New Music for Old Roller Organs

Charles Moore and Walter Moore

It's here at last, a fully computer-operated roller pinning machine. Yes, new music for old roller organs! Popular music from the early 1920s to 2002 can now be adapted for the 20-note Gem and Concert Roller Organs. These organettes were, and still are, fascinating music making machines. Many of these machines are still available today in the antique musical instrument market.

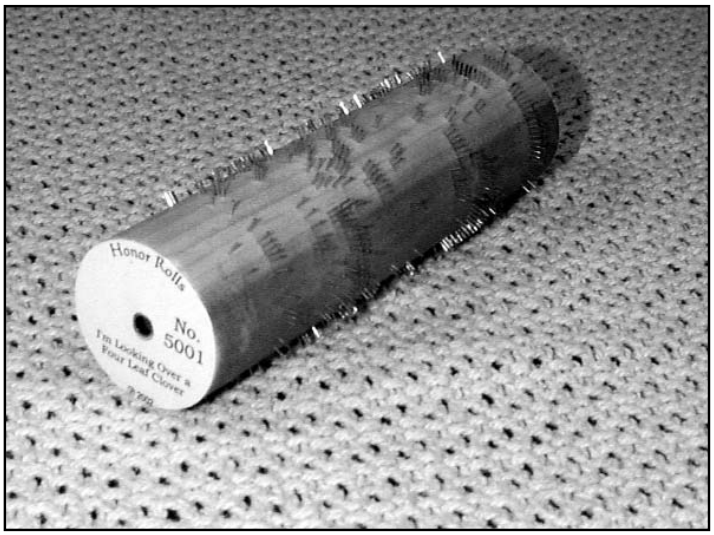


Figure 1. A new music roller for the Gem Roller Organ. *I'm Looking Over a Four Leaf Clover* was chosen as the first of the new series of tunes. The numbering was started at 5001 to avoid duplicating numbers used by the Autophone Co. for the original rollers.

The Gem Roller Organ was introduced by the Autophone Co. of Ithaca, New York in the late 1880s. Because of its simple, durable design and low cost, it became very popular. It was produced in large numbers, up to ten thousand units per year, from the late 1880s through the 1920s. The music, in the form of a pinned wooden roller, was inexpensive to mass produce and was also key to the commercial success of the organ. The Gem was sold directly by the Autophone Co. and also through distributors who applied their own labeling. It was featured in the 1902 Sears catalog and sold for $3.25. Rollers sold for 18 cents. The basic model of the Gem can be found with names such as the "American Music Box" and the "Home Music Box." A deluxe model with an improved air supply and a larger, fancier case was sold as the "Concert Roller Organ" and the "Chautauqua Roller Organ."

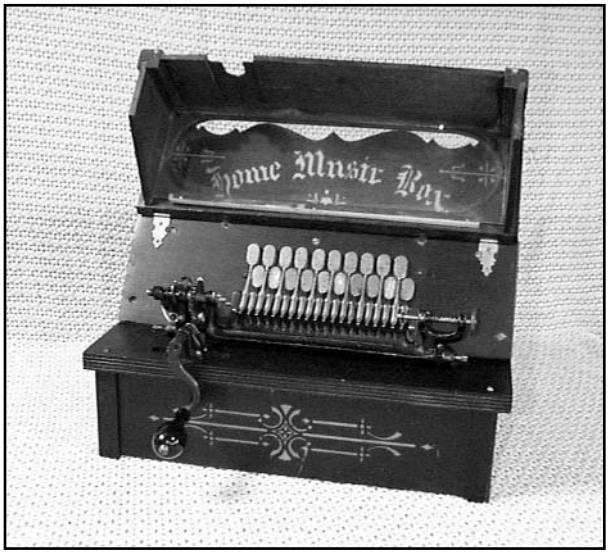


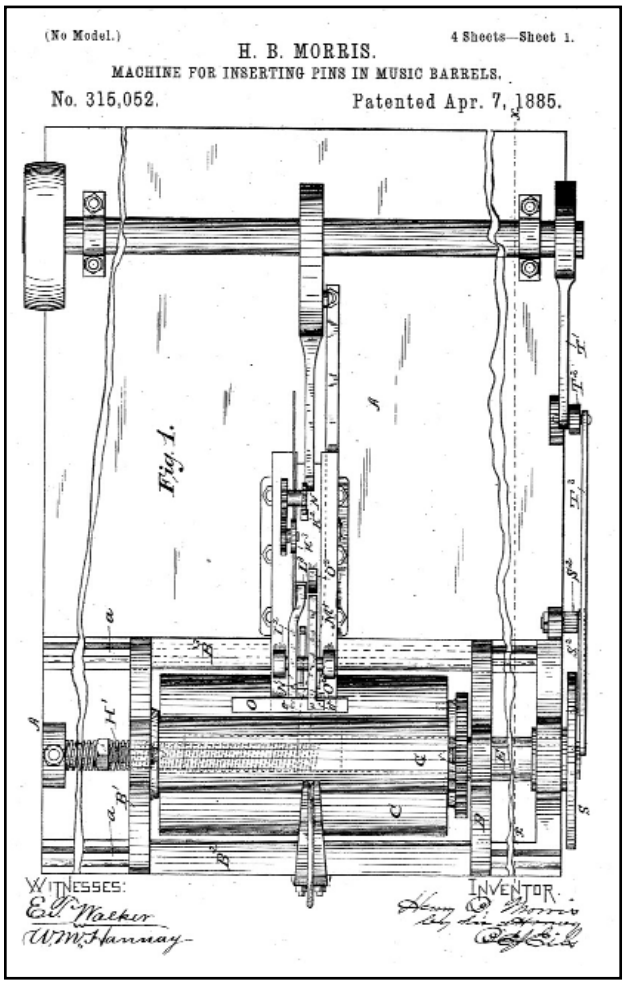
Figure 2. The "Home Music Box" is the basic vacuum-operated model of the Gem Roller Organ with a front cover and name board added for "show." Here the front cover is shown open revealing the double row of valves.

Figure 2 is one version of the Gem Roller Organ shown with the front cover open. The organ is vacuum operated. The reed block is mounted behind the double row of valves on the front of the organ. There are a total of 20 notes with the lower notes arranged on the top row where the valves open wider (**Figure 3**). The roller, or cob as it is now commonly known, installs on a cast iron carriage and is geared to rotate as the crank is turned. As the roller rotates, a worm gear on the left end advances it to the right against return springs on each end of the carriage. The pins on the roller open the valves as the roller turns. The pins are installed along a spiral path back to the left. The roller plays nearly three times around and then a lever engages a release mechanism that pushes the roller away from the valves. This action also disengages the worm gear momentarily allowing the return springs to snap the roller back to the starting position.

Figure 3. The pins on the roller lift the valves to play the 20-note scale. The roller plays for about 40 seconds in three revolutions and then returns to the beginning.

The success of the Gem Roller Organ can be attributed to its simple low cost construction, and the design of the pinned roller that could be mass produced. There are two features described in the patent for the design of the roller that made

mass production feasible. One is that the new Gem rollers did not require staples to sound sustained notes. Instead of staples which were used on many pinned barrels, the Gem rollers used a series of closely spaced pins to hold the valves open for sustained notes. Staples could not easily be installed by machine. The other feature was the pinning of multiple revolutions of the roller with all of the notes falling on a single spiral path. For the Gem this resulted in a roller that played in just under three revolutions with the pins for the next note down the roller starting along the same spiral path at the beginning of the third revolution. This meant that a machine could be built to install pins one at a time at predetermined points along the single spiral path. A source for patent information for the roller was taken from Todd Augsburger's web site (www.rollerorgans.com, www.rollerorgans.com/Roller_Organ_Patents.htm).


(No Model.) 4 Sheets—Sheet 1.

H. B. MORRIS.

MACHINE FOR INSERTING PINS IN MUSIC BARRELS.

No. 315,052. Patented Apr. 7, 1885.

Fig. 1.

WITNESSES: INVENTOR.

Figure 4. Henry Morris' patent (No. 315,052) granted May 1, 1884.

The original pinning machine however was anything but simple. The original invention patented by Henry B. Morris (**Figures 4 & 5**) is dated May 1, 1884 (patent no. 315,052). It describes a wonderfully complex machine that replicates rollers from a pattern cylinder. The machine incorporates cams, slides, shears, transfer-blocks, levers, pawls, a counter-shaft, a lead screw, eccentrics, yokes, pitmans, spur wheels, feeder wheels and dogs. All of this machinery to orchestrate the step by step

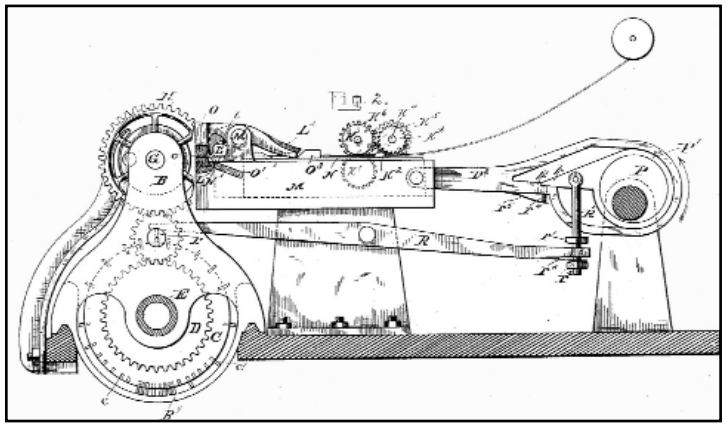


Figure 5. A side view of Henry Morris' patent.

pinning of the music roller from a spool of steel wire. This first pinning machine had a pattern cylinder that was three times the diameter of the music roller, with holes for drop-in pins that determine the position of pins on the roller. The drop-in pins allowed the pattern to be changed for different tunes. At each position, where a pin was to be placed, the mechanism would feed a short length of steel wire from a spool, clipped it to length to form a pin and then drive the pin into the roller. The roller and the pattern cylinder advanced on a lead screw one-tenth of an inch per revolution to form the continuous spiral path for the pins. At full speed it must have been something to see and to hear. Later there were pinning machines built that turned out multiple copies, up to twelve at a time, from one pattern. During the time that the Gem Roller Organ was manufactured, there where over 1000 different tunes pinned. The information on the patent for the original pinning machine was taken from Kevin McElhone's "The Organette Book" published by MBSGB).

So, how do you build an automated pinning machine in the year 2002? The economic equation is very different now because the market for new cobs is limited. The new pinner

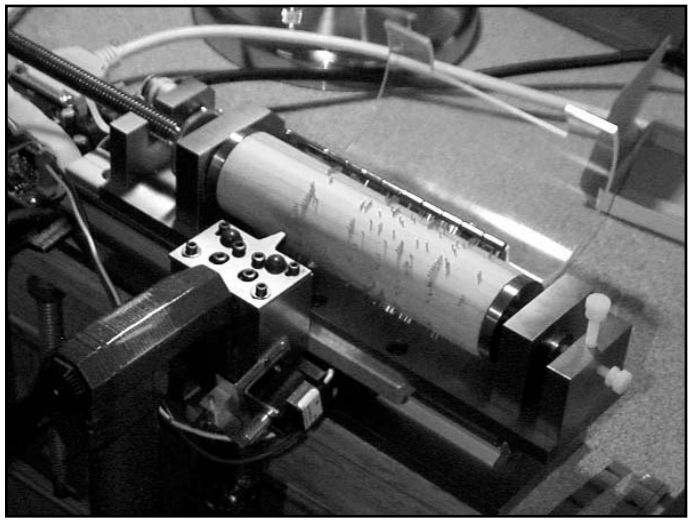


Figure 6. A pneumatic "headless pinner" is used to install steel pins in the roller. As the blank roller is rotated, a lead screw advances the roller and mounting stage along a slide rail. This creates the one-tenth of an inch per revolution spiral path required for the pins.

must be inexpensive enough to build so that costs can be recovered over a much smaller number of units sold. Or, maybe inexpensive enough to build as a hobby. Building something like the original pinning machine would be very challenging and very costly. But that is where technology steps in to make it feasible to design and build a new automated pinning machine (**Figure 6**).

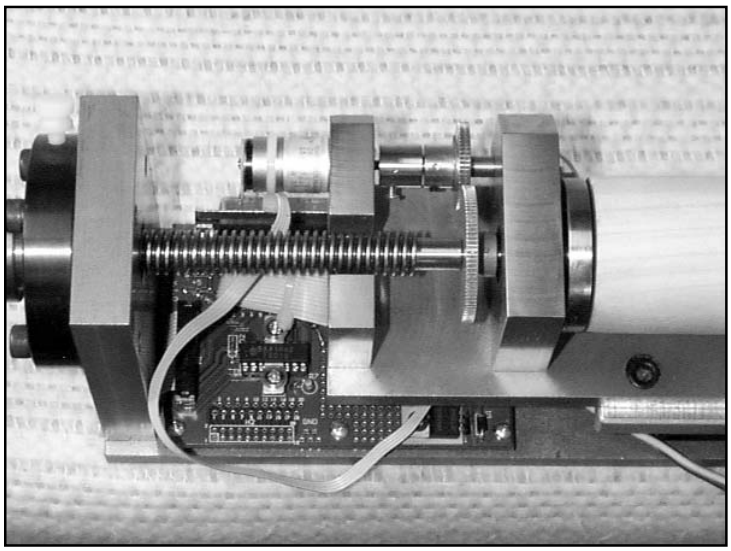


Figure 7. A small stepper motor mounted on the roller stage is geared to the roller and the lead screw. The nut for the lead screw is adjustable to precisely locate the spiral path for the pins.

The basic idea of the pinner is the same as the original. A blank cob is rotated and advanced with a lead screw such that pins can be installed along a continuous spiral path (**Figure 7**). The lead screw, however, is about the only major part that the old and new pinning machines have in common. Where the original pinner used a complicated mechanism to sequence the cutting and installation of pins from a spool of steel wire, the new pinner uses a commercially available pneumatic tool for installing copper plated headless pins (**Figure 8**). The original pinner used a step and repeat process to copy a master pattern. The new pinner is computer controlled and uses a stepper motor

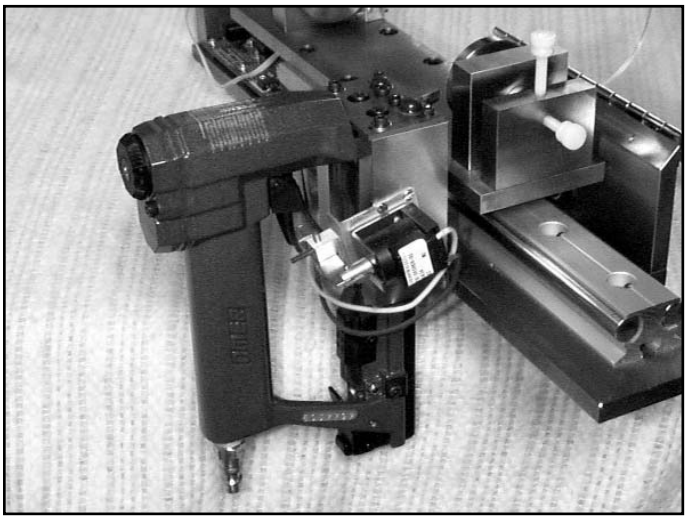


Figure 8. The headless pinner can be fired automatically with a solenoid or triggered manually.

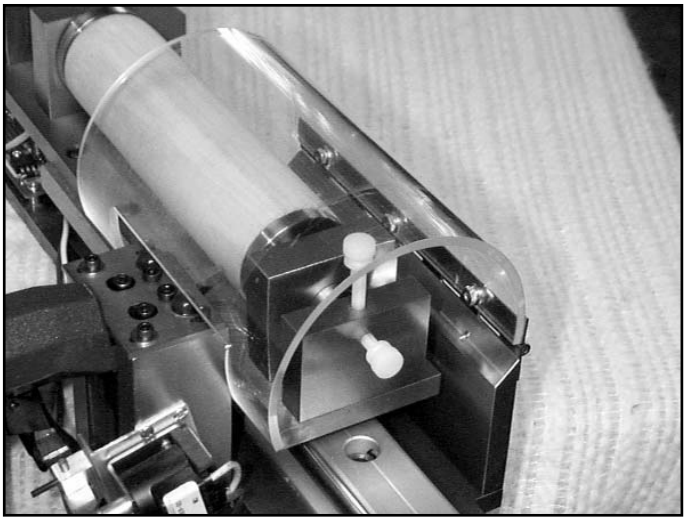


Figure 9 A shield protects the operator from the unlikely possibility of an errant pin.

and a miniature gear box to precisely position pins at any point along the spiral path. The new "master pattern" is a data file with pin positions defined for each particular tune. Technological advances have encapsulated much of the complexity in the form of standard components; the computer, stepper motor and headless pinner (**Figure 10**).

Figure 10. A laptop computer controls the automatic pinner over a standard parallel port.

So, how do you get a new tune onto a cob? It begins with an expert arranger of mechanical music sitting at a computer adapting the music to the 20-note scale. There are just a few rules to follow in creating the music specifically for the Gem Roller Organ. First the repetition rate for a single note is limited to about five repetitions per second. Also the minimum note duration is about one-fifth of a second or so. Finally, the playing time for the song should be about 35 to 42 seconds. Following these few rules, the music as played back on the computer will translate reasonably faithfully to the pinned roller. The completed arrangement is saved as a MIDI file. These are the mechanical steps involved but bringing the music to life is the real genius of the expert arranger.

Then the MIDI file is passed through a conversion program to create a "pin" file containing the pin positions on the roller. The starting position and duration of each note in the MIDI file are converted to precise locations for the pins. The first pin is followed by a run of optimally spaced trailing pins to match the desired note duration. Each pin is located to within a fraction of a degree by its angular position along the continuous spiral path. There are twenty notes and three revolutions for a total of sixty revolutions so that the pins positions range from 0 to 21600 degrees.

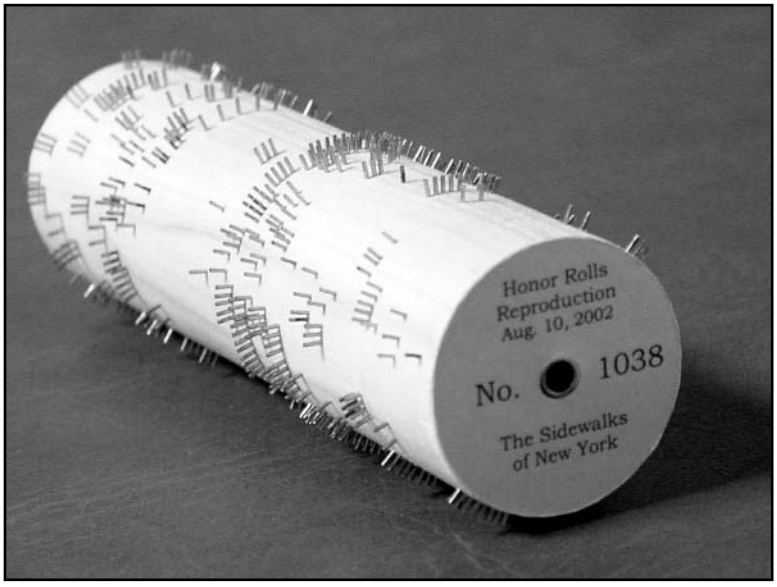


Figure 11. A reproduction of an original roller, #1038 *The Sidewalks of New York*. A reader attachment on the pinner allows originals to be read into the computer. The roller is clearly labeled as a reproduction.

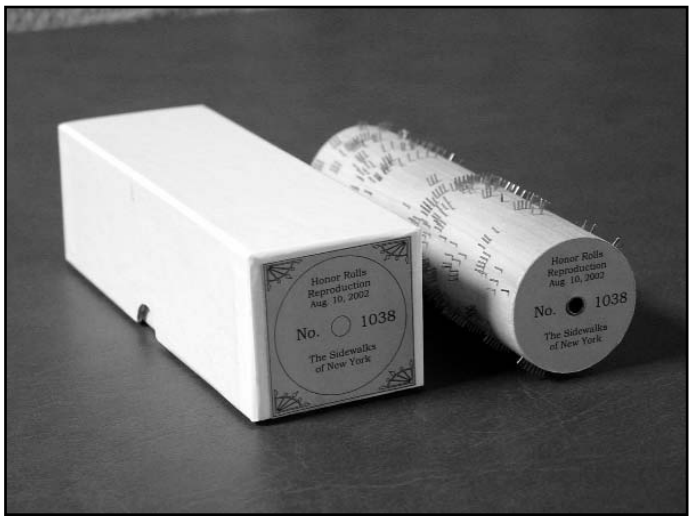


Figure 12. Unlike the original rollers the new rollers are supplied with a box for convenient storage and stacking.

The pin file is then read into a "control" program that operates the pinner. The stepper motor, a solenoid to fire the pneumatic pinner, and travel limit switches are all controlled over a standard parallel port. The blank cob is first installed on the pinner and moved to the standard home position. To begin the pinning process, the angle for the first pin is read from the pin file and the stepper motor is run forward to position the roller at that angle. There are 2732 steps per revolution so that the angle is matched very closely. Then, upon reaching the desired position, the roller is stopped just momentarily and the headless pinner is fired to install a pin. Then it is on to the next pin. The pinner halts every so often for the operator to reload the headless pinner but it is otherwise fully automated. Once pinning is completed, the last step is to apply labels to the ends of the new cob and to the box.

Some interesting questions have come up once this project got underway. One was can you make copies of original cobs? After giving that a little thought the answer was yes. A reader attachment was added to the pinner to allow the pin positions to be "read" into the computer. This has been tested on several original rollers. Some reproductions of original cobs that are familiar tunes, but are now hard to find, will be offered to collectors.

Other questions—are you going to make the larger 32-note cobs for the Grand Roller Organ? Maybe, if the interest is there. It would be a more challenging project because the pinning machine would have to be much more accurate. And—could you pin other types of barrels? Well, the same kind of approach could certainly be used to pin other types of barrels. That is, as long as it would work to replace the staples for sustained notes, with continuous runs of closely spaced pins.

As of August 2002, forty-three new rollers are being offered for sale to collectors. Even if you consider that this is more of a hobby rather than a business, you make some decisions that test your commitment. We have purchased 1500 poplar blanks, 1000 custom boxes and 1.4 million pins. But the project can already be considered a success. We have been privileged to meet with and correspond with many people who have an active interest in preserving these historic instruments and the original music rollers. We have also been able to work with and learn from experts in the arrangement of music for mechanical music instruments. And perhaps, over time, we can collectively add a small footnote to the history of roller organs. We would like to thank several people who have provided valuable information and assistance in getting this project underway: Todd Augsburger, Kevin McElhone, Richard Dutton, Andy Witkowsky, Barry Bierwirth and Harald Mueller. Also thanks to our arrangers, Wayne Holton, Jessie Moore and Harald Mueller. Special recognition goes to the late Carl Semon whose friendship, generosity and genius inspired us to take on the automatic pinner project in the first place.

Walter Moore has been collecting and restoring organettes since 1982. Walter, Jessie and Charles Moore started Honor Rolls as a hobby in 1984 making new paper roll music for a variety of organettes, using a punching machine made from surplus parts. Charles has been involved in projects to create new arrangements for music box discs, cardboard discs, strips and book music.