Adding Bells to a Band Organ using a Pitman Chest

David Wasson

During the rebuilding and reconstruction of my band organ over the past two years, I postponed the rebuilding of the bells until the very last. This was because I knew the organ would probably sound just fine without the bells, and also because I have tuned the organ differently from before. Of course, the bells would have to be tuned to match the organ, so, I saved this entire process until last.

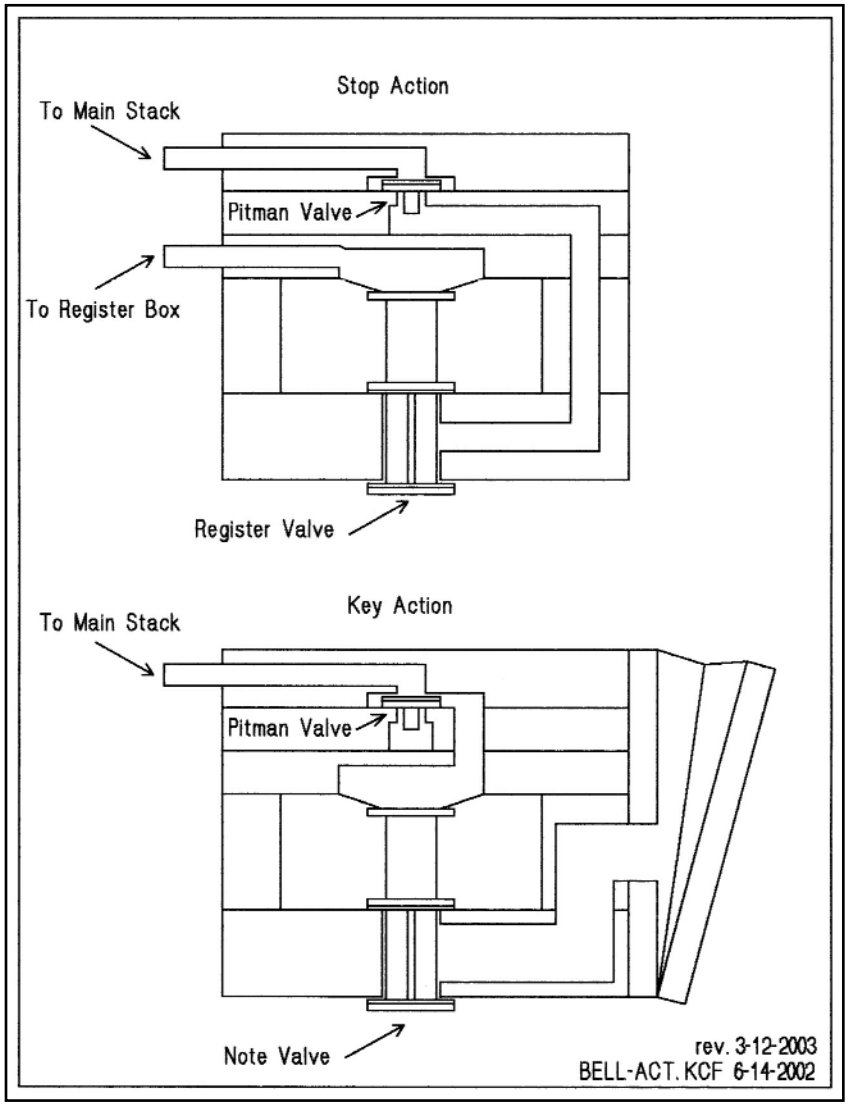

Figure 1. Stop action and key action cross section drawing.

The new valve chest for the bells is an experiment that has turned out very well. The old chest had an annoying habit of allowing a note or two to be struck occasionally whenever the ventil to the chest was activated. So, my experiment was to see if I could design a vacuum-operated chest based on my pressure-operated pitman chest. Pitman type chests are normally used to operate organ pipes, using positive pressure. I use this type of chest work for all the pipe work in my band organ. With a little bit of redesign, I have come up with a pitman design that works on negative pressure, or vacuum, in order to operate striking pneumatics for my set of bells.

Figure 1 shows two cross sections through the chest. The key action cross section shows the porting from the nipple that goes to the main stack. The key action from the main stack is a vacuum signal which can be interrupted by the pitman valve depending on whether or not the stop action is on.

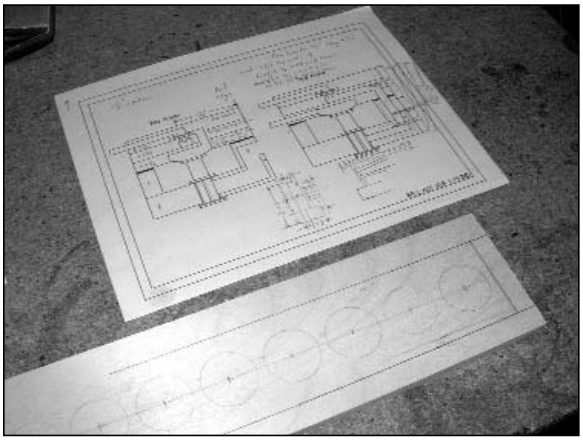

Figure 2. Pouch board layout and chest drawing.

There is one valve in the chest for each bell bar. There is one extra valve that is controlled by the stop action. The stop action signal comes from the register box. This is shown in the stop action cross section. The stop action valve is ported much differently than the key action valve, but, from the outside, looks much the same.

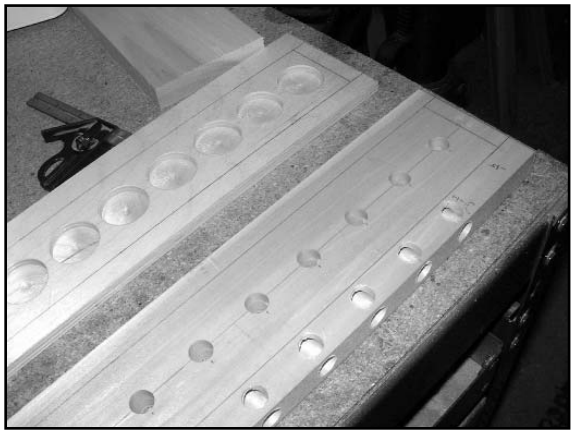

Figure 3. Drilled pouch board and main valve board.

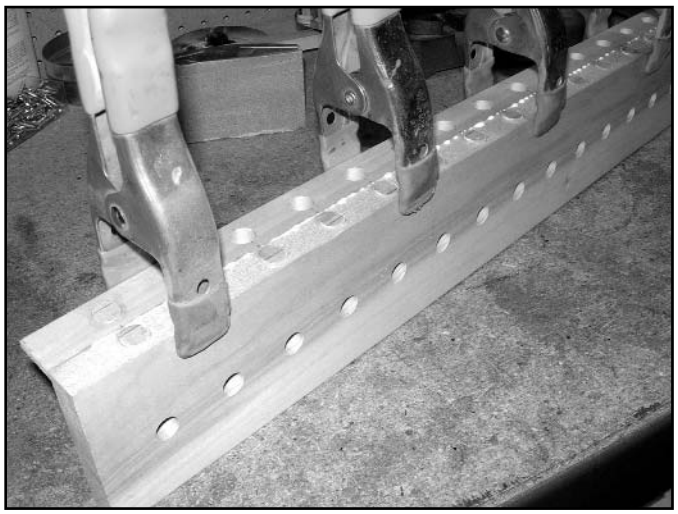

Figure 4. Chest side for pneumatics, being glued to valve board.

Figure 5. First valve position is for stop action.

Figure 6. Port drilling completed.

The top of the chest, which holds the pitman valves, consists of three layers. The preparation of the raw boards for the chest is shown in **Figures 2** through **7**. In **Figure 6**, you can see the groove that connects all of the pitman valves with the stop action valve. **Figure 8** shows the pitman valves. They are ½ inch disks with a 1/8 inch dowel pressed in. They are covered on one side with thick pouch leather for a valve facing. The well for the pitman is drilled such that the movement of the pitman is only about 1/32 of an inch.

Figure 7. Completed drilling and countersinking for screws.

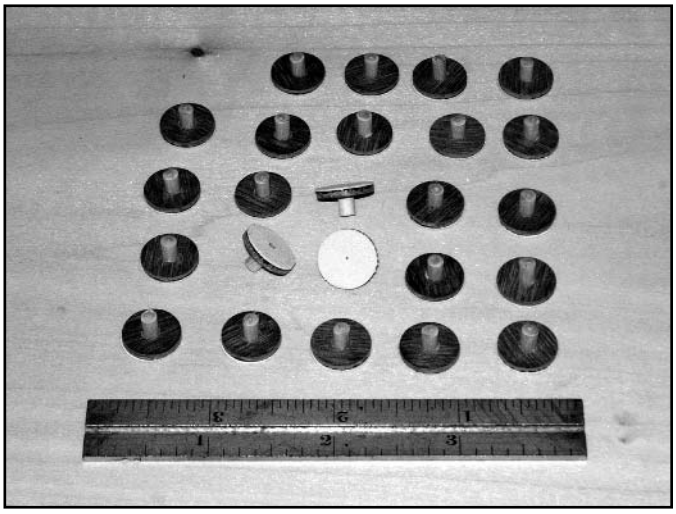

Figure 8. The assembled Pitman valves.

With a little bit of redesign, I have come up with a pitman design that works on negative pressure, or vacuum, in order to operate striking pneumatics for my set of bells.

Figures 9 through 12 show the finished boards for the chests before the pouches and valves are installed. **Figure 12** shows the two gasketed surfaces of the top three layers.

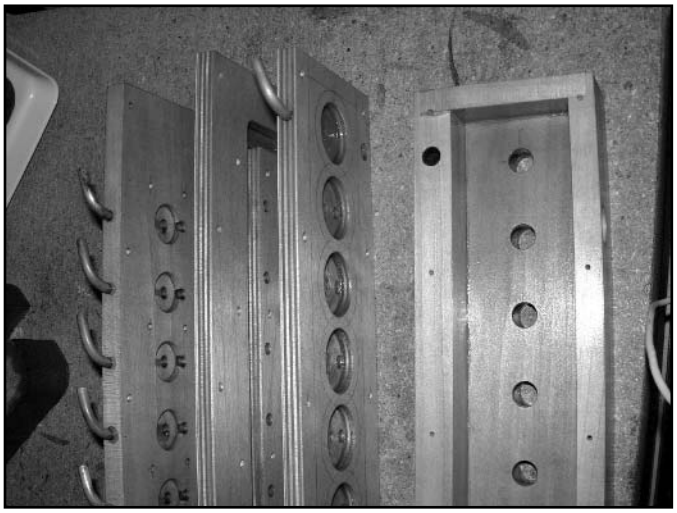

Figure 9. Pitman wells finished and all surfaces schellaced.

Figure 10. Elbows installed for key action and stop action.

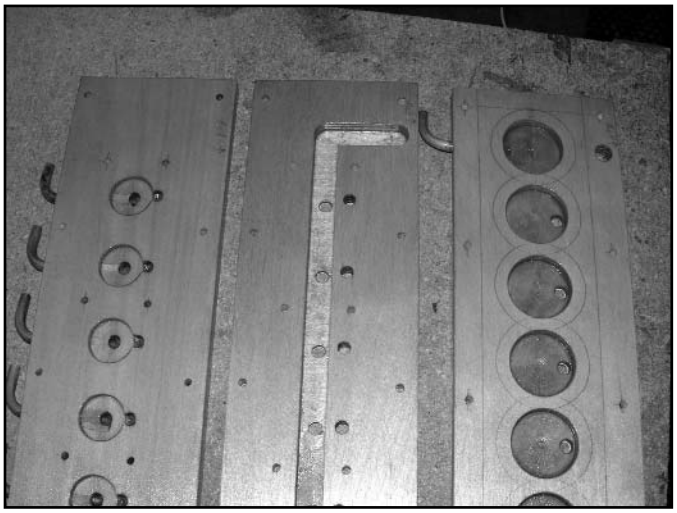

Figure 11. Boards ready for installation of gaskets and pouches.

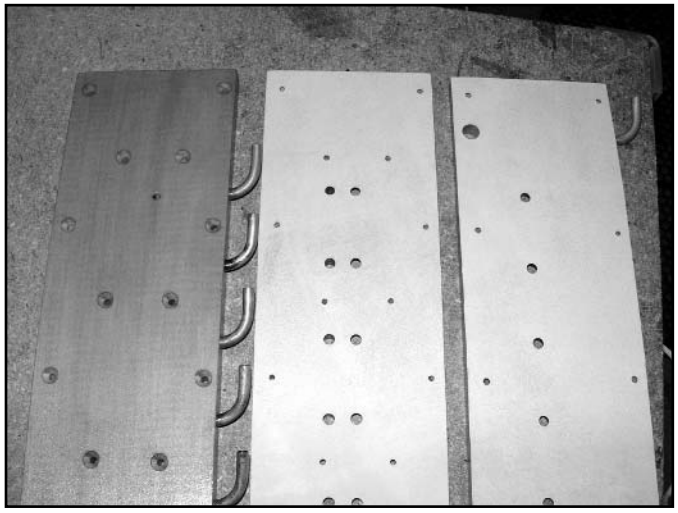

Figure 12. Thick pouch leather used for gaskets on inner two layers.

Figures 13 through 17 show the preparation and installation of the valves. All of the valve faces are fastened to the fluted valves stems with screws. This made necessary the use of a pilot hole in the stem, and a clearance hole in the valve disk. Because the valve is about one inch away from the pouch, a spacer is needed to take up this distance. I used a ½ inch square piece of balsa wood to keep the spacer light. Through the center of the spacer is drilled a hole so you can get to the screw that holds the valve face to the stem. This spacer is shown in place in figure 17.

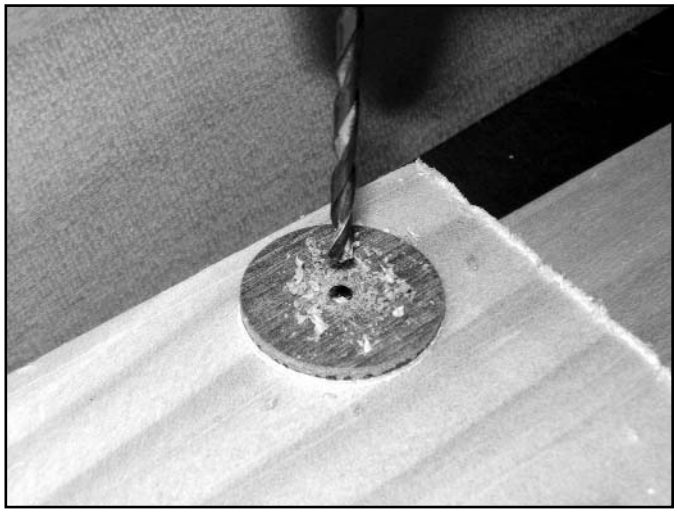

Figure 13 Clearance hole drilled in valve disk.

The vacuum-operated pitman chest has many of the same components as the pressure operated chests.

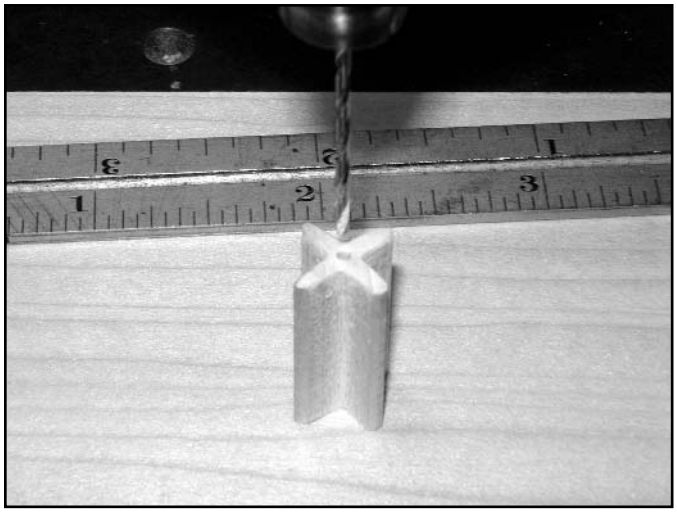

Figure 14. Fluted valve stem must be pilot drilled to avoid splitting.

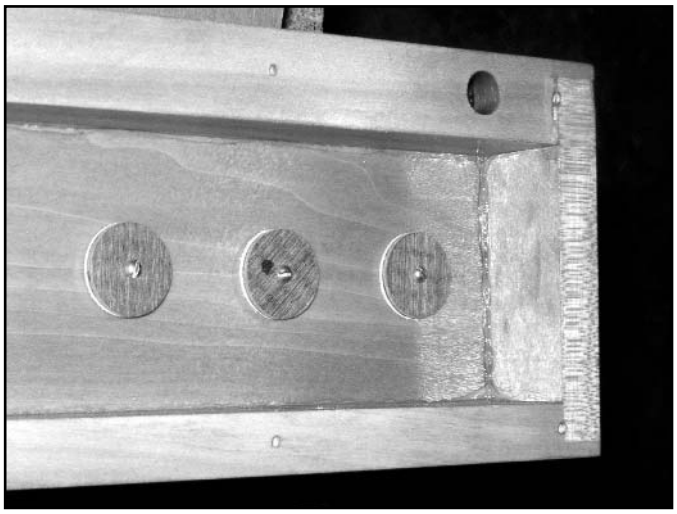

Figure 15. Installed valves.

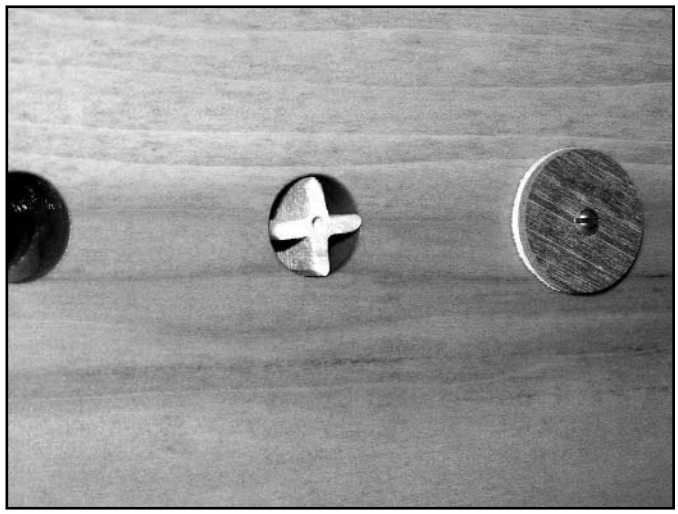

Figure 16 (above). Valve stem before and after installation of valve disk.

Figure 17. Spacers attached to valve disks.

Figures 18 through 21 show installation of the pouches. Figures 19 and 20 show placement of a pouch using a vacuum assisted pouch dish. This helps to avoid pulling any glue into the pouch well, and allows for a well dished pouch without having to stretch the pouch after installation.

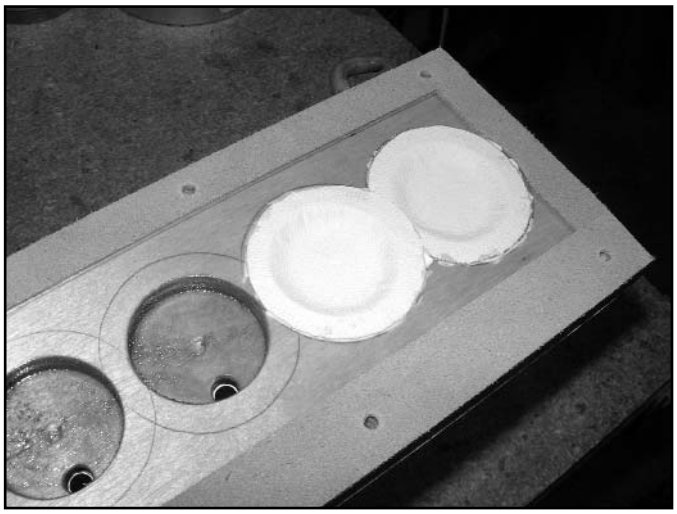

Figure 18. Installed pouches before lifter disks are attached.

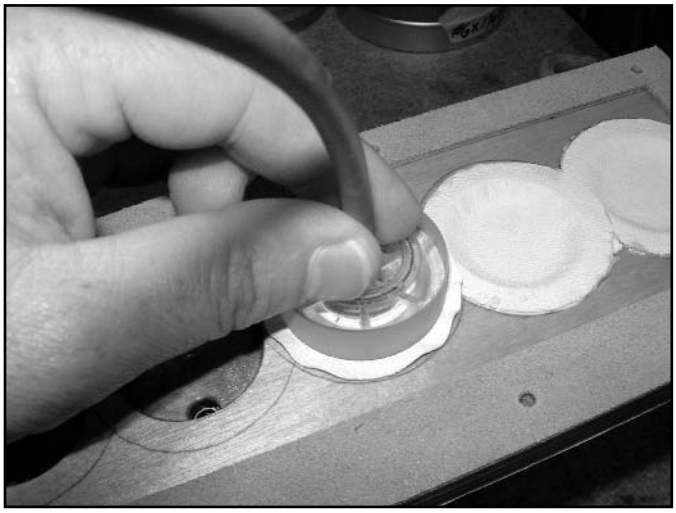

Figure 19 (right). Placing a pouch using a vacuum assisted pouch dish.

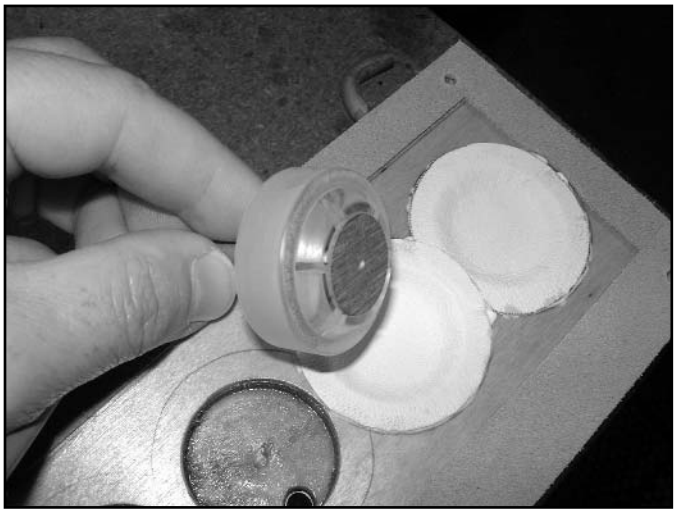

Figure 20 Bottom view of pouch dish, showing vacuum grooves that hold the pouch in place.

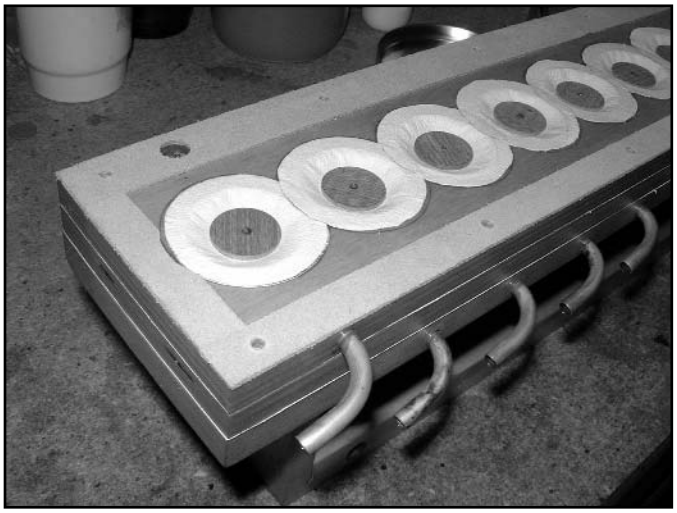

Figure 21. All pouches, lifter disks and gaskets in place.

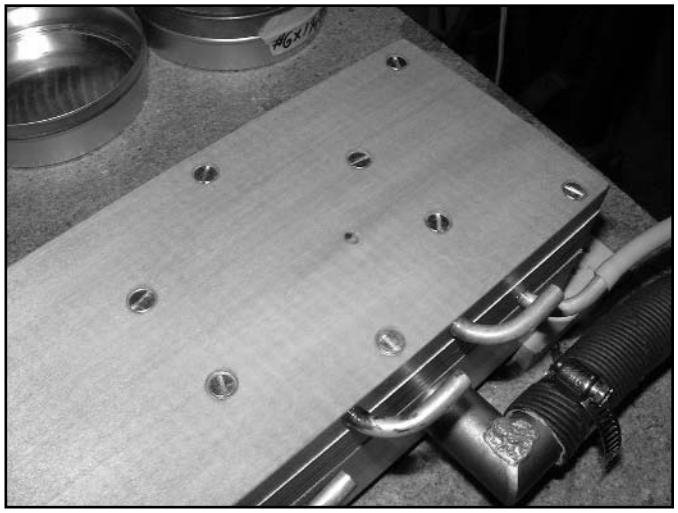

Figure 22. All layers screwed to the chest, with test vacuum supply attached.

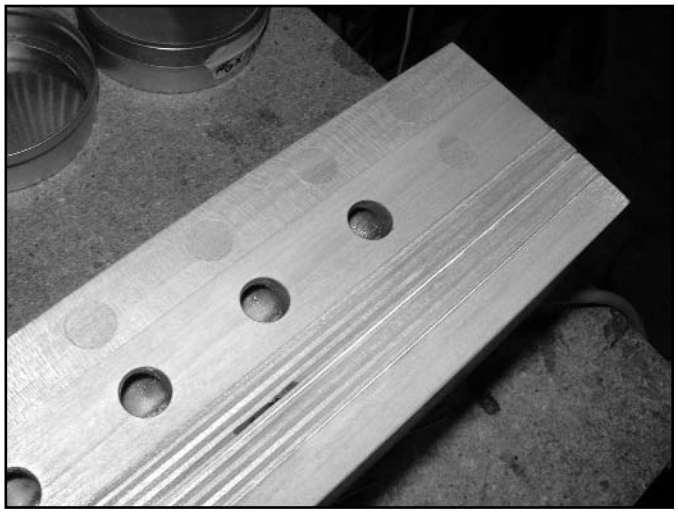

Figure 23. Chest ready for installation of striking pneumatics.

Figures 22 and 23 show the assembled chest before the striking pneumatics were installed.

Figures 24 through 27 show the installed bell action with striking pneumatics in place. On the left side of the action is a junction block, so the entire chest assembly can be removed without having to disconnect all of the tubes. This is shown in **Figure 25**. The key action tubing is shown in **Figures 26 and 27**. This tubing goes to the main stack.

Figure 24. Final installation of bell chest.

Figure 25. Position of striking pneumatics, bell bars and stop rail shown here.

Figure 26. Backside of installed chest, showing main vacuum supply and key action tubes (dressed towards the back).

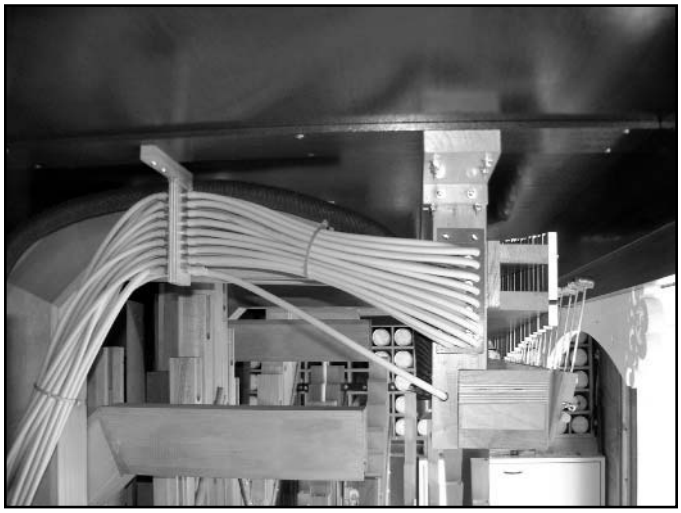

Figure 27. Junction block on left end of chest allows for removal without having to untube anything.

Before I built this chest, I made a few experiments to see if a vacuum operated pitman would work. My tests went well so I proceeded with the design of this chest. The finished chest seems to work well, and has none of the problems of my old chest (even if it has a few more parts!).

David Wasson, a resident of California, has been working on the construction of his band organ, *Trudy*, over many years. Much of his inspiration has come from fellow organ builders, especially Ken Smith of Ohio.

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