can be further altered by adjusting the flow control valves. The left valve adjusts inward motion and the right valve adjusts outward motion of the rod in the cylinder. (See Figure AL-5)

This completes the installation for the A-Lift. For further information on the FRL, refer to Figure AL-6 and the enclosed manufacturer's instructions.

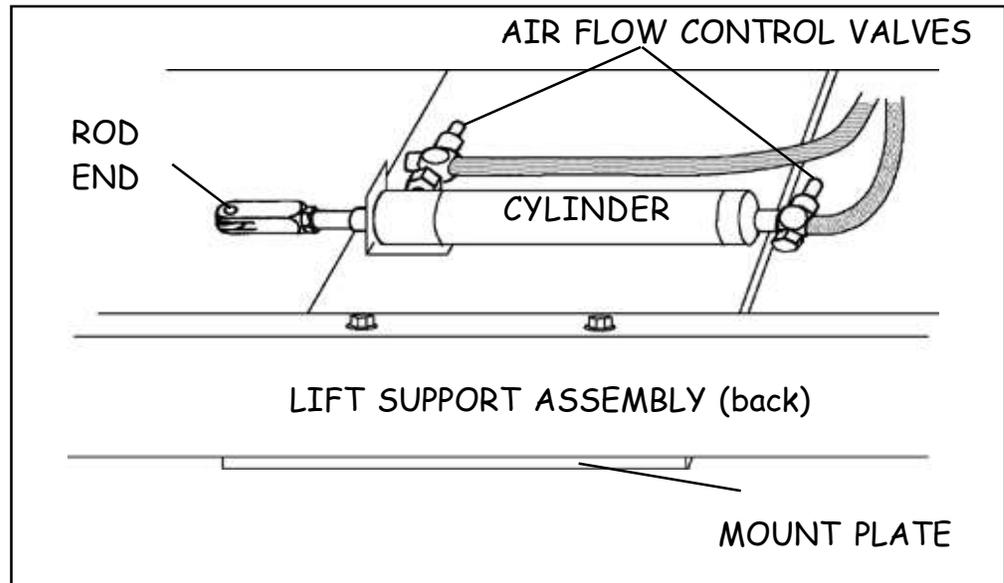


FIGURE AL-5: Air Flow Control Valves

INSTALLING THE A-LIFT

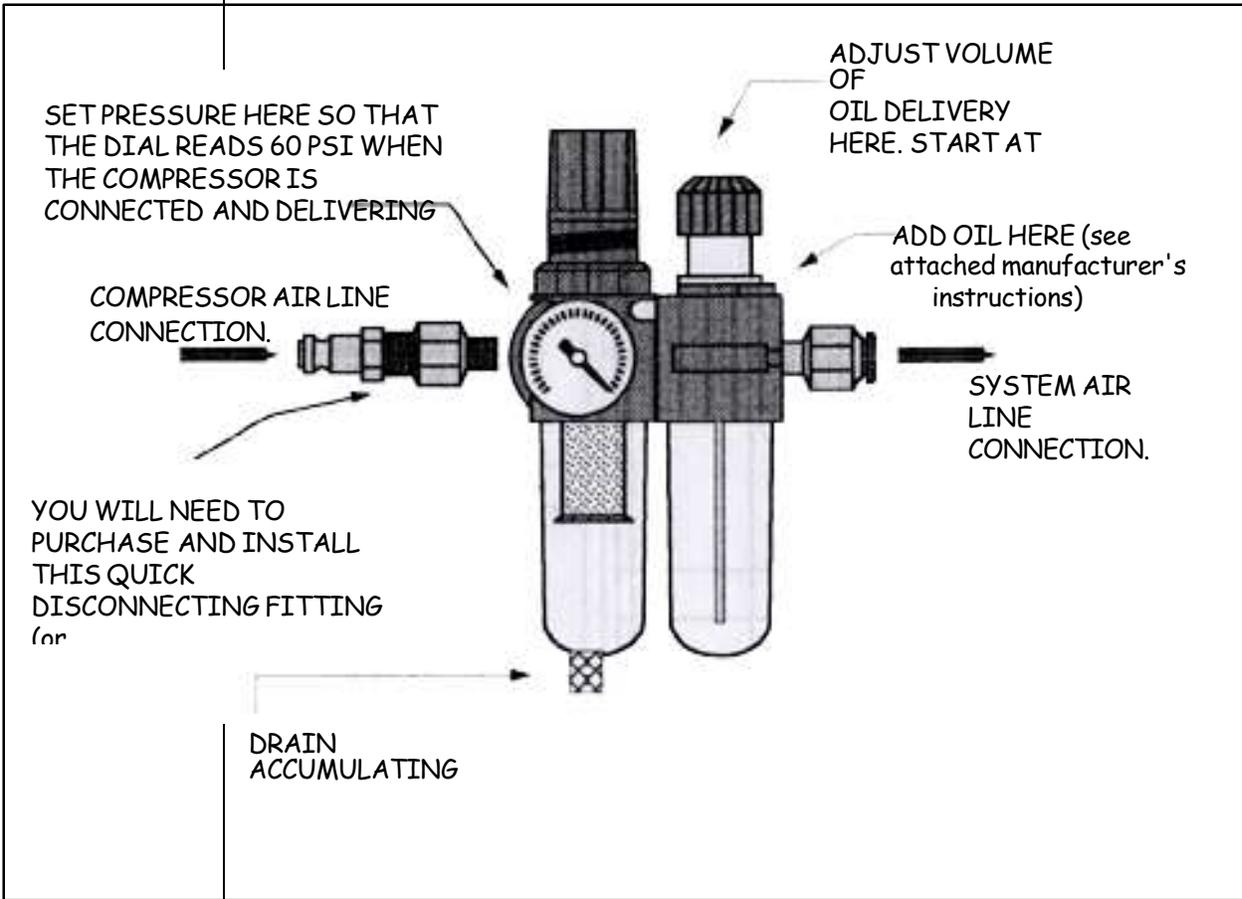


FIGURE AL-6: FRL Detail (may vary)