

An Original North Tonawanda Musical Instrument Works Style 146 Military Band Organ

Documentation and Comparison with Archival Literature

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The purpose of this article is to carefully document an original North Tonawanda Style 146 Military Band organ and its music. This machine has survived nearly intact in its original condition with endless rolls of music that may have been supplied to the initial owner. Comparisons are made with the three patents awarded for its design and extant sales literature for this style organ. Several interesting features are described that are not commonly found on existing American band organs.

Description of the organ

The exterior of the present organ is identical to the image shown for the Style 146 organ in the North Tonawanda Musical Instrument Works (NTMIW) sales catalogue ca. 1913. **Figure 1** shows a photograph of the present organ and the corresponding illustration from the catalogue. The wood grain is different so this is not the organ used to create the catalogue image but otherwise it is identical from the bass drum rope on top to the skids on the bottom.

A brass plate mounted on the front of the case states, "SOLD, OPERATED AND CONTROLLED BY HARRY E. LE-ROY, SAGINAW, MICH." As this organ has brass trumpet resonators, drums on top, was built in the early 1910s and uses endless music rolls containing one selection each, it was most likely used to provide music for a roller skating rink.

The layout is typical of small band organs with the wind pump/reservoir resting on the floor and the vacuum pump/reservoir mounted under the top. Three rows of pipes are visible in front; piccolos, trumpets and flageolets. All remaining open pipes and the wood trombones are located behind a wine-red colored cloth screen. Most of the stopped pipes are glued to white leather on the bottom of the floor. The wind chest is of slider and pallet design. The organ could have been fitted either with a barrel or with a paper roll playing system. There is no evidence that a barrel was ever installed in this machine—it was built as an endless paper roll organ.

The drums and cymbal are mounted on a separate platform that rests on top of the case. A section with wood carvings is

screwed onto the front side to hide the drum supports and playing mechanisms from view. The base drum beater mechanism is mounted under the top of the case so the beater protrudes through a hole in the top. The cymbal is played simultaneously by a pneumatic located just behind it that is connected to the bass drum beater by a section of white rubber tubing. The snare drum is played by a set of four beaters activated by rotating cogs. The pneumatic that engages the snare drum beaters is connected by white rubber tubing to a brass tube projecting through the top. A longer piece of tubing connects the other end of this tube to the vacuum chest.

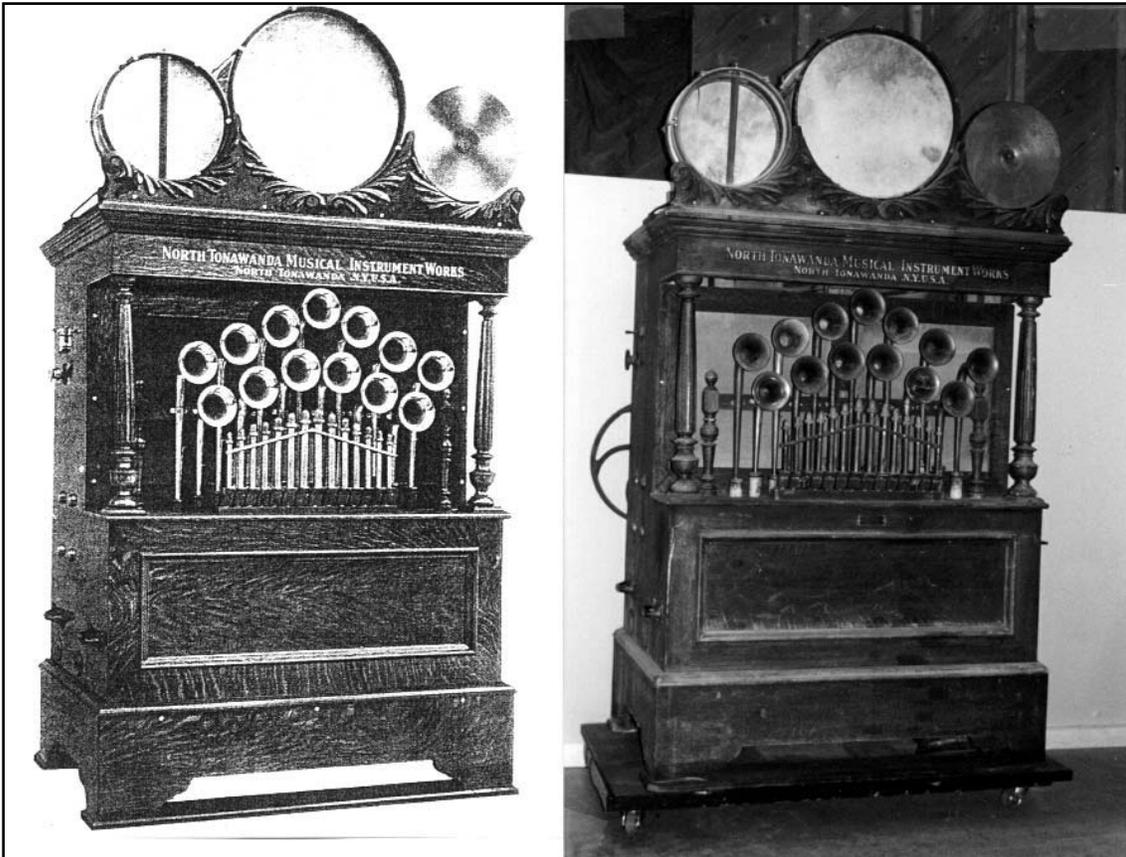


Figure 1. Photograph of the present organ on the right and image of the style 146 organ from a sales catalogue ca. 1913 on the left.

Two round leather belts are used that run between wooden pulleys. The internal belt connects the crankshaft and the shaft containing a wood cone that is part of the speed control for the endless roll drive system. The other passes outside the case from the crankshaft in the rear to the snare drum mechanism on top.

This organ has three sets of numbers. The number "IIIIP" is stamped into the edges of the openings of the case at the back and front and into the edges of the two back doors and the edge of the cloth frame on the front. It is also stamped into the rear side of the pneumatic stack. These marks appear to have been made by a flat chisel about one inch long. Four parallel lines are also written in blue pencil on the top of the floor of the organ beneath the wind pump. These marks were probably made to keep the case and its doors and frame together in the factory before final assembly as they were hand selected or fitted and not necessarily interchangeable. This number may indicate that there were at least four identical cases being constructed simultaneously.

The number "16" is stamped or written on some parts of the organ. It is written in blue pencil on the end of the wind chest nearest the crank shaft and is stamped into the lower right hand corner of the removable back cover. This number may indicate the number of organs of this style that had been made.

The number "857" is stamped with black ink in numbers approximately two inches high on the rear of the pneumatic stack. Perhaps this is the serial number of this organ. Numbers may have been assigned sequentially to all instruments manufactured by NTMIW.

The date March 15, 1911 is written in black pencil inside the case near the top of the left hand side as viewed from the front. The date is hidden behind a horizontal section of the longest mitered open bass pipe so this pipe has to be removed to view the date. The newspaper used on the wind pump dates from December 1910 with several ads for Christmas that year. Thus it can be concluded that this organ was constructed during the winter and spring of 1910-11.

Patents

The following statement was made in the introduction to the ca. 1910 sales catalogue:

In our perfected Military Band Organs with pneumatic action, tracker board, starting and stopping mechanism (sic), operated by endless perforated paper music we offer the most modern, complete and satisfactory instruments of the kind on the market; covered by patents held by us.

Application Date	Issue Date	Number	Classification	Title	Location
Apr 3, 1907	Feb 11, 1908	879110	84/50, 84/335	Pneumatic Action for Musical Instruments	Martinsville, NY
Jan 29, 1908	May 26, 1908	888830	84/121	Mechanical Musical Instrument	North Tonawanda, NY
Feb 13, 1908	June 9, 1908	890288	84/151	Tracker Board for Musical Instruments	North Tonawanda, NY

Table 1. The three U.S. patents awarded to Christian Maerten, Jr. for design features used in paper roll-operated NTMIW organs.

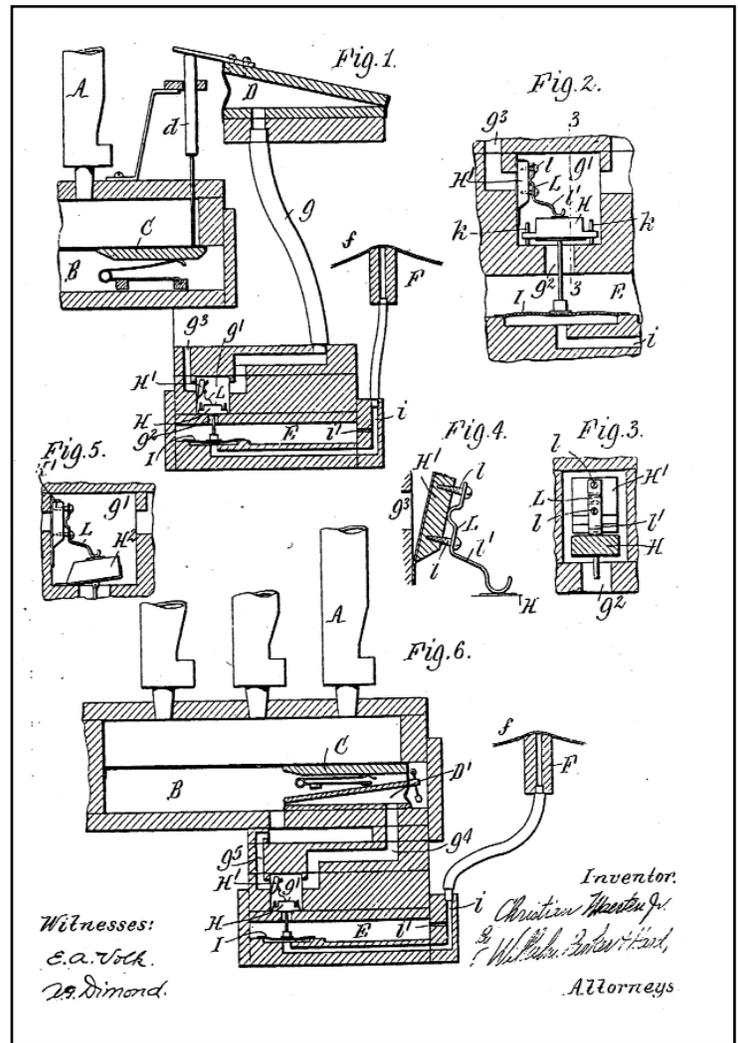


Figure 2. Pneumatic valve design from U.S. Patent 879,110.

Three U.S. patents were awarded to Christian Maerten, Jr. for the design of this type of organ. The patent award dates, Feb. 11, 1908, May 26, 1908 and June 9, 1908, are prominently displayed in gold stencil lettering on the rear of the organ above the doors. The same three dates are repeated on most pages of the ca. 1913 sales catalogue and are stamped with ink on the music rolls. **Table 1** summarizes these patents.

Images of the complete patents can be viewed at the U.S. Patent and Trademark Office web site at www.uspto.gov by searching for the patent numbers listed in Table 1.

Some interesting observations can be made. Numerous patent applications for similar instruments filed about the same

time were attributed to Eugene deKleist. The practice of assigning intellectual property rights to the owner of a company, in this case deKleist, was and continues to be

common practice. Perhaps deKleist was not the actual inventor which prompted some of his more innovative employees to leave and start the North Tonawanda Musical Instrument Works. The patents listed in Table 1 were not assigned to NTMIW but awarded to Mr. Maerten directly. He was probably one of the employees who left deKleist to join the new firm and is listed as the "Superintendent of Factory" in an early sales catalogue. It is also interesting to note that some of the patents for the Artisan band organ designs were also awarded to Christian Maerten, Jr in the 1920s.

The location is listed as Martinsville, NY in the application filed on April 3, 1907 but changes to North Tonawanda in the applications filed in 1908 after Martinsville was absorbed into the community of North Tonawanda. Although the company was incorporated in 1906, the patent applications were filed somewhat later.

The first patent issued on Feb. 11, 1908, describes a novel pneumatic valve design. **Figure 2** shows the basic features. The movement of the main horizontal valve upward pushes a second vertical valve to close the passage to the outside air. It is claimed that this requires less force and thus less pressure difference than the more common approach where a single valve body moves between a lower and upper valve seat. This claim is true as the second valve does have a mechanical advantage. However, this double valve arrangement is more difficult to construct and adjust than the single valve design used by other manufacturers and therefore can be considered to be over-designed and unnecessary. This valve design does have the advantage that it can be used in a variety of sizes and is incorporated into the bass drum beater where the valves are much larger than those in the pneumatic stack. Fig. 1 in the patent drawing shows a pneumatic actuator connected to the stack

with a section of tubing. In the organ described here, the actuators are glued directly on top of the stack and the stack is positioned above the rear access panel of the wind chest. The connecting pieces labeled "d" are much longer than shown in the figure. The actual stack has three rows of valves.

A variation of this design shown as Fig. 6 has the stack mounted directly under the wind chest. The pneumatic actuators are located inside the bottom portion of the wind chest and serve to pull the pallet valves down to open the appropriate air passages. This is similar to the pipe chests used in Coinola instruments. With some modification, this design could be operated on air pressure alone. Perhaps this is a forerunner of the later Artisan design that eliminated the vacuum system.

The second patent awarded May 26, 1908 describes the basic roll playing mechanism. This is the main patent awarded for the organ design and describes the essence of the NTMIW endless roll system used in their band organs. Quoting from the patent specification:

The principle object of this invention is to provide an automatic starting and stopping mechanism for self-playing musical instruments whereby the travel of the music sheet will be arrested and the music stopped at the end of each selection, and the music sheet again started after a period of time has elapsed and the next selection thereon played, when the music sheet contains a plurality of selections, or the selection or selections repeated, without attention of an operative.

Figure 3 contains a photograph of the rear interior of the present organ and the patent figure that shows the construction of the endless roll system. Features that can be recognized in both include the roll drive frame, the music bin underneath, the drive wheel that rests on the drive cone and the leather belt that connects the crank shaft and the drive cone.

The steel arm fastened to the vacuum reservoir and the hinged frame containing the drive wheel can also be seen that stops the advance of the music roll whenever the vacuum is lost and the reservoir opens. Of the four rollers shown on the patent drawing above the music roll in the drive frame, only two are retained in the present organ, the heavy steel roller over the drive cylinder on the left and a smaller wooden roller above and to the right of the tracker board. Other than this minor change, the drive systems appear to be identical. The

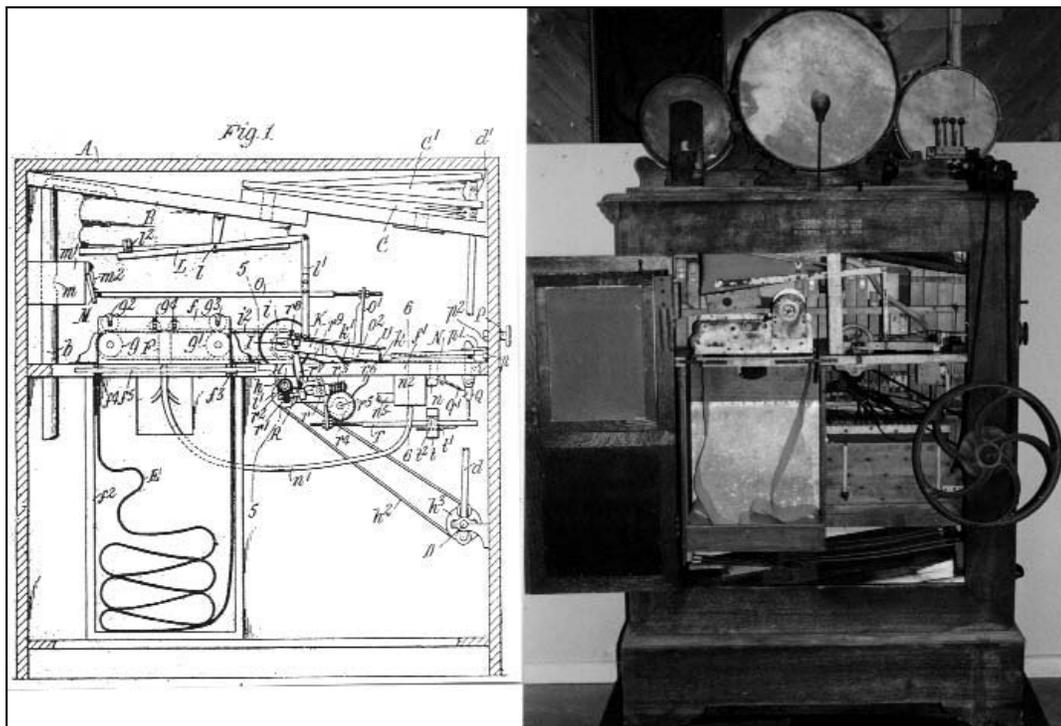


Figure 3. A view of the interior of the rear of the organ on the right and the roll drive system shown in the corresponding patent drawing (#888,830) on the left.

present organ also has the manual roll rewind mechanism mounted above the right-hand side of the drive system.

The automatic shutoff system described in the patent operates as follows: at the end of a song or roll, a hole punched in the roll allows air to pass through the tube labeled "n1" to activate a valve in the box labeled "n2" mounted under the roll shelf. This valve evacuates the air from the pneumatic mounted above it and causes the top board of the pneumatic, "N," to move down. A spring activated catch, "Q," prevents the top board from moving back up until the catch is released. When the board moves down, a 90° angle piece connected to it rotates clockwise and translates the horizontal linkage, "O," to the right. This pulls the spill valve, "M," open that is mounted on the box, m, in the vacuum line near the left side of the case and spills the vacuum from the entire organ. Once the vacuum is lost, the reservoir opens. The left hand end of the pivoted bar labeled "L" is pushed down so its right hand end lifts the link, "I," up that also lifts the drive wheel, "I," off the drive cone. This stops the forward movement of the music roll. With both the vacuum eliminated and the roll movement stopped, the organ stops playing.

The configuration of the shutoff system in the present organ has been modified from what is described in the patent. The main difference is that the horizontal linkage, "O," spans the entire distance across the interior of the case and is pivoted at the sides of the case at both ends. It does not move horizontally but rotates about its axis when the shutoff system operates. The depression of the top board of the pneumatic, "N," pulls the end of a horizontal arm downward that rotates this linkage. The top of a vertical arm at the other end mounted behind the box in the vacuum line, "m," moves toward the rear of the organ and pushes a spill valve open that is mounted on the rear side of the box.

The existing organ has the interesting feature that both spill valves are present. A spill valve configured as in the patent drawing now exists on the side of the box facing the front of the organ; the box, "m," having been rotated 90° to hide this valve from view. This valve is not connected to anything and is held closed by a flat spring. A second valve has been added on the rear side of the box that operates as described in the previous paragraph. This would indicate that the organ is one of the earlier ones built and uses parts made before the alternate shutoff design was adopted.

The organ can be shutoff manually by simply rotating a lever outside the case shown as "p" in the patent drawing. A cam is attached to the end of the shaft inside the case that rotates the linkage, "O," when the lever is rotated clockwise 90°. The motion is enough to open the spill valve and shut off the organ. However it does not engage the catch, "Q," so the organ can be restarted at the same place in the music where it was shut off by simply rotating the lever back to its normal or play position. This manual shutoff feature is described in the patent application and exists in the present organ.

The present organ can be restarted after the automatic shutoff system has engaged by pushing the end of a rod that protrudes through the side of the case. This releases the catch, "Q," so that the top board of the shutoff pneumatic moves upward

aided by a spring and the shutoff process reverses to restart the organ. This manual restart feature is not included in the patent. A flat spring mounted outside the case can be positioned to continuously push the rod in and prevent the catch from engaging. This prevents the organ from stopping automatically and allows for uninterrupted play.

The patent describes a very interesting automatic restarting system. When the organ is shut off automatically and the music drive wheel is lifted off the drive cone, one end of a second orthogonal shaft, "R," mounted below the shelf is lifted up and engages the end of the drive cone shaft through a set of worm gears. Shaft "R" begins to rotate and drives yet a third shaft through a second set of gears. The other end of this third shaft contains a cam that drives a restart rod, "T," to release the catch, "Q," when the cam has made one revolution. When the catch is released, the top board of the shutoff pneumatic, "N," moves upward as in the manual restart operation and the organ begins to play. The duration of time between shutoff and restart is determined by the gear ratios chosen.

The present organ does not have this automatic restarting system and appears to have never been fitted with it. However, it contains some features necessary for its installation. A threaded hole in the drive wheel frame is present for mounting the link that connects the frame and shaft "R" below and an

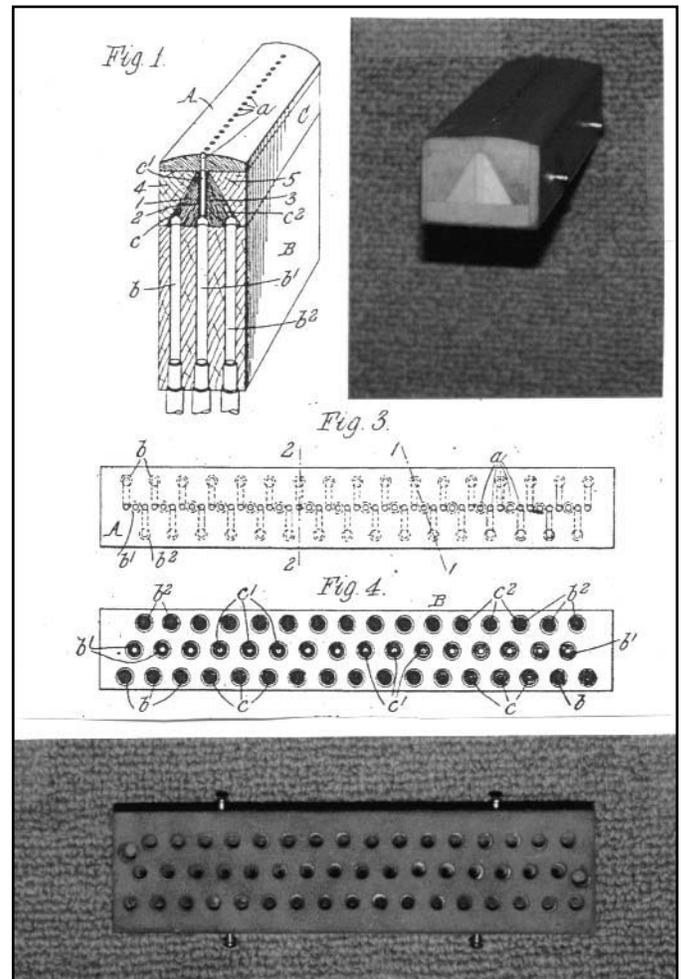


Figure 4. Photos of the tracker board and corresponding drawings from patent No. 890,288.

angled slot has been cut in the rear side of the roll shelf to make room for this link. The bottom portion of the catch has been twisted 90° so the restart rod will push against a flat surface when releasing the catch from the pneumatic board. Two empty screw holes exist on the bottom side of the shelf near the catch which may have been intended for the support bracket for one end of the restart rod. The end of the drive cone shaft is smooth and does not have the gear cut into it as described in the patent to drive the restart system.

Although the automatic restart system is rather clever, it may have been more of a nuisance than a benefit. The organ can play continuously without it or be stopped and restarted manually. Similar pauses in the music can be achieved during rewind in a spooled roll system when the roll contains only one selection. Pauses could also be achieved in the endless roll system by simply adding a section of blank paper between selections or at the end of the roll. Thus the automatic restart system may not have given NTMIW any real advantage in the market and may not have been installed in many organs.

The third patent dated June 9, 1908 describes the construction of the tracker board. To quote from the patent specification:

The primary objective of this invention is to produce a tracker-board composed of pieces or sections so constructed and arranged that the air ducts can be bored with facility and accuracy and so that those portions of the ducts which are close together will not intersect the grain of the sections in such a manner as to allow the leakage of air from one to another of the ducts through the pores of the wood.

Figure 4 shows photographs of the existing tracker board and some drawings from the patent. The existing tracker board is very similar to that specified in the patent. Two additional pieces of wood have been added to the front and back sides for a total of seven rather than the five shown in the patent. This increases the width of the board. It has also been cut into two parts, a top portion that contains all the angled air channels or ducts and a bottom portion that contains only vertical, parallel ducts. The two parts are separated by a fine brass screen. Soft leather attached to the bottom of the upper part provides the air seal between ducts at the screen. The two parts are aligned with an offset pin at each end and are joined with four quick disconnect levers that engage four round head wood screws that protrude from the sides of the upper portion. The lower part is screwed into the music transport frame. The tracker tubing leading to the individual valves is glued into the holes at the bottom.

Although this tracker board achieves the goals of minimal air leakage and closely spaced air channels, as for the valves, it is probably overdesigned. A wood sealant could have been used to prevent air leakage rather than the elaborate laminated design. Most other manufacturers eliminated the use of wooden tracker boards altogether and changed to metal tracker bars where air leakage through the material was not a problem. The tubing could be press fit over nipples rather than glued into holes resulting in faster and more reliable assembly.

In summary, although NTMIW touted the three patents on their machines, in sales literature and on their music rolls, none of the ideas were really necessary and none appeared to give their machines a competitive advantage. Patents awarded to deKleist about the same time were much more innovative and included such concepts as automatic register changes and alternative wind chest designs. The NTMIW organs essentially retained their barrel organ heritage although operated with endless paper rolls, and did not feature the truly innovative designs as did some of the organs manufactured by Wurlitzer. Many existing NTMIW organs have been converted to play Wurlitzer music with Wurlitzer music roll systems and metal tracker bars with very acceptable musical results. In these converted instruments, much of the technology documented in the three NTMIW patents has been eliminated without significant degradation in the quality of the music played.

Comparison with sales literature

Extant sales literature, although informative and useful, does not contain much technical information and may not accurately depict all organs of a given type. The catalogue description may have been entirely correct for some instruments, but not for others as the construction techniques and designs evolved. In this section, comments on the NTMIW sales literature are given and similarities and differences between the literature and the organ under study are shown.

As the earliest organs made by NTMIW were undoubtedly barrel organs, the early sales catalogue images depict this type of organ. In the ca. 1910 catalogue, the same organ is used to depict the No. 46/146 and 55/155 organs with differences in the placement of the drums and cymbal. The organ appears again in the ca. 1913 catalogue as a Style 36/136 organ without percussion. Evidence that these illustrations all use the same instrument include the identical wood grain, stencil, and reflections in the brass trumpet resonators. Thus illustrations exist using the identical instrument covering all three styles. The organ illustrated is actually a barrel organ as the barrel trunion can be seen protruding through the left hand side of the case and the lever to unlock the tune changing knife is also visible. Thus the organs depicted are actually No. 36, 46 and 55. These illustrations were made when barrel organs were being produced. The earliest catalogues may have been modified later to include the 135, 146 and 155 designations when the paper roll format was introduced.

The organ shown as a style 46/146 in the ca. 1913 catalogue is indeed a style 146 paper roll organ. This organ is different than the one shown in the previously described illustrations. The carvings on the drum platform are different, the stencil on top has been redesigned, the piccolo pipes have wider bodies and are spaced further apart, and the speed changing knob and manual shutoff lever for the roll playing system can be seen on the left side of the case. The illustration is identical to the organ being discussed here, as can be seen by the comparison in Figure 1. It is not known why the style 46/146 illustration shows a paper roll organ in the ca. 1913 catalogue while the other two styles retain the older barrel organ illustrations.

Perhaps the style 146 paper roll organ had been more popular and was given an updated image.

The following discussion refers to the ca. 1913 catalogue description of the style 46/146 organs. The pipe disposition agrees with the present organ except for the placement of the four highest melody flute pipes. These four stopped pipes are inside the organ directly in front of the corresponding four shortest violin pipes. Each pair is mounted on a riser block with horizontal air passages drilled from the front side and the holes covered with white leather. Thus the bottom contains only the five stopped bass pipes, the nine stopped accompaniment pipes and the 10 lowest stopped flute pipes for a total of 24, not 28 as indicated in the catalogue. The pipes inside the organ (behind the cloth screen) consist of the five open bass pipes, the three wooden trombones, the nine accompaniment violin pipes, the 14 melody violin pipes and the four shortest stopped flute pipes.

The catalogue description indicates the existence of three stops. The present organ has three sliders that protrude through the side of the case; one for the piccolos, one for the trumpets and one for the trombones. However there is a fourth slider that can be accessed internally from the rear of the organ that will turn off all the remaining pipes behind the cloth screen. Thus there are a total of four stops! The only pipes that cannot be turned off with a slider are the flageolet pipes directly in front of the screen and the stopped pipes on the bottom.

Three options for staining the cases are offered: mahogany, walnut or rosewood. The present organ has the walnut stain.

Interesting Features

Several unusual features of the organ are described in the sections that follow. They were selected because they are rarely seen on existing organs and are not known to be documented elsewhere.

—Trumpet Boots—

The trumpet boots are made from textured paper glued as it was wrapped around a mandrel. The starting edge can be seen



Figure 5. Photograph showing examples of the trumpet pipe paper boots and trumpet pipe components.

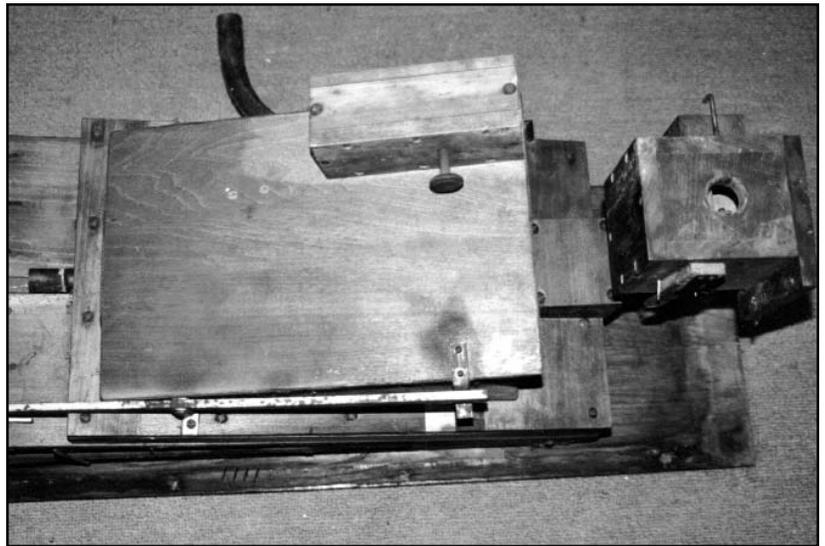


Figure 6. Photograph of the vacuum reservoir showing the regulator with knurled adjusting knob mounted on the cover. Both spill valves can be seen on the cutout box on the right; the unused early valve on top and the later valve on the bottom.

on the inside surface and the final edge on the outside. The material appears to be a type of textured wallpaper. Thus the boots are extremely light weight. The sound generated inside them is attenuated by the soft material much more than in a wooden boot. They will not split like wood and can be easily removed from the cap. The exterior has a brown color so that it resembles wood grain and matches the stain on the case. Thus the appearance of the exposed trumpet boots blends in with the stained quartersawn white oak wood and veneer used on the outside of the case. **Figure 5** shows some of these trumpet boots and the reed pipe components mounted inside. The trombone boots and resonators are rectangular and made of wood.

—Vacuum Regulator—

The vacuum regulator is contained in a box attached to the bottom board of the vacuum reservoir. Similar regulators were used on other NTMIW products. The spring tension and thus vacuum level can be adjusted by turning a knurled brass knob on the end of a threaded bolt that protrudes from the rear side of the box. A photograph of this box and the adjustment knob is shown in **Figure 6**. It is more sophisticated than the usual pallet-type spill valve that maintains a constant vacuum level depending upon the strength of the reservoir springs, the size of the cover, and the length of the stop that lifts the arm of the pallet when sufficient vacuum has been achieved. This more conventional spill valve design could also be adjusted for different vacuum levels by replacing the fixed length stop with a threaded screw or bolt similar to the one used here.

—Part Letters—

Several of the interior parts and components visible from the rear have letters stamped into them. Perhaps this was a means of identifying components for the operator or repair person. Some of the sales sheets for other NTMIW products state “With each instrument is sent a book of instructions.” Thus a

B	Roller lock on paper drive frame
C	Heavy steel roller above paper drive cylinder
E	Wood roller above tracker board
G	Valve box below shutoff pneumatic
H	Hinged steel supports in roll shelf
I	Vacuum cutout
J	Suction regulator
L	Roll rewind tool holder on back door
R	Drive cylinder alignment bearing
U	Tracker tubing strip on pneumatic stack
W	Back cover of pneumatic stack
X	Back cover of wind chest

Table 2. Letters stamped into components accessible from the rear of the organ.

set-up or repair manual may have used these same letters when describing the roll changing procedure or other maintenance. Usually two identical letters are stamped into each item, sometimes on opposite ends as in the removable rollers in the music drive frame. A list of these letters and a description of each corresponding item is given in **Table 2**.

—**Drive Wheel**—

The drive wheel mounted on the end of the crankshaft is made of cast iron as evidenced by the curved spokes. Its outer rim is flat to be driven by a flat leather belt. The wheel is attached to the end of the crankshaft using a spring-catch-pin arrangement. The wheel can be turned freely counter clockwise as the angled catch will prevent engagement with the pin on the crankshaft. However, when the wheel is rotated clockwise, the spring pushes it toward the back of the organ where the catch engages with the pin on the crankshaft and the crankshaft begins to rotate. Thus the crankshaft can be turned only in the clockwise direction as viewed from the rear. This arrangement is very common on barrel organs to prevent the barrel from being turned backwards and ruining the keys and pins. In endless roll organs, the roll should be pulled in only one direction also so this coupling feature was retained.



Figure 7. Photo of rope tensioning system used on the bass drum.

—**Bass and Snare Drums**—

The snare drum has a label glued to the underside of the top of the body that states: “Manufactured by WILSON-JACOBS DRUM Mfg. Co. CHICAGO.” Both drum bodies have birds-eye maple veneer. The snare drum rims are natural wood but the bass drum rims are painted black. The snare drum has eight snares attached to a threaded tensioning system on top. The bass drum is tensioned by a rope or heavy cord that passes through steel tightening fixtures between hooks on either side. Brown leather is used to help maintain the tension. The end of each leather piece has a decorative heart-shaped serrated edge and a five-pointed star embossed on it as shown in **Figure 7**.

—**Snare Drum Beating System**—

A mechanical snare drum beater is employed rather than a pneumatic system that is found on most existing band organs. The design is almost identical to the beater mechanism described in U.S. patent No. 965,435 as shown in **Figure 8**. This patent application was filed on Sept. 8, 1908, awarded to William A. Brauer and assigned to the Niagara Musical Instrument Company. It appears that a NTMIW snare drum beating mechanism was used as the basis for the Niagara design but that a different method of engaging the beaters was adopted. On both designs, a round leather belt passes from a pulley mounted on the organ crankshaft to a second pulley near the snare drum. A portion of this belt can be seen behind the snare drum just above the top of the case in both parts of Figure 1. In the Niagara design, the second pulley is mounted directly on the shaft that contains the cogs for the drum beater sticks so the cogs rotate continuously. On the NTMIW organ, the second pulley is mounted on a separate shaft. A vacuum pneumatic provides the motion to engage the continuously rotating wheel also mounted on this shaft with a wheel mounted on the end of the shaft with the cogs. Other than the different methods of attaching the strikers and engaging the beaters, and the patent drawing showing only two beaters rather than four, the description and drawings appear to be identical to the beater mechanism on the existing NTMIW organ. It is also of interest to note that the Niagara pneumatic requires air pressure whereas the NTMIW pneumatic operates on vacuum. The Niagara patent description also refers to a key that activates the snare drum beater. Thus the Niagara patent is focussed on barrel organ technology, not vacuum/paper roll technology, as late as 1908.

—**Music Rolls**—

An early sales sheet for a No. 55/155 organ indicates that nine tunes would be provided on paper rolls if that option was chosen. In the ca. 1910 catalogue, most paper roll organs would be supplied with 18 tunes. This was reprinted as "18 music selections" in the ca. 1913 catalogue. A later sales sheet for the style 46/146 organ was overprinted so that the barrel option was crossed out and “cylinder sales discontinued” was printed below. Beneath the paper roll option, “endless or spooled music as selected” has been added. Thus the paper roll option progressed from nine to 18 selections provided on endless rolls to spooled music rolls.

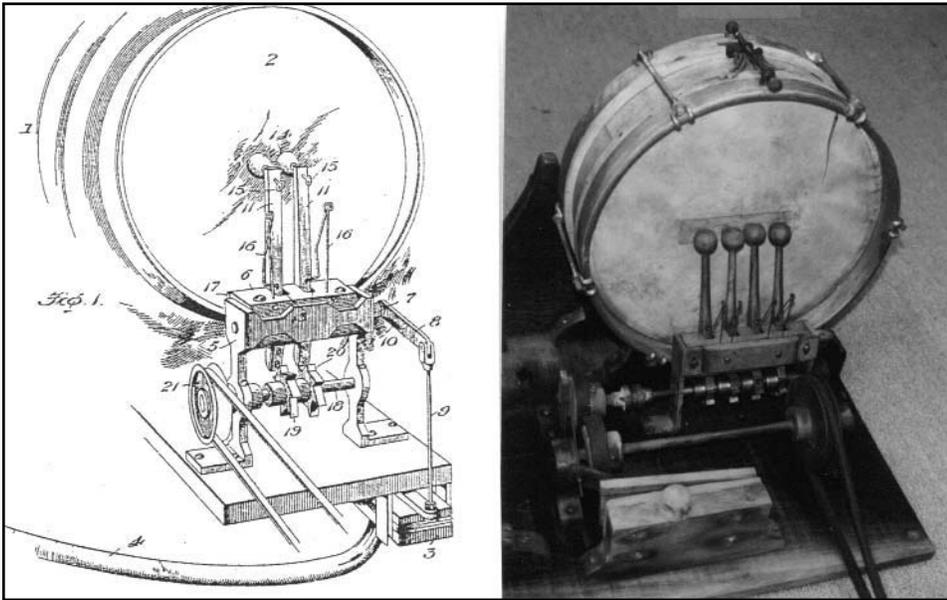


Figure 8. Photograph of the existing snare drum beater mechanism on the right and a drawing of the beater system from U.S. patent No. 965,435 assigned to the Niagara Musical Instrument Company on the left.

The present organ has original endless music rolls supplied by the factory. Each roll contains one selection. The function of the holes in the tracker board or tracks on the music rolls are as listed in Treasures of Mechanical Music under the section “BAB Organ Rolls” with the following differences. Hole #1 is used for the bass drum so all hole numbers are one less than given for the BAB rolls. Holes #47 and #48 are not used as there is no need for rewind or play (although the holes exist in the tracker board) and #49 is used to activate the automatic shutoff mechanism described earlier.

A photograph of the beginning/end of one of the rolls, No. G5, is shown in **Figure 9**. The bass drum holes are at the bottom and the shutoff hole is at the top directly above the star.

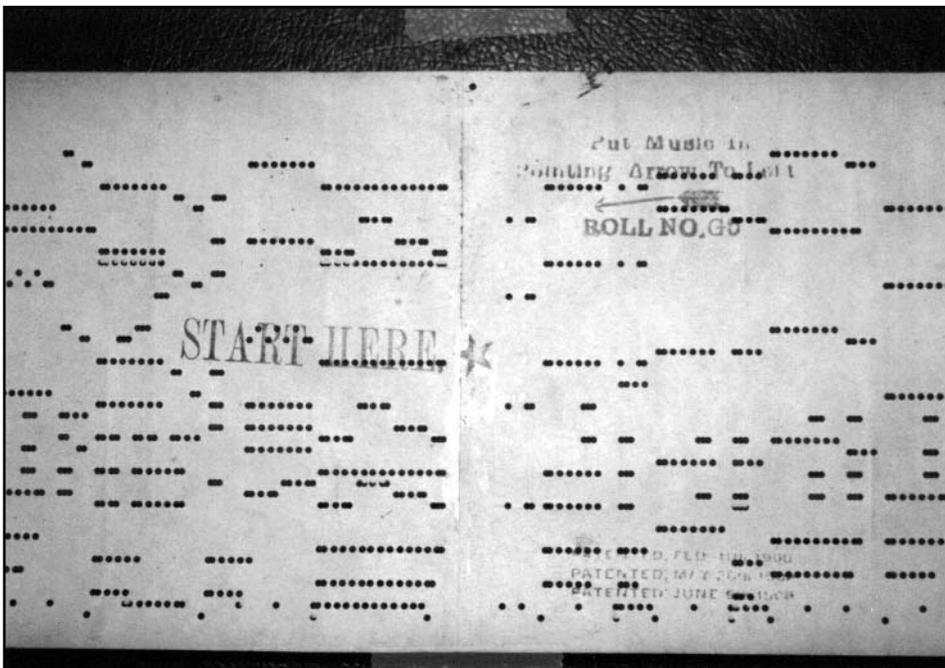


Figure 9. Photograph of the beginning/end of roll No. G5, *Can You Pay?*

The tracks are spaced 1/8 inch apart and the round holes are punched slightly smaller than 1/16 inch in diameter. The distance between successive holes, the advance step of the punching machine, is approximately 0.0122 inches. Two holes are punched in succession at the beginning of each note except for extremely short notes where only a single hole is punched. After the first two, the holes are punched alternately to provide a chain perforation. For example, if a note is to have a total length of 10 steps, the steps that are actually punched are 1,2,4,6,8 and 10. Notes that have an odd number of total steps have successive holes punched at both ends. Thus a note with a length of 9 steps would have 1,2, 4, 6, 8 and 9 punched.

The beginning of each roll has the three NTMIW patent dates (mentioned earlier) stamped on it, a star that indicates where the roll begins, an arrow that shows the feed direction through the roll frame, and the roll designation; a letter followed by a number. Movement of the roll is from right to left so the beginning of the introduction, four notes and a snare drum beat, is just to the right of the star. The roll shown in Figure 9 is labeled G5. Unfortunately, the titles of the selections are not printed on the rolls themselves but on the labels on one end of the boxes. When the box is missing or the label is gone or illegible there is no direct means of identifying the selection. Perhaps a roll catalogue exists that contains the key connecting the musical selection titles and the roll letter/number designations.

Roll length varies depending on the type of musical selection. Fox trots tend to be on longer rolls, waltz rolls are shorter. Typical roll lengths are between 14 and 22 feet.

—Musical arrangements—

The musical selections must be arranged to fit the organ. The organ scale is identical to the Wurlitzer 125 band organ scale except for the addition of the three trombones that are played from separate holes. This illustrates the closeness between the early NTMIW and Wurlitzer products. It is not surprising because the founders of NTMIW came from the deKleist concern prior to its acquisition by Wurlitzer. After an introduction, each selection is played through once in its entirety and then repeated before coming to the end of the roll.

Thus only the first half of the selection heard on a roll needs to be arranged, the second half is essentially a copy. Often only a pickup note or two is missing between the end of the roll and its beginning so the selection could be played indefinitely in a nearly seamless manner without losing

a beat. This feature was important for dancing but not necessary for other uses. The arrangers add the trombones and percussion to the loud passages whereas the soft passages often have neither. The trumpets are also brought in or taken out for extra effect. Ornamentation consists of grace notes, runs and trills. **Figure 10** shows a transcription of the pick-up notes and the first four measures of the introduction to the waltz, *Can You Pay?* The selection contains 8 measures of introduction followed by 64 measures of the waltz which is then repeated for a total of 136 measures of music on the roll. As some of the accompaniment notes often play along with the melody or form a harmony, the bass and accompaniment notes have been split into a “harmony” group and the usual bass/accompaniment group.

Figure 10. Transcription of the introduction to the waltz, *Can You Pay?* The holes corresponding to the first four measures are shown to the right of the star in Figure 9.

—Roll Boxes—

The roll boxes have outside dimensions 2 in. high x 2 1/4 in. wide x 7 1/8 in. long. The tops are covered with a dark green textured paper and have a label attached to one end. The labels appear to have been created by a typewriter and are formatted as in the following example:

NORTH TONAWANDA MUSICAL INSTRUMENT WORKS
MILITARY BAND STYLE 146

Song G5

Can You Pay?

Apparently the reference to the style 146 organ is similar to Wurlitzer's designation of their band organ rolls such as “Style 125.” These rolls will play on other similar machines produced by the same manufacturer such as the 136 and 155 military bands just as the Wurlitzer rolls will play on machines other

than their 125 band organs. The numerical designations were probably chosen because the NTMIW 146 organs and the Wurlitzer 125 organs were best sellers in their respective classes when the rolls were standardized.

Summary

As most band organs manufactured by the North Tonawanda Musical Instrument Works have either been modified or have disappeared entirely, the nearly complete, original, unrestored organ described here provides a reference point for the technology used by this firm. Other than the patent literature and some sales catalogues, very little written technical documentation is publically available. The author hopes that this article will encourage others to share complete and accurate information so that our American band organ heritage will be passed on to future generations. To conclude with a proverb:

*In the end we will conserve only what we love.
We love only what we understand.
We will understand only what we are taught.*

References

Automatic Military Bands, North Tonawanda Musical Instrument Works Sales Catalogue, ca. 1913, reprinted by the Vestal Press.

Bopp, Ron, *The American Carousel Organ, An Illustrated Encyclopedia*, pp. 149-184 (1998).

Bowers, David Q., *Encyclopedia of Automatic Musical Instruments*, The Vestal Press, Vestal, NY, pp. 909-913 (1972).

Mechanical and Automatic Musical Instruments, North Tonawanda Musical Instrument Works Sales Catalogue, ca. 1910, Howe Collection of Musical Instrument Literature, Special Collections in the Performing Arts, Michelle Smith Performing Arts Library, University of Maryland, College Park, MD.

Reblitz, Arthur A. and Bowers, David Q., *Treasures of Mechanical Music*, The Vestal Press, Vestal, NY, p. 472 (1981).

U. S. Patent and Trademark Office web site, patents #879,110, #888,830, #890,288, #965,435.

Tom Kuehn had his apprenticeship building a Wurlitzer 105 band organ replica ten years ago. He now collects, documents and restores original machines in Minnesota.