How To Make A Wurlitzer Tracker Bar

Matthew Caulfield

At first glance Wurlitzer tracker bars look like a solid bar of brass, drilled with the requisite number of square holes in its face (**Figures 1 & 2**). But on closer inspection, the complexity of their construction begins to appear. The bar is actually a hollow rectangular box, and each hole in its face is connected to a larger hole in the back, their size necessitating the holes being staggered in three rows (**Figure 3**). The connection from tiny front hole to large back hole is not, as one might suppose, a channel drilled into solid metal, but a specially formed tapered nipple that is soldered both to the front brass plate that forms the curved face of the bar and to the flat back surface of the bar that clamps the dust screen to the backing block of the roll frame (**Figure 4**). See **Figure 5** for an interior view of an actual Wurlitzer tracker bar.

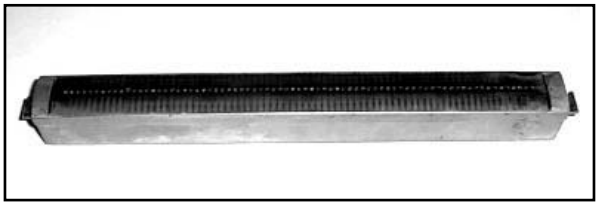

Figure 1. Original Wurlitzer Style 165 tracker bar (front surface).

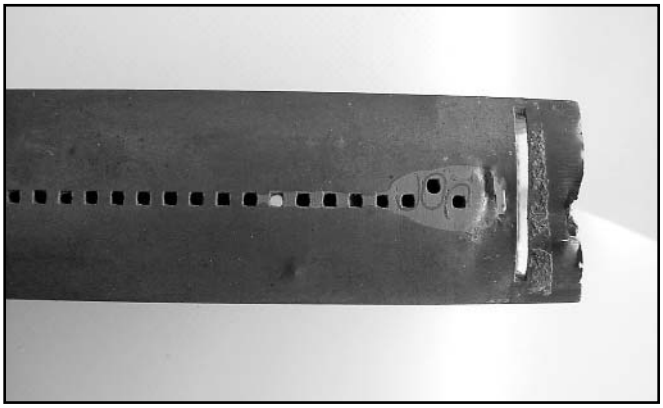

Figure 2. Wurlitzer Style 150 tracker bar, showing offset drum hole and wear from long use.

Why did Wurlitzer make their tracker bars this way and how did they accomplish the air-tight assembly of more than 100 connections inside each tracker bar "box"?

Wurlitzer rightly felt that it needed to incorporate a dust screen into its tracker bar design. Even old and well used music rolls shed a certain amount of paper fiber as they pass over a tracker bar, and new rolls are notorious for the amount of punching debris and surface fibers that they shed for the first dozen runs or so. Pressure systems (e.g. Artizan organs) blow this paper dust out into the atmosphere, but vacuum systems like Wurlitzer's suck the dust into the system, unless it is caught by a dust screen placed between the tracker bar and the organ's primary valves. If paper dust gets sucked into the primary valves and plugs their tiny bleeds, the valves become sluggish or may not turn off at all.

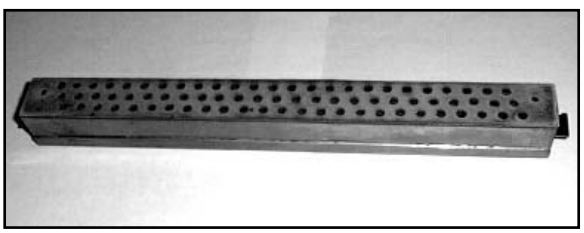

Figure 3. Original Wurlitzer Style 165 tracker bar (back surface).

Player pianos, rather than use dust screens, came with a tracker bar pump, which was to be used, when needed, to suck paper dust out of the tubing way down to the guts of the piano's valve action. Wurlitzer felt that its band organs, built for heavier use and often equipped with dual roll frames, needed a better way of coping with the dust problem than a hand pump sucking on the tracker bar offered. The Wurlitzer dual roll frame system, for one thing, required the interposition of a transfer chest between tracker bars and primary valves. The purpose of this chest was to control which of the two tracker bars was connected to the primaries and which was sealed off. But a negative consequence of the transfer device was that the tracker bars could not be pumped out well enough to remove dust from the primaries.

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In order to put a dust screen behind the tracker bar, Wurlitzer had to make the tracker bar removable from the backing block which held the nipples for the tubing running to the primary valves. Wurlitzer could not use a simple one-piece, open-backed tracker bar with exposed tubing nipples like ones used in player pianos. The Wurlitzer tracker bar had to resemble a solid metal bar, gasketed on its back surface, that could be clamped to a backing block (made of wood and similarly gasketed with sueded white goatskin), with a fine-mesh brass screen clamped between the two parts to catch the dust.

That is the why of Wurlitzer tracker bars. Now for the how. This part must be somewhat speculative, since those who actually made such tracker bars are dead or almost so.

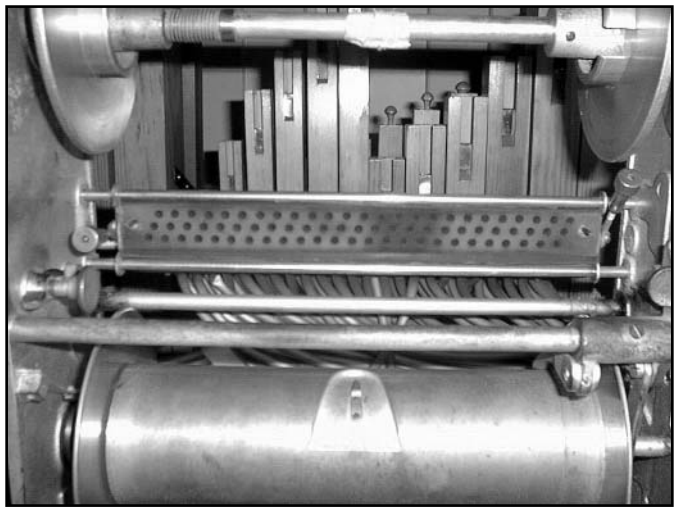

Figure 4. Roll frame, showing backing block for 165 tracker bar.

Figure 6 shows a modern tracker bar nipple, very similar to what Wurlitzer used. The narrow opening, to be soldered to the tracker bar face, is about 3/32" in diameter, with an opening of about 1/16" (the opening just fits over a #50 drill bit). The larger end is sized to receive a standard 5/32" rubber or lead tracker bar tube. In a Wurlitzer bar the larger end would be soldered to the back of the tracker bar; so its diameter is not critical. The narrow end of the nipple is of a size that nicely fits the .1227" Wurlitzer tracker bar hole spacing.

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Wurlitzer probably bent the slight curve into the face of its tracker bar before machining the row of note holes in it. Otherwise it would have been difficult to achieve an even curvature once the line of holes had weakened the metal at that point. The face plate, after being curved and having its row of holes drilled round and then broached into square form, might be laid face down into a wooden jig which had pins pointing upwards, one pin sticking through each hole in the tracker bar. Then the requisite number of nipples would be slipped over the pins, which would hold each nipple in position until the face plate was flooded with enough solder to anchor the nipples. [The pins might have to be made of a material to which solder would not adhere in case it leaked out between nipple end and face plate. Or perhaps solder leakage was minimal.]

The final step in the process would be to close the tracker bar by slipping the box end of the tracker bar over the larger end of the nipples (whose length would be just excessively long enough to protrude through the holes in its back side) and flowing solder into those joints to make a tight seal. By using solder of a higher melting temperature to do the first soldering which anchored the small end of the nipples to the tracker bar face, while using a solder with a low melting point to solder the large ends of the nipples to the back of the tracker bar, the task of performing the two separate soldering operations can be made less chancy. After soldering is completed, the protruding ends of the nipples are machined off the back side of the tracker bar, leaving the bar ready for use.

This description does not account for how the nipples, which as attached to the face of the tracker bar are in one straight horizontal line, become staggered into three separate rows at the point where they need to be slipped through the three rows of holes in the back of the bar (see Figure 2). The first nipple must lean north of the true vertical, the second nipple stands straight up in the true vertical, the third leans south of the true vertical; the 4th to 6th nipples follow the same alternating pattern, as do each succeeding group of three nipples.

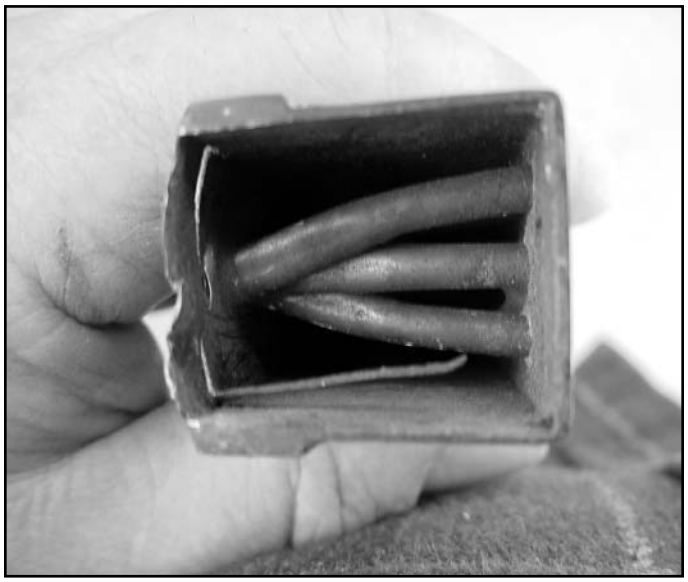

Figure 5. Interior of tracker bar shown in Figure 2.

There are at least two possible ways of accomplishing this staggering. The nipples could all be soldered to the face plate standing straight up on their pins and later be manually bent in the proper direction. This method is somewhat labor-intensive and requires that the soldering bond be stronger than the walls of the nipples. The other way is to use a jig over the larger ends of the nipples prior to soldering the narrow ends to the face plate. That jig would tilt the nipples at their proper angles and hold them in position until they are soldered to the face plate. The drawback to this method is the possibility of solder leakage, if there is much of a gap between the nipple end and the face plate due to the angling, slight as that may be.

Closer examination of the interior of a Wurlitzer tracker bar should tell whether the nipples have been bent to achieve their angling or whether they were soldered in at the angle. Also it would be interesting to test the solders used, to determine their melting point(s).

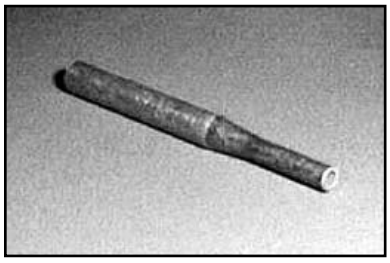

Figure 6. Tracker bar nipple.
Photo: Player Piano Company

In considering tracker bar construction, the question arises as to why Wurlitzer went to the trouble to make the holes in the face of their tracker bars square, which requires broaching in addition to drilling. There are some tracker bars in use that have round holes, and there seems to be no discernable difference in performance. Perhaps the answer lies in deKleist's method of making tracker bars, which resulted in square holes—a method which Wurlitzer may merely have continued when it succeeded deKleist.

U.S. Patent No. 802,079, granted Oct. 17, 1905, to Eugene deKleist is titled "Tracker Board" (**Figure 7**) and describes a relatively complex but foolproof method of making from wood a tracker bar which looks externally exactly like the tracker bars that Wurlitzer later built from brass. But the internal channeling is entirely different and is capable of being produced on the saw-table of any good woodworking shop, with a minimum of drilling. As a result of the channels being sawn, not drilled, the holes in the tracker bar/tracker board were square rather than round. deKleist's patent makes no claim for the superiority of square holes. The decision to make the holes square seems to be based simply on ease of construction and the nature of the material used. Square holes may simply have become a tradition, one that Wurlitzer did not want to change.

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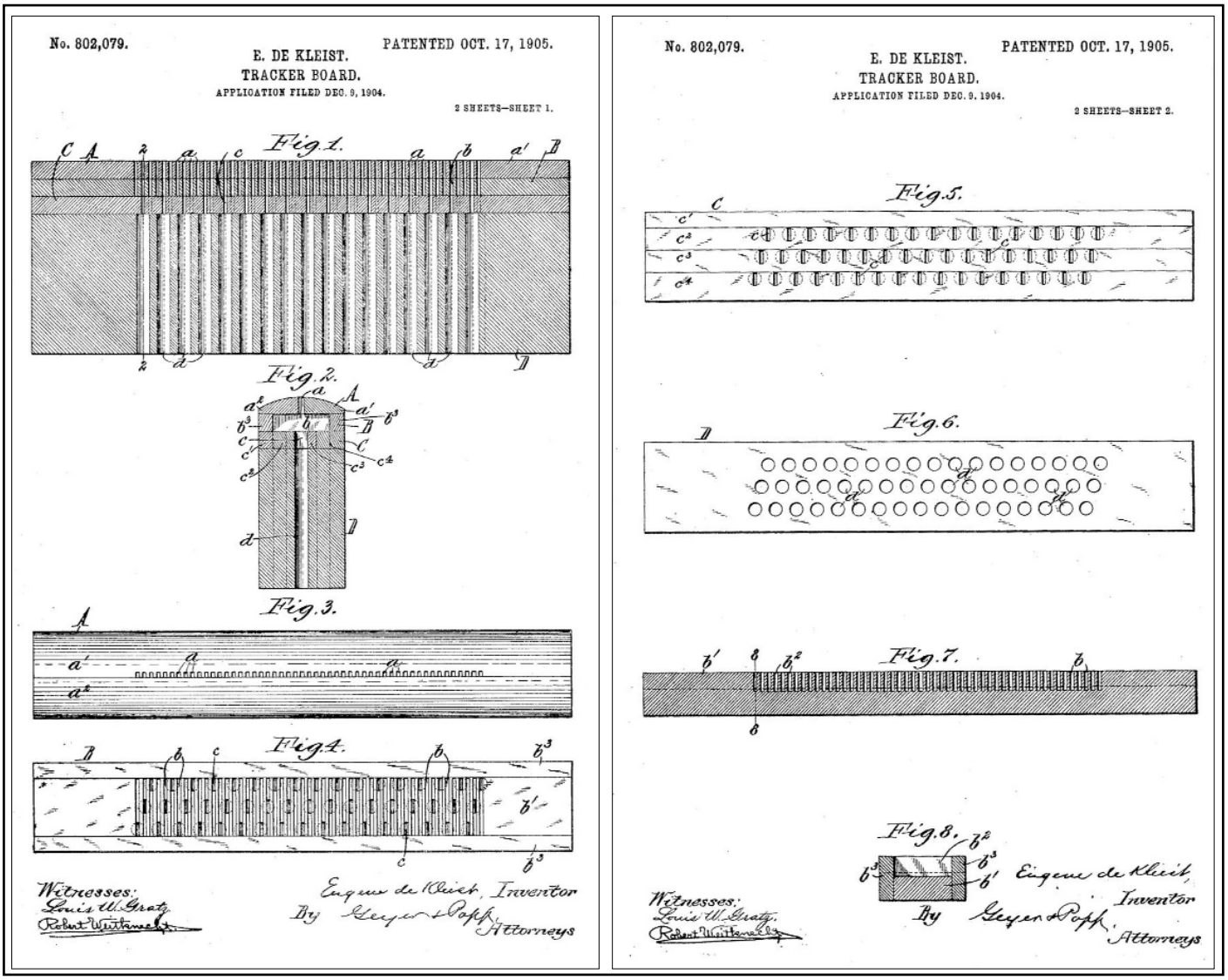

Figure 7. Two pages of Eugene deKleist's *Tracker Board* patent showing drawings of his proposed tracker bar.

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