The Grand Bellows

For photos click on the following:
http://s1195.photobucket.com/albums/aa387/BobbyLFloyd/Grand%20Bellows/

1. Purchased from a lady in Amelia VA for $100 on November 10, 2011.
2. The weight is 160 lbs.
3. The length is 7'6"from end of pipe to end of the rear hanger.
4. Width is 48" from end of each side hanger.
5. It is said that this bellows came from the Patterson/Schutte Plantation near Midlothian or Richmond, VA. On the computer there is a manor house named that name with .5 acres that's or was owned by the Historic Society. The original Plantation had 731 acres and one article said it was completed in 1785. Another article says that it was built between 1735 & 1755.
6. There is a marking, stamped into the wood, toward the front on the top board with the letters US (inch or so high). I don't know what that means in helping me date the bellows.
7. Condition:
    A. Needs all new leather (it crumbles in your hand)
    B. All the wood is in excellent condition with original paint on it (very faded). The only exceptions are the narrow 1' board that goes over one of the large hole is cracked and it needs to be put back inside the bellows with a leather strap and another framing board inside the bellows is cracked but I think that I can glue it back together.
    C. One rust hole in pipe.
    D. Like other bellows (smaller) that I have seen, they were repaired long time ago with canvas like this one.
    E. There is horsehair or some kind of hair used as padding near the front pipe.
    F. This is a single hole bellows as compared to a double hole bellow that I have seen in some bellows. I do not know the significance of this as a dating factor or not.
8. How old is this Grand Bellows? They used this type in 1700 and 1800's. The craftsmanship of this bellows tells me that a true craftsman made it. There was a trade call Bellows Makers. They had machines to make small tacks around 1800 and some of the tacks look to be machine made. The other large tacks with umbrella type washers toward the front are also latter machine made. When I pull one out, I will maybe tell more about it. When I pull the small tacks out, I will check to see if they are wrought iron. If they are, I'm guessing the date of this Grand Bellows to be between 1790 & 1870.

The Repair Schedule:

1. Take a lot of photos as it is now before repairing it to make sure that I can put it back together. **Done,** I've taken 40 plus photos from all angles.

2. Count and remove all tacks and try to save them. Hopefully, I can remove them without having to grind them off. Break one tack almost in half to see if it is wrought iron. Check the shaft of the tack to see if is round or square and if has a sharp point or the tip is square (possible dating factors). Take photos of where the tacks are and after removing some take photos of the two types of tacks. **Done!**
3. Try to completely open the bellows to help figure out how wide it did open. Take more photo inside it and photos of the leather straps that hold some of main leather. Using the remaining leather after it is removed to try to guess at the size that I will need and order some. What thickness and what kind of leather to be determined. The correct size of my leather piece to install is my biggest challenge.
4. After all the leather and canvas are removed, take more photos.
5. Soak all tacks in vinegar to help remove the rust. Afterward, decide if I need new tacks.
6. Fill in all the tack holes with wood putty.
7. Glue the two boards that are cracked.
8. Make leather strap for board that goes over one of the holes and replace old leather strap on board on other side.
9. Fix the hole in the pipe.

Day one Nov. 15th: I worked about 2 hours today removing the tacks on ½ of the top board left side. What did I learn?

A. I can remove them with my nail remover and will not have to grind them off.
B. The smaller tacks are about ¾ in long, the heads are almost the same, it is a square point, 80 percent of the shaft from tip up is almost square or somewhat rectangle, the metal is soft, it's wrought iron and it was the original tacks because there were no more holes in wood.
C. The large tacks (1") with umbrella type washers had round shanks; sharp points; steel; and they were used to repair the bellows at a latter time. I'm guessing after 1880 when round shanks came into play more often and steel making was being use more. Also, when I remove them and under the leather there were holes in the wood where other original tacks were.
D. When I forced open the back, it measured a little over 7" from top board to the first brace (floating rib).
E. The top, middle and bottom big boards have an addition leather strap holding the leather (1 & 1/8 ") when nailed.
F. The two center braces (floating ribs) have another piece of leather about 3/8" wide holding the leather when nailed.
G. The top board has over 200 tacks in it.
H. Because of so many holes in the wood, I'm getting concerned about using wood putty to fill them in. I need something better to hold the tacks. Suggestions anyone?
I. Because all the tacks are somewhat rusty or rusted through, I need to start thinking about what kind of tacks or nails to use for the new leather.

Day two Nov. 16th: Worked about 4 hours today removing tacks on left side of top board and the next top middle brace plank (floating ribs) and started on middle board. What did I learn?

A. On the top board and middle brace plank (floating ribs) I removed 280 tacks, 45 tacks with umbrella washer in back and 12 on the side near the front on right side.
B. What I'm calling the middle brace plank (floating ribs) is 3" wide and about 5/8'thick. It's made of four pieces that are braced together in three places with other small planks. The leather is held to this brace plank (floating rib) with only one tack every three inches.
C. The main three boards are 1 & 5/8' thick.
D. There were 2 different places where the leather had been replaced or fixed. The back part that had 25 tacks with umbrella washers was a repair job and the other near the front with 12 umbrella washers was a replacement with another piece of leather about a foot long. The repairs/replace were either the leather broke/came loose or the bellows exploded. Yes, they will explode.
E. The large leather was glued together to make one piece. It was not sewn together. They folded each piece about 1/2''back and put another piece in the middle and glued them together. The location of this is in the back on right side.
F. I pulled two tack/nails that were one inch long out. I need to check them out for there estimated age.
G. I pulled two wrought iron nails out with no heads
H. I beginning to think that the small tacks that are machine made are after 1830's because of grain structure. They are easy to bend in half when the grain structure was side ways. They did not have this generally speaking until after 1830's. Before it was lengthwise and would break more easily. I need to put acid on the nails to make sure of grain structure.
I. Received this from Shelton Browder on facebook: cool. You will want four to six oz leather. if you can find it, there is a leather called blacksmiths sides that is very tough and supple. The old ones were usually leathered with calf skin. It will take at least one whole side, probably two. If there are two floating ribs in the top and only one in the bottom, then the top should open twice as wide as the bottom (best) and if not, they are equal. I have found it best to make the top and bottom pieces slightly larger and trim them after they are tacked on. Tack first with small blue tacks. Do it with the bellows in a rack and standing on edge. Tack two thin cleats on the back to hold them open to the correct width. You can start in the center back or in the front to tack them sparsely to check fit and stretch. Wish I could go help you but there just ain't time right now. I've been gone too much.
J. The middle board for the hole has 1' plank that has a leather hinge and on each side toward front are two another pieces of leather that keeps it from going to far.

Day 3. Worked again removing tacks/nails on this cold day. Worked about six hours. What did I learn?

A. Found two larger nails that were holding the center planks in place and I have removed temporally so that I can etch them in acid to help determine the direction of the grain. You know the Historic Detective is another fun part for me.
B. Found a cotton pad toward the back bottom on backside under the canvas. I guess it was put there to protect the canvas from tearing.
C. Four cracks in centerboard with strips of leather nailed over them with the same type of nails found in the other part of bellows. Therefore, it was put on when the bellows was made. The cracks were caused when the wood dried. The centerboard is not made or finished as well as the two other bellows boards. I guess because one cannot see it with leather covering all.
D. One of the planks holding the floating ribs pieces in place has come undone and needs to be nailed or screw back.
E. One of the pieces of a plank holding one of the floating ribs (top) is broken off. Needs glued and nailed back on.

Days 4 & 5. Worked removing tacks/nails again but the days were perfect to work in. Worked about 13 hours total. What did I do and learn?

A. The total of all the tacks/nails in the bellows are between 900 to a 1000. Most all are removed except within a foot and half near the front pipe.
B. Removed one nail near the back next to the extended board that held the leather and it was different than the others that I have removed. It has about an inch head and is called a bellows nail in Europe.
C. After removing the majority of the nails, I started looking at the holes in the wood that held the leather to see a pattern. Yes, there was. Three nails were put in at a 45 degree angle about half inch apart in the 3 main thick boards but also I noticed that other larger holes were in the middle of the boards placed about two or so inches away from each other. Sat. night, at the end of the day, I started thinking about what I done and remembered that I had removed a few nails that were larger but with no heads and could not figure out why they were there. All of a sudden I realized that maybe these larger nails were bellow nails with the heads broken off. I got up Sunday morning early to compare the nails with no heads to the shank of the ONE bellow nail that I had removed and it was an exact match. **Conclusion from the History Detective (me): All the old leather that had been removed was the second time this grand old man (the Grand Bellows) had new leather on nearly every part of it.**
D. The four pieces of leather over the cracks in the centerboard were put on at the same time when replaced leather was put on because the nails were the same as the majority of the ones holding rest of the leather and the heads did not match any others of the same size. So now the question is why the cracks? Was it shrinkage in the wood or did it come apart with an explosion?

E. The Y shaped piece of metal with the hook that's in the back, I believe, is a newer piece put on because of the many larger nail holes in the wood near the end in the back.
F. Two more larger nail holes in main board cannot be explained yet.
G. Screwed and glued the broken piece of the floating rid and also glued (Gorilla glued) the one-foot air hole plank that was broken and removed the very small tacks and leather from it.
H. I put four screws in each of the two brace planks holding the floating ribs. Why screws? Because they hold better than nails and I think they would have used them if they had access to them at a reasonable price. The first screw machine that made the head slot and point on a screw was made in the late 1850's and by early 1860's they were selling tons & tons of them at a cheap price. This is an excellent dating factor.
I. Removed all the leather strips & tacks over the cracks in the centerboard. I'm thinking that I will fill the cracks with silicone so the air will not come through and not use leather.
J. Was able to take out one of the metal sidepieces that fit into the centerboard. It's one the two rods that holds the bellows in a stationary place when in operating it. I wish that I could have taken out the other one but it would not come out. It would make it much easier for me to put the new leather on with both of them removed. It looks to be a round piece of metal that goes into the wood is store bought with the larger part forged welded to it.
K. None of the wood, so for, is rotten or has any wormholes. I did find another small piece of wood on the centerboard missing where the leather is nailed.
L. The leather where the extended piece of the wood that holds the hook was put under the extended piece. In other words it was turned 90 degrees from the other leather that was tacked/nailed to the rest of centerboard. This could maybe be a problem when I put new leather on.

Day 6: Remove the most the tacks/ nails near the front of bellows near the pipe. Work about 5 hours.

A. I believe the newer hook was put on when the leather was still on the bellows because the nails holding were not clinched.
B. A couple of smaller pieces of wood that were holding one of flowing ribs was cracked some. I glued and screwed them together.
C. I've separated the bottom board and flowing rib and placed it aside.
D. Did not take the rest of the bellow nails& tacks out because I need to measure the whole thing around bellows for how much leather that I will need. I was unable to save or measure any of the old leather to figure out how much leather I need.
E. Now, I need to go to Lynchburg to get some supplies (muratic acid, silicone, some smaller pieces of leather and tacks.

Day 7: The nail study: I used a glass jar to put the muriatic acid in and then I put the nails into jar so that I could etch them so that I could see which way the grain was going on the front face side of the cut nail. I checked every five minutes to make sure that the acid

would not dissolve too much of the metal. I used a 20x magnifying glass to find the grain structure, confirm were the burrs & buttresses were located. The book that I use to help me identify the estimated date of any early cut nails is called *Historic Louisiana Nails.* This is what most Architectural Historians use. The early dates are the beginning heavy use and the latter dates are ending of heavy use.

A. The 3/4" tack/nail that held most of all the leather. We now know that this leather was a replacement leather and maybe the nails could tell be about when it was put on. I had removed over 900 of these tacks/nails. I put 5 of this type nails/tacks in the acid.
    1. The heads were round to octagonal shape and thin. This tells me that the machine that made it was not around in early 1800
    2. In line grain: 1834- 1880
    3. Wrought Iron- up to 1880
    4. Flat point: 1791-1880
    5. Burrs on same side: 1808-1885
    6. Buttress on front face: 1791-1849

    ***** Estimated repair date is not before 1834. If he bought the nails for this repair job the date is no latter than 1849 but he could have had some old nails in stock that changes everything.**
B. Only two one inch nails removed out of the same leather and the only thing different than the above is:
    1. Cross grain 1815-1836
C. Two-two and half inch nails removed from braces on bellows. This should give me an idea as to when the bellows was made.
    1. Heads are very irregular sides, corners tipping and somewhat square or rectangular. Very early machine.
    2. The other factors are the same as # A except for the buttress and it was on the cut side. 1815 –1849
D. Other nails.
    1. One three and half inch nail removed from the larger brace. It' the same as A except I could not identity the point because of damage and the head was somewhat thick and rectangular.
    2. The hand forged made bellow nails/tacks had ¾ to 1" thinly made heads and the shank was about 1" long. I found no record of any machine in the 1800's that made these. They were specialty nails and still hand made.
    3. Some nails that were used on the repair job were steel, with sharp points, round and they were starting to be made them only after 1880's. They look like today's nails.

****** I feel comfortable in saying that my grand bellows was probably made sometime between 1830's and 1850's. The first replacement leather was put on between the same period, but probably closer to the 1850's because of the evenness of the shape of the heads.**

Day 8: It's time to slow down and think things out. Yes, I want to have a functional bellows that I can use in my shop, but on the other hand, I need to preserve this historical object in it's original condition as much as I can because very few of them remain. I did take my time in removing the nails/tacks to help preserve the wood the best way that I could. Everything that I do to it from here on out needs to be thought out more carefully, if I'm going to preserve this historical Grand Old Bellows in it's near original condition. I could just hang it on the wall and that would preserve it but I want to use it.

In my research to find information about how these grand on masterpieces were made is non-existent - so for. I have decided to take photos and measurements of everything. In this way if someone wants to replicate one-- they can.

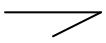
In the next couple of weeks, I'm starting my research on leather. What kind did they use, where to get some and how much does it cost?

Days 9& 10: Put in about 12 hours. What did I do and learn?

1. Washed all the wood with mild soap and used a soft brush so that the color would not come off more. Patched all the nail/tack holes with wood filler, let it dry for a day and then sanded it all.
2. Had a couple of places where small pieces of wood were broken off and I fill it in with epoxy putty and sanded.
3. Filled in all the cracks in the large boards with Liquid Nail. This was done to stop any air coming through. After thinking about this for a few days, I've decided that the next time in my shop that I will remove the Liquid Nail that's in the larger cracks, clean the cracks good and put cut a shiver of wood with Gorilla Glue to make it more solid and to hopefully keep the boards from splitting open more. I will be using Gorilla Glue over Elmer Carpenter's glue because the Gorilla glue expands over 4 times and maybe this stuff will fill the cracks better and hold better.
4. Removed 203 bellow nails from a very old, rotten, bug infested, smaller, torn-up, pieces of a bellows that someone had given me a few years ago. They are hand forged; thicker heads, longer & thicker shank bellow nails than I pulled out of the Grand Bellows. The heads vary is size for 1" to ½". The shank lengths vary in size from an inch to an inch and half.
5. I took my entire collection of bellow nails, tacks/nails and soaked them in Muriacic acid for 30 minutes to remove the rust. Then I rinsed them, wash them mild soap, rinsed again and dried them before putting some spray penetrating oil on all of them. Yes, I plan on using some of these nail/tacks when I put the new leather on.
6. The centerboard is thicker than the other two main boards.
7. The two floating arms are not the same length.
8. The air flaps leather hinges are put on differently. One has it toward the top and the other toward the bottom.
9. Looks to have been a fire inside the bellows between the centerboard and the top board because of the scoot and stain in the boards.

Day 11-12: Worked about 4 hours.

1. Removed Liquid Nail that I had put between some larger cracks to stop the airflow and made the crack more even by enlarging the cracks with file & grinder and then cut pieces of wood to fit, glued them into in the cracks, dried and sanded it all.
2. Used air pressure to clean the smaller cracks and poured some glue in them.
3. Just about finished preparing it all for the leather.



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