TRUMBULL COUNTY WOODEN WORKS TALL CLOCK DIALS:
Analysis and interpretation of construction and layout

by

Chris W. Klingemier

Submitted in Partial Fulfillment of the Requirements

for the Degree of

Master of Arts

in

History

YOUNGSTOWN STATE UNIVERSITY

August, 2012

TRUMBULL COUNTY WOODEN WORKS TALL CLOCK DIALS:
Analysis and interpretation of construction and layout

Chris W. Klingemier

I hereby release this thesis to the public. I understand that this thesis will be made available from the OhioLINK ETD Center and the Maag Library Circulation Desk for public access. I also authorize the University or other individuals to make copies of this thesis as needed for scholarly research.

Signature:

Chris W. Klingemier, Student Date

Approvals:

Dr. Thomas Leary , Thesis Advisor Date

Dr. Martha Pallante, Committee Member Date

Dr. Donna DeBlasio, Committee Member Date

Peter J. Kasvinsky, Dean of School of Graduate Studies and Research Date

Abstract

Trumbull County Wooden Works Tall Clock Dials:

Analysis and interpretation of construction and layout

Employing the methods of industrial archaeology, this study utilized as its primary source a newly assembled collection of wooden works tall clock dials produced in Trumbull County, Ohio between 1815 and 1835 to create an artifact derived history of the industry. The construction, design, lettering and markings of a group of local clock dials were analyzed to ascertain patterns that could be interpreted to establish the identities and business relationships among the owners, makers, jobbers and merchants active in the Trumbull County wooden works clock industry.

Absent any previous research focused on wood movement clock dials, the writer devised a system to measure, record and categorize evidence of industrial processes employed in early batch and mass production to reveal traits attributable to specific factories or shops. The patterns of occurrence of these traits form the basis for the artifact derived history of the industry that was used to test and expand the existing historic narrative. Subsequently, the usefulness of the methods and conclusions of this limited, regional sample were explored relative to both the greater wooden movement tall clock industry and the companion wood movement shelf clock production.

Contents

A carding mill "was built by C. & R. Silliman, a little north of the center, and was soon after changed into a clock factory by Hart & Truesdale. For some years quite a business was done in the manufacture of wooden works clocks."

T. A. Bushnell's 1882 historic account of Hartford, Ohio in the 1820s[1]

Preface

The years following the close of the War of 1812 were good years for northeast Ohio. The flood of migrants, primarily from New England, spurred economic activity as the new settlers bartered their labor for the land, farm animals, housing and possessions they needed to start their new life. The difficult overland journey meant that most families brought only essentials; other than a few blanket chests that were used for packing; the furnishings for their new home would all have to be produced locally. The swelling population created opportunity for the entrepreneurs as they re-created the industries of New England and eastern Pennsylvania. Streams were harnessed to supply the power for saw mills, grist mills and trip hammers. Where sufficient water was not available, horses or oxen powered smaller mills and cabinet shops. Iron ore was dug,

[1] Williams & Bro., *History of Trumbull and Mahoning Counties with Illustrations and Biographical Sketches*, 2 vols. (1882: reprint 2 vols. in 1 with index of names, Evansville, In.: Unigraphics, Ind., n.d.) vol.II, 273.

smelted and cast; glass houses produced open vessels, bottles and window glass. With local industries supplying most of the population's needs, northeast Ohio was rapidly becoming self-sufficient. But in Trumbull County, the largest industry didn't revolve about a "need", but rather a "want". And everyone, it seemed, wanted a clock.[2]

Trumbull County had been the gateway for settlers entering the Connecticut Western Reserve section of Ohio beginning in 1798 and 1799. There, in the mid-1810s, an industry arose, pioneering the mass production of wooden tall case clockworks.[3] The industry provided employment for laborers to cut, saw and kiln-dry the lumber, clock factory workers to fabricate and assemble clockworks, the whitesmith for the pewter hands, and the local iron industry for the wire, bells, and pendulum bobs. Young women and girls were employed to letter and decorate thousands of clock dials. Clocks were used as currency in place of scarce cash; they were used as surety for loans.[4] Peddlers ranged into Michigan, New York, and north into Canada[5]. They crisscrossed Pennsylvania and traveled downriver to Virginia and Kentucky, all the way to the mouth

---

[2] *Azel Tracy Account Book, 1818 - 1860*, private collection, Hartford, Trumbull County, Oh. Xerox copy on file Trumbull County Library, Warren, Ohio.

Tracy, a cabinetmaker and wheelwright, had worked in the local clock industry for seven years, ending in 1834. He continued to repair these local clocks into the 1850s. Over 50% (159 out of 305) of the persons listed in his account book had had Tracy repair a wooden movement clock.

[3] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990), 9-24.

[4] Garry Lewis Note, November 2, 1827, Clocks pledged as surety, private collection, Hartford, Trumbull County, Ohio.

Garry Lewis, receipt stating "Rcd. Warren Nov 2nd 1827 of A. Adams one dollar in full of all demands to this date except said Adams' receipt for one hundred clocks which he has in security for being surety for me at the Western Reserve Bank." private collection, Hartford, Trumbull County, Oh.

[5] *Diaries of Sylvia Lewis Tyler: Volumes for 1818, 1819 & 1820 only*, June 11, 1818, NSDAR Americana Collection, acc. 2899, Washington, D.C.. Transcription by Alden O'Brien, 2000.

of the Mississippi, going out with clocks and returning with profits measured in notes, bartered goods and, on rare occasions, cash.[6] The manufacture and pedaling of wooden works clocks became the industrial engine that drove the economic expansion of Trumbull County into the late 1820s. However, by 1829, the inevitable industrial contractions had begun as individuals involved in the clock business endured forced sales, seizures and bankruptcy. Within 6 years, the wooden movement clock industry had completely disappeared, plunging the local economy into a recession large enough to influence New England's economy, helping to induce the Panic of 1837.[7]

The collapse of the Trumbull County clock industry seems not to have merited any special notice in the newspapers of the period, nor is it mentioned in the 1882 *History of Trumbull and Mahoning Counties*.[8] The industry and the people who created it have been largely forgotten, lost within the larger narrative of the economic turmoil of the Jacksonian era. The objects they created, however, survive to tell the story.

---

[6] *Depositions Taken in a Civil Court Case of Lambert W. Lewis, Pardon Sherman, Noahdiah Webster vs. Garry Lewis in Chancery, as Heard in Appeal to the Ohio Supreme Court: Twenty eight depositions contained within, spanning May 23, 1834 to November 12, 1834*. private collection, Poland, Mahoning County, Oh. Hereafter referred to as *Lewis v Lewis.*
(The county archivist can no longer locate the originals on microfilm; only the unedited transcription of the originals used by Rebecca Rogers remain.)

[7] New Englanders' speculation in western land effectively tied the fortunes of the two regions together, guaranteeing that an economic downturn that depressed land values in the west would create a similar downturn at home as investors scrambled to cover their obligations.

[8] Williams & Bro., *History of Trumbull and Mahoning Counties with Illustrations and Biographical Sketches.*

TRUMBULL COUNTY WOODEN WORKS TALL CLOCK DIALS:

Analysis and interpretation of construction and layout:

A study to analyze the construction, design and lettering of a group of local clock dials to ascertain patterns that can be interpreted to establish the identities and business relationships among the owners, makers, jobbers and merchants active in the Trumbull County wooden works clock industry.

Chapter I

In the absence of sufficient documentary evidence, the objects must take on the role of the primary resources. The wooden clock producers were among the first to move from craft to batch production, with the locally made clockworks and dials exhibiting evidence of the evolving industrial processes used to create them. This analysis seeks to establish the existence of patterns within that evidence and to use the resulting patterns in construction and design to create an artifact derived history of the industry.

The revolution in production techniques that spawned the Trumbull County wooden works clock industry began in Connecticut in 1793 with visionary clockmaker Eli Terry.[9] Traditionally, both wooden and brass tall clocks were handcrafted for the wealthy by master clockmakers and their apprentices, with every gear individually

[9] Kenneth D. Roberts and Snowdon Taylor, *Eli Terry and the Connecticut Shelf Clock*, 2nd ed., revised (Fitzwilliam, NH, Ken Roberts Publishing Company, 1994), 35.

fabricated, filed and fit.[10] Terry revolutionized clockmaking by introducing the mass production of parts and the division of batch production into skilled and unskilled segments.[11] He designed gear cutting devices, eventually creating engines capable of creating hundreds of identical, interchangeable, wooden clock wheels. By 1806, when a traditional clockmaker might still take weeks to produce a single clockworks, Terry had the confidence to sign a contract with Levi and Edward Porter to produce 4,000 wooden clock movements within just three years, a contract he fulfilled in 1809. [12]

Terry received a contract price of $4.00 for each of these clockworks, compared to $13.33 for an average, traditionally made wooden tall clock movement, and nearly $50.00 for brass.[13] The majority of Terry's wooden movements were sold uncased, with the cases produced by a cabinetmaker in the region where the clock was purchased.[14] Even with the prospect of an additional cost for the case, peddlers sent out with Terry's inexpensive, mass produced clockworks found a ready market as both the urban and rural middle class added a status symbol to their homes. But success in business invites imitators and competitors, and the Connecticut clock industry quickly became crowded with both. Seth Thomas, Silas Hoadley, and Riley Whiting were some of the most

---

[10] By the mid 18th century, several clockmakers had begun to experiment with wooden movements to create a less expensive clock. However, they continued to use the same production model as the brass clockmakers. See *American Wooden Movement Tall Clocks, 1712 - 1835.*

[11] Roberts and Taylor, *Eli Terry and the Connecticut Shelf Clock*, 34 - 38.

[12] Morris, *American Wooden Movement Tall Clocks, 1712 - 183*1 (Hoover, AL., Heritage Park Publishing, Inc., 2011),133 - 139.

[13] Philip Zea and Robert C. Cheney, *Clock Making in New England, 1725 - 1825, An Interpretation of the Old Sturbridge Collection* (Sturbridge Ma., Old Sturbridge Village, 1992), 121.
Roberts and Taylor, *Eli Terry and the Connecticut Shelf Clock*, 36, 46.

[14] For this reason, the case styles are not an element in this study, as they reflect the area in which the clocks were sold, not necessarily Trumbull County. Unlike Pennsylvania-German wag-on-the-wall clocks in which all wheels and wires are contained within the plates, Trumbull County *common* clocks had both the verge wire and intermediate wheel mounted on the outside of the back plate. This arrangement meant that these clockworks could not simply hang on the wall, but had to be cased or placed on a specially constructed shelf.

successful of the manufacturers who entered into the mass production of wooden works tall clocks. Eli Terry, always the innovator, abandoned the manufacture of tall clock works by 1814 to develop and eventually patent a wooden movement for a "short or shelf clock."[15] These clocks were sold cased with an initial price near $15.00, eventually declining to as little as $8.00, and quickly displaced the wood movement tall clocks.[16] By the late 1820s the Connecticut production of wooden tall clock movements had nearly ceased as Terry's competitors began to imitate his patent shelf clock movements.

Connecticut tall case clock movements had been available in northeast Ohio as early as 1812, though only a few of these clocks were purchased by the local merchants for resale.[17] The northeast Ohio market wasn't large; economic growth had stalled after 1807 when escalating tensions with the British in Canada nearly stopped the influx of new settlers.[18] Even after hostilities ceased in 1814, immigration and commerce lagged. However, that pattern changed abruptly in 1816 and 1817 when political turmoil and a climatic catastrophe combined to push New England's economy to the brink of collapse. The threat of starvation loomed throughout the New England states, triggering a flood of refugees headed west to Ohio. And even though those refugees brought only a few possessions and little money with them, they brought prosperity to Ohio. The growing population and the extension of the frontier created new business opportunities for peddlers, merchants, craftsmen and mechanics as a thriving "barter-by-book" economy

---

15 Roberts and Taylor, *Eli Terry and the Connecticut Shelf Clock*, 60 - 62.

16 Chauncey Jerome, *History of the American Clock Business for the Past Sixty Years, and Life of Chauncey Jerome* (1860; reprint, Bristol Ct, National Watch and Clock Collectors Inc., 2001), 39.

17 Morris, *American Wooden Movement Tall Clocks, 1712 - 183*1, 257.

18 Williams & Bro., *History of Trumbull and Mahoning Counties with Illustrations and Biographical Sketches*, 2 vols. (1882: reprint 2 vols. in 1 with index of names, Evansville, In.: Unigraphics, Ind., n.d.) vol.II, 255.

arose to supply the needs of the new settlers.[19] The merchants who had formerly purchased only a few Connecticut tall clock movements for resale in a static market now looked to send out their peddlers to supply an expanding market.

The Connecticut wooden tall clock movements had been an ideal product for shipping long distances. The clockworks were small and lightweight, the clock weight canisters were shipped empty to be filled with sand later, and even though the pendulum bob and bell were made of iron, they were both small and easily packed. A peddler's wagon could hold a few hundred wooden tall clock movements, allowing for long trips without restocking and offering a profit opportunity on every piece.[20] These advantages were lost when peddling the larger and heavier Connecticut shelf clocks. These clocks required 6 times the volume and several hundred pounds more weight than the tall clock movements, and so reduced the number of clocks carried and limited the distance and duration of the peddlers' routes as well as his profits.[21] The potential for the Trumbull County merchants was not in reselling Connecticut shelf clocks, but in shifting from

---

[19] "Barter by book" is used here to reference the contra bookkeeping system that functioned in the absence of specie. Each person maintained an account listing for every person with whom they dealt, tracking values earned, owed and discounted. Discounting was the practice of using a third party, often a merchant, to transfer value between individuals. Accounts were seldom settled, often running years with balances owed.

[20] *Depositions Taken in a Civil Court Case of Lambert W. Lewis, Pardon Sherman, Noahdiah Webster vs. Garry Lewis in Chancery, as Heard in Appeal to the Ohio Supreme Court: Twenty eight depositions contained within, spanning May 23, 1834 to November 12, 1834*. transcription. private collection, Poland, Mahoning County, Oh., depositions of : Thomas K Ballard (June 19, 1834), and Nathan Beach Lewis (November 12, 1834), hereafter referred to as *Lewis v. Lewis.*

The 543 clocks that Lambert W. Lewis transported to Warren were contained in five boxes. This represented only the clockworks. The dials were transported loose, and no weight canisters were included in the order.

[21] A typical tall case wooden movement measures 8"w x 10"h x 5"d and weighs less than 3 lbs. A pillar and scroll shelf clock from the same period measures 18"w x 28"h x 5.5"d and weighs over 18 lbs. This works out to a 6 to 1 ratio; a wagon with 50 shelf clocks would have the same weight and volume as a wagon with 300 tall clock works. (Measurements taken from clocks in author's collection.)

middleman to manufacturer and re-creating the wooden works tall clock industry in northeast Ohio.

Before beginning the analysis of dials, it may be helpful to understand the basic anatomy of a tall case wooden clockworks. A clock consisted of two empty weight canisters, two lead or pewter clock hands, a wire pendulum rod, an iron bell and bob, and the wooden clockworks and dial.[22] For the purpose of this inquiry, the clockworks will be interpreted as a composite artifact with the emphasis on the dial, though each element embodies its own information related to materials, design and production processes.

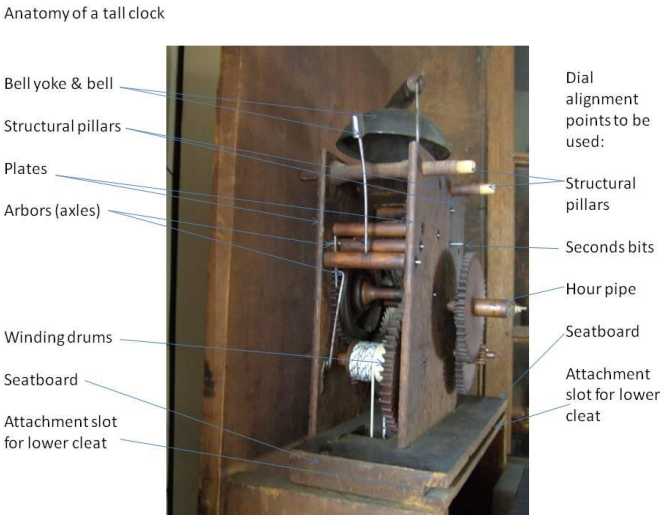


figure 1.1

All Trumbull County made works used a 1" thick seat board of poplar, 12" long and 4.25" wide.[23] The front and back plates of the clockworks measures 6.5" x 9" and were formed of red or white oak. A boring template was used to drill all holes for pillars

[22] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990), 13-14.

[23] Measurements taken from locally produced works used for this study. (Author's collection and others)

(frame elements) and arbors (axles). The front plate was then mortised into the seat board 1.5" from the front edge. The back plate was attached with two turned wooden studs that extend from the base plate through the back plate, both wedged in place with tapered pins. To secure the top of the plates, either two or three turned pillars extend through the top of both plates, again wedged with tapered pins; a Plymouth type works had 3 pillars, while a Waterbury type had 2. The top pillars and pins, along with the mortised seat board and wedged studs, create a solid, parallel frame for the gear trains; all time and strike train gears and arbors utilized these plates for their support. The gears were cut and formed from cherry lumber, while the arbors were turned from laurel branches. Viewed from the front, the right side of the works houses the time train, a four arbor arrangement of wooden gears that meter the power of a falling weight into the small nudges that keep a pendulum swinging.

The left side of the works forms the strike train, only activated on the hour to strike a top mounted iron bell; a wooden count wheel mounted on the exterior of the back plate controls the number of strikes. The time and strike train are linked by a simple tripwire attached to the center arbor which extends out through the front plate and carries the minute hand. The hour hand is mounted on the end of the wooden hour *cannon tube* that fits over the arbor that carries the minute hand. The wheels that drive the minute and hour hands are mounted on the exterior of the front plate, and receive their power directly from the rotation of the time train winding drum.

The length of the pendulum sets the period of the arc, the weight provides the power and the time train regulates the delivery of that power to keep the pendulum

swinging. The hands essentially keep track of the number of beats of the pendulum. With each beat allowing a small rotation of the winding drum as the weight drops, two wheels attached to the winding drum shaft drive the hands; the minute hand requiring 3,600 clicks to complete a rotation, and the hour hand needing 43,200.

The accompanying dials were painted on poplar boards having a square lower section that initially measured approximately 12" by 12" topped by a semi- circular lunette with a 5"to $5^{1}/_{2}$" inch radius, with the grain oriented vertically. Cross grain shrinkage has reduced the widths of the dials by 3/16" to 5/16 inch. The center hole for the minute arbor and cannon (hour) tube was drilled at the intersection of diagonals run from the corners of the 12" by 12" square. The dials were hand planed smooth on both sides and two dovetailed wooden strips, called cleats or stiffeners, were inserted into rabbets cut across the back, parallel to the base. The lower cleat fit into a groove cut into the seatboard, while two holes were drilled into the top cleat to accept the extensions of the pillar studs. Holes were drilled through each of these connections, and small wooden pins were inserted to fasten the dial to the clockworks.

All dial fronts were then prepared with multiple coats of white lead in linseed oil, with each coat reduced with pumice stone to provide a smooth surface, with 8 to 10 coats needed for "good well finished common faces."[24] The numerals, chapter rings, and signatures were rendered in black ink; the spandrels and lunettes decorated with combinations of ink-work, oil paint, gesso and occasionally, gold, silver and/or bronze leaf.

---

[24] *Lewis v. Lewis,* depositions of : Charles Lewis (June 17, 1834) and Orrin Johnson (June 17, 1834).

These locally made wooden clockworks were, by the nature of the material, very fragile mechanisms, with the majority destroyed by breakage of the cross-grain teeth of the wooden gears. Very few clock movements remain intact, even fewer are in working condition. The dials, however, survive in larger numbers, often loose or grafted onto later brass works, and many simply too attractive to have been thrown away. This study will examine a group of these surviving dials marked with known Trumbull County names, searching for patterns in construction and decoration that will help to clarify the business relationships within the industry.

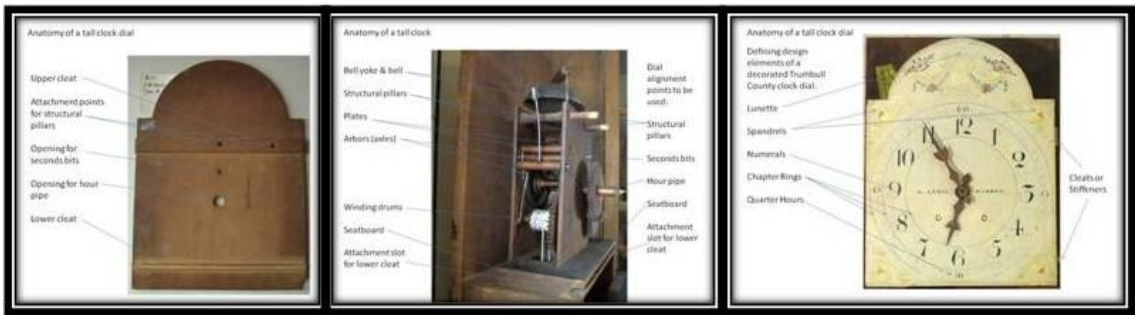


figure1.2 *figure.13* *figure 1.4*

A factory that manufactured clockworks using interchangeable plates and parts required interchangeable dials, exactly matched to the factory's patterns. Each factory's dials will exhibit a unique set of measurements for the cleats and pillar holes on the back of the dial (*figure 1.2*) that provide for the dial's attachment to the clockworks. (*figure 1.3*) However, the combinations of names and numbering styles used on the face of the dial will not be consistent for every factory (*figure 1.4*). It is expected that these varied combinations of dial measurements, signature blocks, and numeral templates can be interpreted to yield:

1. An estimate of the number of factories represented;

2. Which of these factories may simply have been assembly shops;
3. Whether or not a factory's dials were lettered in-house or jobbed out;
4. Which factories manufactured clocks for merchants who then released them "in their name;"
5. Ownership changes based on commonality of patterns;
6. A chart or charts with the characteristics that can be used to place unsigned dials into context by assigning them to a specific factory.

This information can then be used to expand the existing literature related to the local industry, clarifying the business relationships among the manufacturers, jobbers, and merchants to further understanding of the birth, growth and collapse of the Trumbull County wooden works clock industry.

Chapter II

The most important primary source materials for this analysis are the clocks and dials residing in two private collections in Northeast Ohio. Additional dial photos and tracings have been obtained from historical societies and museums, as well as from collections of other private owners. Unfortunately, not all of these sources offered an opportunity to remove and measure the dials, significantly reducing the available sample size. Finally, dials and clockworks published in sale and auction catalogues have been included, though only photos were available. All dials and their pertinent information are included in the appendix; the eighty-four tall clock dials included in this study represent over twenty years of searching.

Two basic types of clocks were made in Trumbull County, common clocks and *patent* clocks [25] These terms refer to the movements: the design of the common clock mechanism was public or *common* property, while the recently developed shelf clock movement was *patented*. Initially, all the local factories produced only 30-hour common clocks, with the local industry's output of common clocks estimated at over 75,000 clocks manufactured over a twenty year period.[26] During the later years of the industry patent clocks were produced, but in limited numbers. These smaller and better built patent clock movements were sold cased and ready to use, with nearly all carrying an

---

[25] James W. Gibbs, *Buckeye Horology, A Review of Ohio Clock and Watch Makers* (Columbia, Pa., The Art Crafters, 1971), 40-43.

[26] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990), 9.

interior paper label to identify the maker and/or seller.[27] A few examples of locally produced *groaner* shelf clocks also exist, retaining the large scale wheels of the older common clock technology.[28] All shelf clocks of the period, including the groaners, seem to have been referred to as patent clocks, though makers often modified their works just enough to avoid patent infringements. None of these patent or groaner clocks will be used in the data, but both will be reconsidered in the analysis applying the findings to the broader industry.

Period documents consulted include the daybook accounts of Azel Tracy, an account book from the Robert Cochran General store in Vienna, Ohio, and a surety note from Garry Lewis. Azel Tracy's account book, begun in 1818, served as his master book for the debit and contra bookkeeping accounts that functioned in the absence of specie.[29] Tracy worked in and around the clock industry, beginning as a clockmaker in the late 1820s and as an occasional repairer of both wood and brass clocks into the 1850s. The Cochran General Store ledger was the daily book for the barter transactions of the proprietor and confirms published segments of the lost general ledger which dealt with clock maker Ansell Merrell, his employees, and transactions that used clocks in place of cash.[30] Similarly, the surety note from Garry Lewis pledged clocks stored by merchant Asahel Adams for a loan from the Western Reserve Bank.[31]

---

[27] There is little consistency in the type of clockworks that have survived in the few extant local *patent* clocks, leading to confusion as to which works might have been produced locally and which were purchased from Connecticut peddlers.

[28] Groaners retained the larger wheel diameters of the common clocks, necessitating much heavier weights than patent type clocks. This caused the clocks to emit a loud "groaning" noise when the strike train was operating.

[29] *Azel Tracy Account Book, 1818 - 1860*, private collection, Hartford, Trumbull County, Oh. Xerox copy on file Trumbull County Library, Warren, Ohio.

[30] *The John Cochran Accounts Book, 1828 - 1845*, private collection, Poland, Mahoning County, Oh.

As no business records are known to exist for any of the Trumbull County wooden works clock producers, the most important period source is the transcription of a group of deposition for a civil court trial pitting brothers Garry and Lambert W. Lewis against one another in a suit to enforce performance on a contract for the delivery of wooden tall clocks.[32] While all of the preceding documents served to demonstrate the workings of the barter system that supported the industry, the depositions provide local context with information on methods of construction, business practices and glimpses into the social relationships among the participants.

Two sets of diaries provided clues to the role of women in the clock industry. Childhood friends Candace Roberts and Sylvia Lewis began their diaries the same day in 1801 while living in Connecticut.[33] Roberts wrote of her time as a dial painter, her diary ending in 1806 with her death at age nineteen; Lewis-Tyler continued hers sporadically throughout her life. She married and moved to Trumbull County where her husband Abel Tyler and brother Levi were involved in the earliest years of the clock industry.

Local governmental records consulted include warranty deed and mortgage deed transfers, personal property and real estate tax records, and the accompanying tax maps. Probate court records were also included for those individuals whose estates were settled

---

Excerpts to be submitted to the *Cog Counter's Journal* for future publication.

[31] Garry Lewis Note, November 2, 1827, Clocks pledged as surety, private collection, Hartford, Trumbull County, Ohio.

[32] *Depositions Taken in a Civil Court Case of Lambert W. Lewis, Pardon Sherman, Noahdiah Webster vs. Garry Lewis in Chancery, as Heard in Appeal to the Ohio Supreme Court: Twenty eight depositions contained within, spanning May 23, 1834 to November 12, 1834*. private collection, Poland, Mahoning County, Oh. Hereafter referred to as *Lewis v Lewis.*

[33] *Diary of Candace Roberts: 1801 - 1806*, The Bristol Public Library, Bristol, Ct.. Transcription by Maumee Roberts, 1946. unpublished.

Diaries of Sylvia Lewis Tyler: Volumes for 1818, 1819 & 1820 only, NSDAR Americana Collection, acc. 2899, Washington, D.C.. Transcription by Alden O'Brien, 2000.unpublished.

during and immediately after the end of the clock industry.[34] The region's newspaper, *The Western Reserve Chronicle*, provided legal notices related to licensing, contracts, seizures and bankruptcies, as well as advertisements for the clock factories. [35]

Though not a primary source, the 1882 Williams' *History of Trumbull and Mahoning Counties* offered contemporary accounts that assisted in establishing the local context, though little information was included pertaining to the clock industry.[36]

The secondary literature relating to American wooden clocks can be broadly divided into three groups: the clock's role in history and as an historic artifact; clocks as engineering; and clocks as art. The majority of the works cited below belong primarily to the first group, though those related to Eli Terry also display a heavy reliance on an engineering framework.

The Book of American Clocks by Brooks Palmer was among the first attempts to gather information on 18th and 19th century American clocks and clockmakers.[37] A friend and collaborator of the pioneering American furniture collector Wallace Nutting, Palmer's *The Book of American Clocks* expanded the clock section of Nutting's *Furniture Treasury* to provide an overview of American clock production through 1850. Most importantly, he began the process of gathering a consolidated list of persons related to the clock industry. Utilizing his access to museums and private clock collections, New England town histories, and earlier, less expansive lists, he assembled over 6,000 names

---

[34] Trumbull County, Oh public records and archives, Warren, Trumbull County, Oh.

[35] *Warren (Ohio) The Western Reserve Chronicle: 1816-1921*, The Trumbull County Public Library, special collections, microfilm, Warren, Oh.

[36] Williams & Bro., *History of Trumbull and Mahoning Counties with Illustrations and Biographical Sketches*, 2 vols. (1882: reprint 2 vols. in 1 with index of names, Evansville, In.: Unigraphics, Ind., n.d.).

[37] Brooks Palmer, *The Book of American Clocks* (New York, Macmillan Publishing, 1928, 1950).

of watch and clockmakers. However, just as the industry was centered in New England, so was his list. Trumbull County, Ohio makers are represented by only two entries; Hart & Truesdale appears with the entry "Possibly some connection to Connecticut clockmaking. Wood movement. Shelf clocks;" Ansel Merrell's work is represented by a clock label in a New England private collection.[38] (A third entry for a wooden works tall clock labeled "R. W. Lewis" is likely an erroneous transcription for an L. W. Lewis.) *The Book of American Clocks* remained the best consolidated source for maker's information for over seventy years.

Buckeye Horology: a Review of Ohio Clock and Watch Makers by James Gibbs marked the first attempt to gather information specifically related to the Ohio clock industry.[39] Most entries throughout the book were the result of the book's author having sent requests to county historical societies in all eighty-eight counties asking if clocks had been produced or sold in their county. Not all counties responded and the quality and accuracy of the responses received varied widely. The Trumbull County section contained only three entries; Ansel Merrell, Boarman & Wells, and Hart & Truesdale, with a late addendum near the end of the book for John Hart & Sons. The Boarman & Wells nameplate was properly interpreted as a merchant's "paste-over" label while John Hartson was incorrectly identified as John Hart & Sons.[40] Fortunately, the Ansel Merrell and Hart & Truesdale entries had been supplied by NAWCC members who had

---

[38] Palmer, *The Book of American Clocks*, 208 & 241.

[39] Gibbs, *Buckeye Horology, A Review of Ohio Clock and Watch Makers* (Columbia, Pa., The Art Crafters,1971), 41-43.

[40] Both are shelf clocks and not included in this analysis. Private collection, Hartford, Oh.

conducted research on particular clocks.[41] The information provided by an un-named descendant of a merchant who dealt with Ansel Merrell included research from a primary source, likely the previously noted John Cochran Accounts Book and the lost ledger. The Hart & Truesdale research was credited to Paul Hollingshead with information derived primarily from the 1882 Williams' *History of Trumbull and Mahoning County*. Both the Merrell research and the Hart & Truesdale information were accurate and represented new information.

The 1984 booklet Ohio Clock Exhibit: Guide to the Collection was produced to document Ohio clock production between the years 1810 and 1850. The guide contained two references to Trumbull County tall clocks.[42] A listing for Garry Lewis and three of his brothers, Wheeler, Charles and Lambert W. appeared here, and represented new research. The information on the Hart & Truesdale factory repeated the Gibbs version as well as additional research which supplied a new, though incorrect, date of operation.[43] This pair of entries, coupled with the information from Gibbs' *Buckeye Horology*

---

[41] Gibbs, *Buckeye Horology*, 41-43.

[42] Paul V. Heffner, *Ohio Clock Exhibit: 1810 - 1850, Guide to the Collection* (Lebanon, Oh., jointly published by NAWCC Buckeye Chapter #23 and the Warren County Historical Society, 1984).

[43] Chris Klingemier, "Excerpts from the Azel Tracy Daybook," *Cog Counter's Journal, no. 29* (Spring - Summer 2007): 11 - 14.

Perhaps the incorrect date for the commencement of operations stems from a misunderstanding of the changing regulations affecting the tax records. Hart & Truesdale's clock factory first appears in the 1832 real estate tax assessment, suggesting that it came into existence the previous year. However, a careful comparison reveals that no business structures appear anywhere in the Trumbull County tax records prior to 1832. The appearances of distilleries, mills and factories in the 1832 record is the first instance of the taxing of commercial properties. H & T commenced in 1827 and ended production in 1833, leasing the factory to the Hartson brothers for one year. A short cleanup period ensued after the Hartson lease ended, with the last entry for the factory in the spring of 1834. Information derived from the *Azel Tracy Account Book, 1818 - 1860*, private collection, Hartford, Oh.

provided the only generally available published information on Trumbull County clocks until the early 1990s.[44]

The dearth of information on the northeast Ohio clock industry ended with Rebecca Rogers' 1991 monograph *Trumbull County Clock Industry, 1812-1835*.[45] Utilizing tax, census and civil court records, Rogers reconstructed an industry, identifying previously unknown participants and establishing a framework for future research. Her discovery of the depositions for a civil suit between two clockmakers provided a wealth of primary information hinting at the methods and practices within the industry. Rogers' work and the depositions that she discovered provide the baseline against which this paper's conclusions will be compared and contrasted.

American Clocks: Volume Three, American Clockmakers & Watchmakers by Spittlers and Bailey replaced Palmer's *The Book of American Clocks* as the best source for makers' information.[46] Published in 2000 as a consolidation of both previously published and unpublished research works, *American Clockmakers & Watchmakers* expanded Palmer's 6,000 entries to over16,000 names. The more comprehensive list facilitates tracking makers and workers as they moved from shop to shop and region to region. The entries for Trumbull County, Ohio rely heavily on Rebecca Rogers' *Trumbull County Clock Industry, 1812-1835,* though previous inaccuracies were carried

---

[44] Some references to Trumbull County clocks had appeared in a private club's newsletter known as "The Cog Counter's Journal". Begun in 1975, it had carried small notes and observations on clocks that members had examined or repaired. The newsletter's information is included in the discussion of clocks as engineering.

[45] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990).

[46] Sonya & Thomas Spittler and Chris Bailey, *American Clocks - Volume 3, American Clockmakers and Watchmakers* (Fairfax , Va., Arlington Book Company, Inc, 2000).

over, such as the continued misidentification of one of the principals in the Trumbull County firm of Hart & Way as Connecticut maker Alpha Hart.[47]

The recently published work, *American Wooden Movement Tall Clocks, 1712 - 1835* by Philip Morris contained a full chapter devoted to the Trumbull County clock industry.[48] His account places the products of the Trumbull county factories into the context of the national industry by building upon Roger's *Trumbull County Industry, 1812 - 1835*, combining his photos and research with additional, unpublished information provided by both Rogers and this author.[49] Morris presented new biographies of each of the makers, workers and peddlers associated with the clock industry, providing insight into both the business and familial relationships among the industry's participants. Though he devoted considerable attention to design and technological changes in the chapters chronicling the early years of the national clock industry, there was little change or innovation to note within the Trumbull County output.

The next group of the writings on the early clock industry relied on an engineering framework. These works are characterized by studies concentrating on one of the following:

1. the clocks of an individual maker or related group of makers
2. a type of movement and/or related movements
3. a technology or change in technology, such as wood or brass.

---

[47] W*estern Reserve Chronicle*, September 26, 1831. Published notice that Hart & Way had acquired the assets and stock of Ansel Merrell and that they would be continuing in the business.

[48] Philip Morris, *American Wooden Movement Tall Clocks, 1712 - 183*1 (Hoover, AL., Heritage Park Publishing, Inc., 2011).

[49] The information from this study was shared with Philip Morris as it was being developed and was included in *American Wooden Movement Tall Clocks, 1712 - 1835* by permission. All dial examples illustrated in *American Wooden Movement Tall Clocks, 1712 - 1835* were included in this thesis.

4. a type of clock such as a tall clock or an ogee shelf clock

The most commonly used venue for presenting these studies has been the NAWCC publications. These include: full length works; articles in the Watch and Clock Bulletin, published 6 times annually; the Cog Counters Journal, an irregular newsletter devoted to wooden works clocks; and individual monographs.[50]

The presentations of Ward Francillon regarding interchangeable parts addressed Eli Terry's tall clock output prior to his full entry into mass production with the 1806 Porter contract.[51] Francillon's work established Terry's progress in standardizing the clockwork design, as well as his engineering of the construction techniques and machinery needed for mass production of identical parts.

Donald Hoke's *Ingenious Yankees* went beyond Francillon's work, making the argument that the addition of merchant capital and marketing networks were as important as Terry's mass production of interchangeable parts to the growth of the wooden clock industry.[52] In order to demonstrate the interchangeability of the mass produced wheels, Hoke chose to concentrate on the more technically advanced *patent* clock segment of the industry which required tighter tolerances than the *common* clocks included in this study.

Eli Terry and the Connecticut Shelf Clock by Kenneth Roberts and Snowden Taylor chronicles Terry's work from his early training as a clockmaker in the craft

---

[50] "The Cog Counter's Journal" (The Cog Counter's Club, 1974 - 2010, unpublished)
The Cog Counter's Journal, a private club's newsletter, was begun in 1974 and was issued irregularly until the death of Ward Francillon, the founder and writer. The originals were bequeathed to the NAWCC Museum in Bristol, Ct.; updates on file with same.

[51] Ward Francillon, "Pre-Porter Wooden Tall Clocks - Terry's Contemporaries and Their Products, a Comparison" (Lecture presented at the 18th annual NAWCC Seminar, Bristol, Ct, October 23 - 25, 1997).
The Porter Contract was the first large scale use of interchangeable parts involving the production of 4,000 clocks in a period of less than 3 years.

[52] Donald R. Hoke, *Ingenious Yankees: The Rise of the American System of Manufactures in the Private Sector* (New York, N. Y., Columbia University Press, 1990).

tradition through his career as an innovator in design, materials, and production techniques.[53] Roberts and Taylor, along with clock researcher George Bruno, worked to reverse-engineer Terry's methods, using the tooling marks left on the wheels and arbors to recreate the technology of Terry's equipment. Combined with analysis of changes in the design of the clock mechanism during Terry's career, an engineering timeline emerged; period source material from contracts, correspondence, and law suits provided historic context and introduced the work of Terry's competitors. The works of Roberts and Taylor reinforced those of Francillon and Hoke on interchangeable parts, and presented the approach of identifying makers by small variations in the design and construction. Taylor had previously codified the varieties of 30 hour shelf clock movements details, resulting in his shelf clock movement guide, published in the NAWCC Bulletin in 1980.[54] All of these studies fall into the larger discipline of industrial archeology, a "concern with the physical evidence of industry and technology" and its "study (and) interpretation of "historically significant sites … and artifacts." [55]

The literature in the final category, treating clocks as art, is heavily weighted to the brass works tall clock industry, with most of the studies centered on English White Dial makers. No sources have been found related specifically to American wood clock dial manufacturing or decoration. However, considerable research has been conducted

---

53 Kenneth D. Roberts and Snowdon Taylor, *Eli Terry and the Connecticut Shelf Clock*, 2nd ed., revised (Fitzwilliam, NH, Ken Roberts Publishing Company, 1994).

54 Snowdon Taylor, "Characteristics of Standard Terry-type 30-hour Wooden Movements as a Guide to Identification of the Movement Maker," *Bulletin of the National Watch and Clock Collectors, Inc*., #208, part 1, volume XXII (October 1980).

55 The full quote from the Society for Industrial Archeology home page @ SIA-web.org. defines industrial archeology as a "concern with the physical evidence of industry and technology-the study, interpretation, and preservation of historically significant sites, structures, buildings, artifacts, industrial processes, bridges, railroads, canals, landscapes, and communities."

into a related skill, tole painting on tinware. Gina Martin and Lois Tucker's *American Painted Tinware: a Guide to its Identification* reveals that decorative painters worked with both tinware and clock dials, often utilizing the same techniques and related patterns. [56] Martin and Tuckers' work, combined with two previously noted primary sources, the Candace Roberts' diary and the Civil Court Depositions, provide a context in which to interpret the artwork.

[56] Gina Martin & Lois Tucker, *American Painted Tinware, A Guide To Its Identification*, in four Volumes (Cooperstown, NY., Historical Society of Early American Decorations, Inc., 1997).

Chapter III

The initial overview of the dial faces that began the search for patterns of construction, lettering, finish or signature revealed similarity in the construction methods, several different numeral patterns and thirteen different nameplates. The attachment points on the dial backs were recorded and analyzed first, then the numeral form and orientation on the dial face were compared and contrasted. Lastly, general observaions on ornamentation were noted, though the artists' paint work that appears in the lunettes and spandrels were not included in this analysis. Their work was executed freehand and does not exhibit the patterns inherent in an industrial process.

All known Trumbull County dials used the same method to join the face to the works.[57] The dado plane from a tongue and groove set was used to create a groove on the front of the seatboard, with the matching plane utilized to form the lower cleat of the dial, one of the two dovetailed stiffeners that were inserted into rabbets cut across the back. The broader top cleat was drilled with two holes to receive the ends of the pillars that extended from the upper portion of the clockworks. When properly assembled, the lower cleat slid into the groove in the seatboard, the pillars plugged into the holes in the upper cleat, and the minute arbor and cannon tube extended through the center hole of the dial. Four small holes were drilled, one on each end of the seatboard top and one for each pillar. Wooden pins were then inserted to draw the parts together. [58]

---

[57] Information taken from inspection of all available dials included in the study. Nine dial photographs are included for clocks that were not available for inspection.

[58] The originality of a clockworks and dial pairing can often be determined by the alignment of the holes for these small pins.

A factory that manufactured identical, interchangeable parts and used a template to drill all pivot and attachment holes would have created identical clockworks, and identical works required interchangeable dials that had identical attachment points specific to that factory's clockworks. Thus, the dial back's cleat and hole positions become a mirror for the works, specific to each factory.

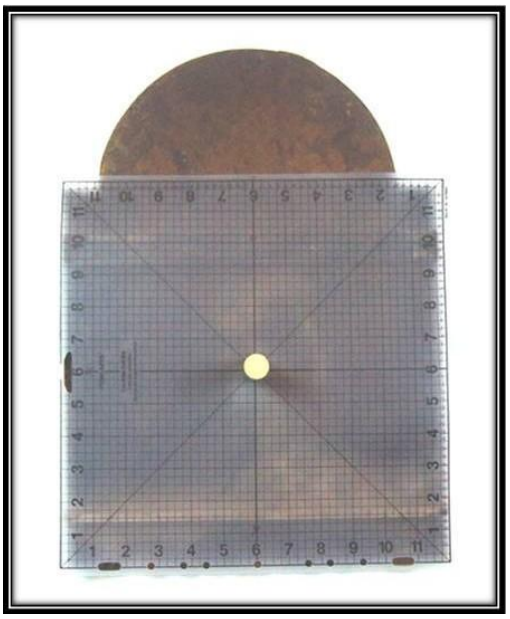


figure 2.1

The only point where all clockworks and dials must align exactly is the center hole; all other points are subject to variation based on the design and layout of the works. For this reason, the center hole was used as the baseline for all measurements in this study. All attachment points were plotted using an XY axis grid with XY intersection (X=0, Y=0)as the center of the center hole. A transparent plastic grid was divided into quarter inch increments and a tapered dowel affixed at the XY intersection.(*figure 2.1*) The tapered dowel centered itself when inserted into the center hole of the dial and the grid was rotated so that the lower cleat was parallel with the X axis.

The edges of all cleats and holes were then recorded to the nearest quarter of a grid increment, resulting in a margin of error of $\pm$ .25 ($^{1}/_{16}$"). The positions were then averaged to provide center points for the lower cleat and upper holes, and distances between the points computed. The points and measurements used to classify the movements were: the Y value of the center of the lower cleat; the perpendicular distance from the center of the lower cleat to the center of each of the holes in the upper cleat; and the distance between the two upper hole centers. For a dial to fit a set of clockworks, these four values must be closely matched.

A few difficulties were encountered related to repairs and wood shrinkage. The most common problem was the variation in the position of upper cleat holes relative to the x-axis. The cleats retained their original length but the dials had shrunk, leaving the cleats extending beyond the dial and able to slide in the dado. For this reason, only the distance between the holes was used and not the XY co-ordinates for the holes, as the original positions could not be established. An additional problem arose because repairers often used a knife to enlarge holes to provide clearance after shrinkage had misaligned the dial and works, altering the hole sizes. This was mitigated by recording the edges of the holes and averaging to establish the center points. Occasionally enlargement of the center hole created difficulty in establishing the center point, rendering the value for the center of the lower cleat unreliable. This problem was addressed by relying on the distance between the top holes and bottom cleat, as that distance would be constant regardless of the starting position. Other dials were rejected from the sample because the alterations to the cleats and/or holes were excessive.

The first and most vital question arising in this analysis will be simply whether the templates the factories used to drill the pillars and pivots were varied enough from one another in layout and construction to provide a discernible difference in the measurements. The following analysis will proceed under the assumption that sufficient variation existed; the validity of the assumption will be examined with the recap of the dial data. The chart (Table I) contains all measurements and the margin of error inherent in the computations for each of the data points.

dial #	maker's name	lunette & spandrells	bottom cleat	bottom cleat upper edge	bottom cleat width	C Width σ Uncert	C midpoint σ σ	top cleat lower	top cleat upper edge	top cleat width	C σ σ2	l.h. left	l. h. right	l.h x	Cc l.h. σx	l.h. lower
D-7	Assel Merrell	Arches	-18 50	-17.50	1.00 ± 0.25	-18.00 ± 0.125		13.00	17.25	4.25 ± 0.25		-0.75	0.50	-0.13 ±	0.125	15.75
A-8	Garry Lewis	Reserve village	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		14.00	18.00	4.00 ± 0.25		-0.50	0.50	0.00 ±	0.125	15 50
A-1	Garry Lewis	Romantic buildings	-18.00	-17.25	0.75 ± 0.25	-17.63 ± 0.125		13.00	17.00	4.00 ± 0.25		-0.50	0.50	0.00 ±	0.125	16.00
A-7	Garry Lewis	Strawberries	-18.00	-17.25	0.75 ± 0.25	-17.63 ± 0.125		13.50	17.50	4.00 ± 0.25		-0.50	0.50	0.00 ±	0.125	15 50
D-11	Assel Merrell	European scene	-18.25	-17.25	1.00 ± 0.25	-17.75 ± 0.125		13.50	17.25	3.75 ± 0.25		-1.00	0.25	-0.38 ±	0.125	16.00
A-9	Garry Lewis	Flower basket	-18.25	-17.00	1.25 ± 0.25	-17.63 ± 0.125										
D-1	Assel Merrell	Masonic emblems	-17.00	-16.25	0.75 ± 0.25	-16.63 ± 0.125		14.50	18.25	3.75 ± 0.25		-0.50	0.50	0.00 ±	0.125	16 50
A-2	Garry Lewis	Germanic flowers	-18.00	-17.25	0.75 ± 0.25	-17.63 ± 0.125		13.75	17.75	4.00 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
B-12	L.W. Lewis	Oval & urn	-18.00	-17.25	0.75 ± 0.25	-17.63 ± 0.125		13.75	17.50	3.75 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
I-1	Phineas Demming	Large house	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.75	17.75	4.00 ± 0.25		-0.50	0.75	0.13 ±	0.125	15.50
D-12	Assel Merrell	Two roses	-18.50	-17.50	1.00 ± 0.25	-18.00 ± 0.125		13.50	17.25	3.75 ± 0.25		-0.75	0.50	-0.13 ±	0.125	16.00
C-2	Wheeler Lewis	Georgian house	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.50	18.00	4.50 ± 0.25						
B-3	L.W. Lewis	Flower basket	-17.75	-17.00	0.75 ± 0.25	-17.38 ± 0.125		13.75	18.00	4.25 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
B-5	L.W. Lewis	Chopped lunette	-18.25	-17.00	1.25 ± 0.25	-17.63 ± 0.125		13.00	17.75	4.75 ± 0.25		-0.5	1.00	0.25 ±	0.125	14.75
C-10	Wheeler Lewis	Chopped lunette	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		1250	17.00	4.50 ± 0.25						
C-1	Wheeler Lewis	Strawberries	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.50	18.00	4.50 ± 0.25		0.00	1.25	0.63 ±	0.125	15.25
X-1	unknown	Butterflies	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.50	17.00	3.50 ± 0.25		-0.50	0.50	0.00 ±	0.125	15.50
C-9	Wheeler Lewis	Oval & rose	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.75	18.00	4.25 ± 0.25		-0.50	0.75	0.13 ±	0.125	15.25
C-14	Wheeler Lewis	Flower swags	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		14.00	18.00	4.00 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.50
C-5	Wheeler Lewis	Masonic emblems	-18.00	-16.75	1.25 ± 0.25	-17.38 ± 0.125		14.00	18.00	4.00 ± 0.25		-0.50	0.50	0.00 ±	0.125	15.50
C-11	Wheeler Lewis	Large house	-17.50	-16.75	0.75 ± 0.25	-17.13 ± 0.125		14.00	18.50	4.50 ± 0.25		-0.50	0.50	0.00 ±	0.125	15.50
G-1	Ambrose Hart	Basket of flowers	-17.75	-16.75	1.00 ± 0.25	-17.25 ± 0.125		14.25	18.00	3.75 ± 0.25		-1.50	0.25	-0.63 ±	0.125	15.50
B-7	L.W. Lewis	Yellow bird	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.25	17.25	4.00 ± 0.25		-0.50	0.75	0.13 ±	0.125	15.00
B-13	L.W. Lewis	Two roses	-17.75	-17.00	0.75 ± 0.25	-17.38 ± 0.125		14.00	18.00	4.00 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
B-17	L.W. Lewis	Flower pot	-17.75	-17.00	0.75 ± 0.25	-17.38 ± 0.125		13.75	17.75	4.00 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
B-10	L.W. Lewis	European scene	-17.50	-16.50	1.00 ± 0.25	-17.00 ± 0.125		14.00	18.00	4.00 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
C-8	Wheeler Lewis	Strawberries	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.75	18.00	4.25 ± 0.25		-0.50	0.50	0.00 ±	0.125	15.25
B-6	L.W. Lewis	Golden urn	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		14.00	17.75	3.75 ± 0.25		-0.50	1.00	0.25 ±	0.125	15.00
K-1	W. W. Ling	Two roses	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		14.00	18.00	4.00 ± 0.25		-0.75	0.75	0.00 ±	0.125	15.25
B-20	L.W. Lewis	Eagle & shield	-17.50	-16.50	1.00 ± 0.25	-17.00 ± 0.125		14.00	18.25	4.25 ± 0.25		0.00	1.25	0.63 ±	0.125	15.50
D-3	Assel Merrell	Queen Anne	-18.00	-16.50	1.50 ± 0.25	-17.25 ± 0.125		14.25	18.00	3.75 ± 0.25		-0.75	0.25	-0.25 ±	0.125	16.00
A-4	Garry Lewis	Flying eagle	-18.00	-17.00	1.00 ± 0.25	-17.50 ± 0.125		13.50	17.50	4.00 ± 0.25		-0.75	0.50	-0.13 ±	0.125	15.25
B-4	L.W. Lewis	Gilded urn /w swag	-18.25	-17.00	1.25 ± 0.25	-17.63 ± 0.125						-1.50	0.25	-0.63 ±	0.125	15.00
F-1	Hart & Truesdal	Dodecagon	-16.00	-14.75	1.25 ± 0.25	-15.38 ± 0.125						-8.25	-6.25	-7.25 ±	0.125	14.75
F-2	Hart & Truesdal	Drapes	-15.75	-14.50	1.25 ± 0.25	-15.13 ± 0.125						-8.50	-6.50	-7.50 ±	0.125	15.00
F-3	Hart & Truesdal	Eagle & shield	-16.00	-14.75	1.25 ± 0.25	-15.38 ± 0.125						-9.25	-7.00	-8.13 ±	0.125	14.75
F-8	Hart & Truesdal	Raspberries	-15.50	-14.00	1.50 ± 0.25	-14.75 ± 0.125						-8.50	-6.50	-7.50 ±	0.125	15.00
F-9	Hart & Truesdal	strawberries & deer	-15.00	-14.00	1.00 ± 0.25	± 0.000						-8.50	-6.75	-7.63 ±	0.125	15.25
B-14	L.W. Lewis	urn & spray	-18.00	-17.00	1.00 ± 0.25	-17.50	0.125	13.25	17.75	4.50 ± 0.25		-1.00	0.50	-0.25 ±	0.125	15.25
L-1	H. Cook	floral	-15.00	-13.50	1.50 ± 0.25	-14.25 ± 0.125						-8.50	-7.25	-7.88 ±	0.125	15.50
M-1	C. Lewis	floral	-18.00	-17.00	1.00 ± 0.25	-17.50	0.125					-0.50	0.50	0.00 ±	0.125	15.50

Table I

dial #	maker's name	l. h. upper	l.h. y	C l.h. ay	r. h. left	r. h. right	r.h. x	C r.h. ax	r. h lower	r. h. upper	r.h. y	C r.h. ay	dist btwn	C obtwn	lh height	C o lh	rh height	C o rh	Colun	Column12
D-7	Ansel Merrell	16.75	16.25	± 0.125	13.25	14.50	13.875	± 0.125	15.50	16.50	16.00	± 0.125	14.00	± 0.25	34.25	± 0.25	34	± 0.25	0.25	
A-8	Garry Lewis	16.50	16	± 0.125	13.50	14.50	14	± 0.125	15.00	16.25	15.63	± 0.125	14.00	± 0.25	33.5	± 0.25	33.125	± 0.25	0.38	
A-1	Garry Lewis	17.00	16.5	± 0.125	13.50	14.75	14.125	± 0.125	15.50	16.50	16.00	± 0.125	14.13	± 0.25	34.125	± 0.25	33.625	± 0.25	0.5	1
A-7	Garry Lewis	16.50	16	± 0.125	13.50	14.75	14.125	± 0.125	15.00	16.25	15.63	± 0.125	14.13	± 0.25	33.625	± 0.25	33.25	± 0.25	0.38	
D-11	Ansel Merrell	17.25	16.625	± 0.125	13.25	14.50	13.875	± 0.125	16.00	17.25	16.63	± 0.125	14.25	± 0.25	34.375	± 0.25	34.375	± 0.25	0	
A-9	Garry Lewis																		0	
D-1	Ansel Merrell	17.50	17	± 0.125	13.75	15.00	14.375	± 0.125	16.50	17.50	17.00	± 0.125	14.38	± 0.25	33.625	± 0.25	33.625	± 0.25	0	
A-2	Garry Lewis	16.25	15.625	± 0.125	14.00	15.25	14.625	± 0.125	15.00	16.25	15.63	± 0.125	14.38	± 0.25	33.25	± 0.25	33.25	± 0.25	0	
B-12	L. W. Lewis	16.25	15.625	± 0.125	14.00	15.25	14.625	± 0.125	14.75	16.00	15.38	± 0.125	14.38	± 0.25	33.25	± 0.25	33	± 0.25	0.25	
I-1	Phineas Demming	16.25	15.875	± 0.125	13.75	15.00	14.375	± 0.125	14.50	15.75	15.13	± 0.125	14.25	± 0.25	33.375	± 0.25	32.625	± 0.25	0.75	1
D-12	Ansel Merrell	17.00	16.5	± 0.125	13.75	14.75	14.25	± 0.125	15.75	17.00	16.38	± 0.125	14.38	± 0.25	34.5	± 0.25	34.375	± 0.25	0.13	
C-2	Wheeler Lewis																		0	
B-3	L. W. Lewis	16.25	15.625	± 0.125	14.00	15.25	14.625	± 0.125	14.75	16.25	15.50	± 0.125	14.38	± 0.25	33	± 0.25	32.875	± 0.25	0.13	
B-5	L. W. Lewis	16.25	15.5	± 0.125	14	15.25	14.625	± 0.125	14.25	15.75	15.00	± 0.125	14.38	± 0.25	33.125	± 0.25	32.625	± 0.25	0.5	
C-10	Wheeler Lewis																		0	
C-1	Wheeler Lewis	16.50	15.875	± 0.125	14.00	15.25	14.625	± 0.125	15.00	16.25	15.63	± 0.125	14.00	± 0.25	33.375	± 0.25	33.125	± 0.25	0.25	
X-1	unknown	16.75	16.125	± 0.125	13.75	15.00	14.375	± 0.125	15.00	16.25	15.63	± 0.125	14.38	± 0.25	33.625	± 0.25	33.125	± 0.25	0.5	
C-9	Wheeler Lewis	16.50	15.875	± 0.125	13.75	15.00	14.375	± 0.125	15.00	16.25	15.63	± 0.125	14.25	± 0.25	33.375	± 0.25	33.125	± 0.25	0.25	
C-14	Wheeler Lewis	16.75	16.125	± 0.125	13.75	15.25	14.5	± 0.125	15.25	16.50	15.88	± 0.125	14.25	± 0.25	33.625	± 0.25	33.375	± 0.25	0.25	
C-5	Wheeler Lewis	16.50	16	± 0.125	13.75	15.00	14.375	± 0.125	15.25	16.50	15.88	± 0.125	14.38	± 0.25	33.375	± 0.25	33.25	± 0.25	0.13	
C-11	Wheeler Lewis	16.50	16	± 0.125	13.75	15.00	14.375	± 0.125	15.25	16.50	15.88	± 0.125	14.38	± 0.25	33.125	± 0.25	33	± 0.25	0.13	
G-1	Ambrose Hart	16.50	16	± 0.125	13.75	15.00	14.375	± 0.125	15.00	16.50	15.75	± 0.125	15.00	± 0.25	33.25	± 0.25	33	± 0.25	0.25	
B-7	L. W. Lewis	16.25	15.625	± 0.125	14.00	15.25	14.625	± 0.125	14.25	15.50	14.88	± 0.125	14.50	± 0.25	33.125	± 0.25	32.375	± 0.25	0.75	1
B-13	L. W. Lewis	16.50	15.75	± 0.125	14.00	15.50	14.75	± 0.125	14.50	16.00	15.25	± 0.125	14.50	± 0.25	33.125	± 0.25	32.625	± 0.25	0.5	
B-17	L. W. Lewis	16.50	15.75	± 0.125	14.00	15.50	14.75	± 0.125	14.50	16.00	15.25	± 0.125	14.50	± 0.25	33.125	± 0.25	32.625	± 0.25	0.5	
B-10	L. W. Lewis	17.00	16	± 0.125	14.00	15.50	14.75	± 0.125	14.75	16.25	15.50	± 0.125	14.50	± 0.25	33	± 0.25	32.5	± 0.25	0.5	
C-8	Wheeler Lewis	16.50	15.875	± 0.125	14.00	15.25	14.625	± 0.125	14.75	16.00	15.38	± 0.125	14.63	± 0.25	33.375	± 0.25	32.875	± 0.25	0.5	
B-6	L. W. Lewis	16.50	15.75	± 0.125	14.25	15.50	14.875	± 0.125	14.75	16.00	15.38	± 0.125	14.63	± 0.25	33.25	± 0.25	32.875	± 0.25	0.38	
K-1	W. W. Ling	16.75	16	± 0.125	14.00	15.75	14.875	± 0.125	17.75	16.25	17.00	± 0.125	14.88	± 0.25	33.5	± 0.25	34.5	± 0.25	-1	1
B-20	L. W. Lewis	16.75	16.125	± 0.125	14.25	15.50	14.875	± 0.125	15.25	16.75	16.00	± 0.125	14.25	± 0.25	33.125	± 0.25	33	± 0.25	0.13	1
D-3	Ansel Merrell	16.75	16.375	± 0.125	13.75	14.75	14.25	± 0.125	15.50	16.75	16.13	± 0.125	14.50	± 0.25	33.625	± 0.25	33.375	± 0.25	0.25	
A-4	Garry Lewis	16.75	16	± 0.125	13.50	14.75	14.125	± 0.125	15.00	16.25	15.63	± 0.125	14.25	± 0.25	33.5	± 0.25	33.125	± 0.25	0.38	1
B-4	L. W. Lewis	16.50	15.75	± 0.125	13.25	15.00	14.125	± 0.125	14.50	16.00	15.25	± 0.125	14.75		33.375		32.875		0.5	
F-1	Hart & Truesdal	16.75	15.75	± 0.125	12.25	14.25	13.25	± 0.125	14.75	16.75	15.75	± 0.125	20.50		31.125		31.125		0	
F-2	Hart & Truesdal	17.00	16	± 0.125	12.25	14.25	13.25	± 0.125	15.00	17.00	16.00	± 0.125	20.750		31.125		31.125		0	
F-3	Hart & Truesdal	16.75	15.75	± 0.125	11.50	13.75	12.625	± 0.125	14.75	16.75	15.75	± 0.125	20.75		31.125		31.125		0	
F-8	Hart & Truesdal	17.00	16	± 0.125	12.00	14.00	13	± 0.125	15.00	17.00	16.00	± 0.125	20.50		30.75		30.75		0	
F-9	Hart & Truesdal	17.00	16.125	± 0.125	13.50	14.25	13.875	± 0.125	15.25	17.00	16.13	± 0.125	21.50		16.125		16.125		0	
B-14	L. W. Lewis	17.00	16.125	± 0.125	13.50	15.00	14.25	± 0.125	14.25	16.00	15.13	± 0.125	14.50		33.625		32.625		1	
I-1	H. Cook	17.25	16.375	± 0.125	13.00	14.75	13.875	± 0.125	15.25	17.25	16.25	± 0.125	21.75		30.625		30.5		0.13	
M-1	C. Lewis	16.50	16	± 0.125	14.00	15.00	14.5	± 0.125	15.00	16.00	15.50	± 0.125	14.50		33.5		33		0.5	

Table I (continued)

The term "*works type*" is used in this study to divide the sample set of local clock dials measurements into like groups, designated as *type 1* through *type 11*. Within each group, a cluster of like data points should indicate interchangeability and therefore, a common source. The "*type*" designations created from this data set are not applicable to clocks from other regions.

The following list of names associated with the clock industry provides a rough framework for the interpretation of the measurement data from the dial backs, though it must be noted that there is no way to be certain that all factories are represented.

A list drawn from the civil court depositions names Levi Lewis, Abraham Lewis, Tyler & Hummason, Lambert W. Lewis, Charles Lewis, Thomas Lewis, Ansel Merrell, Phineas Deming, William Hartson, Hart & Truesdale as factory operators.[59] Also noted

[59] *Lewis v Lewis*, deposition of : Orrin Johnson(June 17, 1834), Henry Stiles (June 18, 1834), George Patterson (September 4, 1834), Riley Alderman , Morgan Hart and Richard Holton (November 12, 1834).

was a factory "which was said to belong to Garry Lewis" and the shop of Asahel Scoville who may have made clocks utilizing wheels that were seconds from other factories.[60] Comparing these names with those found on Trumbull County clock dials allows for three lists:

1. Levi Lewis, Abraham Lewis, Tyler & Hummason, and Asa Scoville were all factory operators whose names have not appeared on dials;

2. Wheeler Lewis, D.R. Hartson, and Ambrose Hart were individuals or firms which were not listed in the depositions as operators but whose names have appeared on dials;

3. Hart & Truesdale, Hart & Way, L. W. Lewis, Garry Lewis, Charles Lewis, Ansel Merrell and Phineas Deming, all of which were listed as operators and whose names have appeared on clock dials.

In addition to the nameplates (names found on the dials) represented above, the author has included three dials that he believed may have been products of the local industry. These include a dial and works marked "W. W. Ling" and "1817", a loose dial marked "H. Cook" and "Medina", and an unsigned dial and works.

Six of the nameplates account for over 91% of the dials in the study, with the remaining 8% made up of six nameplates which occur only once, with three additional unmarked examples. Assuming that the survival rate is approximately equal for the output of for each of the companies or individuals nameplates, the share of the total market over the lifespan of the wood works industry would have been 27% to L.W.Lewis, 19% to Wheeler Lewis, 17% to Ansel Merrell, 16% to Garry Lewis and 12%

---

[60] *Lewis v Lewis*, depositions of : Rosewell Scoville (June 18, 1834)and Thomas K. Ballard (June 19, 1834).

to Hart & Truesdale. The six nameplates with only a single example are Hart & Way, A. Hart, W. W. Ling, Phineas Deming, H. Cook and C. (Charles) Lewis, each accounting for just over 1%.

Only two nameplates, H. Cook and Hart & Truesdale, utilized Plymouth style works, with all other Trumbull County nameplates were matched to tall clock movements based on the Waterbury layout. The analysis will consider these Waterbury style clockworks first. The results, displayed on Table II, have been sorted by data points into eleven major groupings.

-17.500	14.500	±	0.25	33.125	±	0.25	32.375	±	0.25	0.75	B-6	L. W. Lewis	Golden urn	type 1
-17.500	14.500	±	0.25	33.125	±	0.25	32.375	±	0.25	0.75	B-7	L. W. Lewis	Yellow bird	type 1
-17.000	14.500	±	0.25	33	±	0.25	325	±	0.25	0.5	B-10	L. W. Lewis	European scene	type 1a
-17.375	14.500	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-13	L. W. Lewis	Two roses	type 1a
-17.375	14.500	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-17	L. W. Lewis	Flower pot	type 1a
-17.625	14.500	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-12	L. W. Lewis	Oval & urn	type 1a
-17.625	14.375	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-5	L. W. Lewis	Chopped lunette	type 1a
-17.375	14.375	±	0.25	33	±	0.25	32.875	±	0.25	0.125	B-3	L. W. Lewis	Flower basket	type 2
-17.000	14.250	±	0.25	33.125	±	0.25	33	±	0.25	0.125	B-20	L. W. Lewis	Eagle & shield	type 2
-17.625	14.750	±	0.25	33.375	±	0.25	32.875	±	0.25	0.5	B-4	L. W. Lewis	Gilded urn	type 1a
-17.500	14.630	±	0.25	33.375	±	0.25	32.875	±	0.25	0.5	K-1	W. W. Ling	Two roses	type 3a or 1a
-17.500	14.625	±	0.25	33.375	±	0.25	32.875	±	0.25	0.5	C-8	Wheeler Lewis	Strawberries	type 3b
-17.250	15.000	±	0.25	33.25	±	0.25	33	±	0.25	0.25	G-1	Ambrose Hart	Basket of flowers	type 4
-17.500	14.250	±	0.25	33.375	±	0.25	32.625	±	0.25	0.75	I-1	Phineas Demming	Large house	type 5
-17.500	14.500	±	0.25	33.625	±	0.25	32.625	±	0.25	1	B-14	L. W. Lewis	Urn	
-17.625	14.125	±	0.25	33.25	±	0.25	33.25	±	0.25	0	A-2	Garry Lewis	Germanic flowers	type 6
-17.500	14.000	±	0.25	33.5	±	0.25	33.125	±	0.25	0.375	A-8	Garry Lewis	Reserve village	type 7
-17.625	14.125	±	0.25	33.625	±	0.25	33.25	±	0.25	0.375	A-7	Garry Lewis	Strawberries	type 7
-17.500	14.000	±	0.25	33.5	±	0.25	33.125	±	0.25	0.375	A-4	Garry Lewis	Flying eagle	type 7 or 9
-17.500	14.375	±	0.25	33.625	±	0.25	33.125	±	0.25	0.5	X-1	unknown	Butterflies	type 7a or 9a
-17.500	14.500	±	0.25	33.5	±	0.25	33	±	0.25	0.5	M-1	Charles Lewis	Floral	type 7a
-17.625	14.375	±	0.25	34.125	±	0.25	33.625	±	0.25	0.5	A-1	Garry Lewis	Romantic buildings	type 8
-17.500	14.250	±	0.25	33.625	±	0.25	33.375	±	0.25	0.25	C-14	Wheeler Lewis	Flower swags	type 9a
-17.500	14.000	±	0.25	33.375	±	0.25	33.125	±	0.25	0.25	C-1	Wheeler Lewis	Strawberries	type 9
-17.500	14.250	±	0.25	33.375	±	0.25	33.125	±	0.25	0.25	C-9	Wheeler Lewis	Oval & rose	type 9
-17.375	14.375	±	0.25	33.375	±	0.25	33.25	±	0.25	0.125	C-5	Wheeler Lewis	Masonic emblems	type 9
-17.125	14.375	±	0.25	33.125	±	0.25	33	±	0.25	0.125	C-11	Wheeler Lewis	Large house	type 9
-18.000	14.000	±	0.25	34.25	±	0.25	34	±	0.25	0.25	D-7	Ansel Merrell	Arches	type 10
-17.750	14.250	±	0.25	34.375	±	0.25	34.375	±	0.25	0	D-11	Ansel Merrell	European scene	type 10
-18.000	14.375	±	0.25	34.5	±	0.25	34.375	±	0.25	0.125	D-12	Ansel Merrell	Two roses	type 10
-16.625	14.375	±	0.25	33.625	±	0.25	33.625	±	0.25	0	D-1	Ansel Merrell	Masonic emblems	type 10a
-17.250	14.500	±	0.25	33.625	±	0.25	33.375	±	0.25	0.25	D-3	Ansel Merril	Queen Anne	type 10a
-14.750	20.500	±	0.25	30.75	±	0.25	30.75	±	0.25	0	F-8	Hart & Truesdale	Raspberries	type 11a
-15.375	20.500	±	0.25	31.125	±	0.25	31.125	±	0.25	0	F-1	Hart & Truesdale	Geometric	type 11
-15.375	20.750	±	0.25	31.125	±	0.25	31.125	±	0.25	0	F-3	Hart & Truesdale	Eagle & shield	type 11
-15.125	20.750	±	0.25	31.125	±	0.25	31.125	±	0.25	0	F-2	Hart & Truesdale	Flower & drape	type 11
-14.500	21.500			30.625			30.625			0	F-9	Hart & Truesdale	Strawberries	type 11b
-14.250	21.750			30.5			30.5			0.125	L-1	H. Cook	floral	type 11b

Table II

The dials marked for L. W. Lewis all fell within the assigned margin of error though four subgroups emerged. (see data groups for each dial on Table II) *Type 1-a*, the largest concentration of dials (B- 5, 10, 12, 13 & 17), share all measurements within .125 ($^1/_{32}$") and a common value of .50 ($^1/_8$") for the height difference between the pillars (column D). An additional dial, (B-4), lies within the margin of error for columns A, B & C, and carries a matching value for column D. This dial is included in *type-1a*, though it will be reconsidered in the discussion of the *type 3* and *type 3a* movements. The two dials marked as *type 1* (B-6 & 7) show a variance in column D of .75 ($^3/_{16}$"), while two dials marked as *type 2* (B-3 & 20) show the height variation in column D to be.125 ($^1/_{32}$"). The largest variation among the dials occurs in dial B-14 with a difference of 1.00 ($^1/_4$")for the height of the two column hole. This dial, designated works *type 1b,* is closest to *type 1*, though the values for the variance in columns C & D are at the edge of the margin of error .25 ($^1/_{16}$") and the column B doubles that difference to .5 ($^1/_8$")[61] Dial B-14 will be reconsidered with the Phineas Deming marked dial I-1. Other than dial B-14, a peddler could probably have made most of these dials fit with the judicious use of a penknife, but they were not truly interchangeable. All of the available clockworks associated with these dials exhibit identical features and wheel placements, indicating that they were the product of a single factory. This places L. W. Lewis among the men who were listed as operators and whose names have appeared on clock dials.

[61] Both upper holes show evidence of slight alteration. These seem minor as they do not extend to the interior to effect the fit of the clockworks, though the altered edges may have impacted the measurements, leading to larger values for columns C & D.

The L. W. Lewis factory operated for nearly twenty years; whether this variation in pillar placement is evidence of a worn template, a new or re-bushed template, or shoddy workmanship will be discussed in the recap at the end of this section.[62]

Of the five dials signed G. Lewis, three (A-4, 7&8) share all data points within .125 ($^1/_{32}$") and values in columns B and C that move in unison. These three dials, *type 7*, are interchangeable and seem likely to have been the product of a single factory.

All data points for the fourth Gary Lewis dial (A-2) fall within the margin of error for *type 7*, though only two points on one dial (A-7) match. And even though the values for columns A and C are the same on these two dials, the values for columns B and C do not move in unison. The .325 ($^3/_{32}$") difference in the value for column D means that dial A-2 would most likely not be interchangeable with those classified as *type 7*, hence its classification as *type 6*.

Another correlation could be achieved by relating dial A-2 to the *type 9* dials marked for Wheeler Lewis. A comparison with Wheeler Lewis dial C-5 yields variances of .25 ($^1/_{16}$") for column A, .125 ($^1/_{32}$") for column B, a match for column C, and .125 ($^1/_{32}$") for column D; these two dials would be interchangeable. Dial A-2 had no accompanying clockworks to allow for further comparisons.

All data points for the fifth Garry Lewis marked dial (A-1) fall outside the margin of error for *type 7*. The values for columns B and C are both off by .5 ($^1/_8$"), the maximum value for the margin of error. Dial A-1's classification as *type 8* indicates that

---

[62] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990), 19.

it is not interchangeable with either *types 6* or *7*. This dial will be discussed further when considering the products of the Ansel Merrell factory.

According to the depositions included in the Civil Court proceedings, Garry Lewis was a merchant who bought and sold clocks from several different factories, as well as having a "factory which is said to belong to Garry Lewis."[63] The existence and/or function of this factory will be considered in the final analysis section. Garry acted as a merchant who bought clocks from others and released them under his name, and perhaps as an operator who released clocks in his name.

An unsigned example designated as X-1 is the next dial to be considered. This dial most closely matches the Garry Lewis marked dials of *type 7* (dials A-4, 7&8). It exhibits a variation of .25 ($^1/_{16}$") for column A and a difference of .125 ($^1/_{32}$") for columns C and D. This dial would have been interchangeable and so is included as a subset, *type 7a*. However, two alternate possibilities, inclusion as *types 8 or 9*, must also be considered. *Type 8* dial A-1 shares data points for columns A and D with unsigned dial X-1, though the values for columns B and C vary by .5 ($^1/_8$"), the maximum allowable margin of error. These dials could be made interchangeable with a slight thinning of the lower cleat.

The second alternative classification for dial X-1groups it with *type 9a* assigned to the Wheeler Lewis factory. Its data points fall within the margin of error for these dials, though with significant variations. This possible reclassification will be examined with the *type 9* & *9a* dials.

---

[63] *Lewis v Lewis*, deposition of : Thomas K. Ballard (June 19, 1834).

The most consistent measurements were found on dials signed for Wheeler Lewis. Only one of the Wheeler Lewis marked dials (C-8) fell outside the main grouping, with all others (C-1, 5, 9, 11 & 14) within the margin of error. However, two clusters of points are apparent; dials C-1,5,9 & 11 (*type 9*)share all values within $\pm$ .125 ($^1/_{32}$") and parallel behavior for columns B and C, with dial C-14 having values for columns B and C that are separated from the *type 9* group by at least .25 ($^1/_{16}$") . Though these six dials could be interchanged with a small amount of trimming to the bottom cleat, the measurements for C-14 suggest that it constitutes a distinct group, *type 9a*.

The unsigned dial X-1 that was initially designated as *type 7a* now falls within the margin of error for *type 9a*, dial C-14, with column A & B matching and a .25 (1/16") variance for columns C & D. An inspection of the clockworks revealed a disk on the third arbor of the time side, a feature thus far found only on clockworks accompanied by Wheeler Lewis' name. This combination of features suggests that the clockworks were a product of the Wheeler Lewis factory and that the works for dial X-1 should be reclassified as *type 9a*.

The reclassification of dial X-1 from *type 7a* to *type 9a* indicated the need to review any clockworks associated with the *type 7* dials. A subsequent inspection found a disk on the third arbor of the movement that accompanied dial A-4, indicating that it was also a product of the Wheeler Lewis factory and that it should be reclassified as *type 9*.

As to who operated the factory, Wheeler Lewis was described as a merchant and saddler and was likely to have been the dealer, not the clockmaker. [64]

---

[64] Rogers, *Trumbull County Clock Industry, 1812 - 1835,* 20.

The Wheeler Lewis labeled dial (C-8) that fell outside the margin of error shares all data points with the dial marked W. W. Ling (K-1). These works will be noted as *type 3a* for dial C-8 and *type 3b* for K-1. A third dial, classified as *type 1-a* and signed L. W. Lewis (B-4), shares all but one data point with C-8 and K-1, that point falling within .125 ($^{1}/_{32}$"). Whether the Ling dial is connected to Lambert Lewis, Wheeler Lewis or neither cannot be discerned by the data points alone. An inspection of the clockworks indicates that they were products of at least two different factories, with the works accompanying dial C-8 showing a disk on the third arbor of the time side; both the B-4 and K-1works were constructed with a flared arbor. No additional comparisons of the works were available. Though several possibilities exist for this combination of nameplates and works, the Ling dial (K-1) was most likely a product of the Lambert W. Lewis factory.

Though the surname appearing on the W. W. Ling signed dial (K-1) has not been found in any records of Trumbull County or of the clock industry, it was prevalent in the area near Girty, Pennsylvania where the clock was discovered. [65] This would suggest that the signature is that of a merchant, regardless of the maker of the clockworks and dial.

Three other nameplates that used a Waterbury style movement are each represented by single dials; Phineas Deming (I-1), Charles Lewis (M-1)and A. Hart (G-1).[66] The A. Hart dial (G-1) stands alone, exhibiting the largest value in the Waterbury data set for the distance between the pillar holes, column A. This dial is not

---

[65] Ling Genealogy, internet search, http://files.us.gwararchives.net/pa/blair/history/davis 1-9.txt (2-27-2012).

Several families with the surname Ling were located in the area of Blair Co, PA where the clock was found. All can be traced to Anthony and Elizabeth Rad Ling, who came from Hessen, Germany to Somerset, PA in 1781.

[66] This is merchant Ambrose Hart of Brookfield, Ohio. Secondary sources such as Spitler's *American Clockmakers and Watchmakers* often repeat the erroneous identification as Alpha Hart, a Connecticut clockmaker with no known Ohio connection.

interchangeable with any of the dials in the study, earning it the notation of *type 4*. As Ambrose Hart's was one of the individuals or firms which were not operators but whose names have appeared on dials, the clockworks likely originated in one of the factories whose operator's names have not appeared on dials. The four names comprising that group are Levi Lewis, Abraham Lewis, Tyler & Hummason, and Asa Scoville.

The data points for the Phineas Deming dial fall within the margin of error assigned to the L.W. Lewis dials, specifically those in *type 1 and 1b.* The argument can be made that the *type 1b* works associated with dial B-14 are statistically the best match for the Deming marked dial. Unfortunately, the clockworks accompanying the Deming dial have been substantially rebuilt, making comparison with the L. W. Lewis works inconclusive. Absent evidence to the contrary, the Deming clockworks must be assumed to be a product of the Phineas Deming factory, labeled as *type 5*, and assigned to the group who were listed as operators and whose names have appeared on clock dials.

Dial M-1 marked for C. Lewis most closely matches the unmarked example X-1 with an identical value for the fourth column and a variation of .125 ($^{1}/_{32}$") in the first, second and third column, with the second and third columns moving in unison. These two dials are interchangeable and share an initial designation as *type 7a*. Dial X-1 has previously been reclassified as *type 9a*, a product of the Wheeler Lewis factory in response to the discovery of a disk on the third arbor of the time side. Dial M-1 retains its *type 7a* designation, as an inspection of the works associated with dial M-1 revealed a flared arbor in that position. The combination of interchangeable dial measurements and distinctly different arbors suggests that C. Lewis sourced the plates, and may have

sourced wheels and assembled clocks from parts. This categorizes Charles Lewis as an operator whose name has appeared on clocks, though the extent of his operation is unknown.

The largest variations in data points occur in the Ansel Merrell labeled dials. The closest cluster of data points is comprised of only two examples, dials D-11&12, with all values within .125 ($^{1}/_{32}$") but only one of the four data points matched. Dial D-7 falls within the margin of error, but no data point matches the other examples. Values for the columns differ by as much as .325 ($^{3}/_{32}$"). The first two dials, classified as *type 10* would be interchangeable, the third dial, *type 10b* would require trimming of the lower cleat and enlarging the top right pillar hole. The Garry Lewis dial A-1 may well be a product of the Ansel Merrell factory, as its data points are within the margin of error with dial D-7, though the lack of consistency within Merrell's production makes attribution to his factory uncertain. Two other Ansel Merrell dials (D-1&3) comprise a second cluster with all data points within .25 ($^{1}/_{16}$") and a matching measurement for the height of the left pillar hole. It is the difference in the height of this pillar hole, .875 ($^{7}/_{32"}$) that separates dials D-1&3 from the *type 10* and *10b* classifications. Ansel Merrell dials D-1&3 would only be interchangeable with one another, making them *type 10a*. Merrell was an operator who released clocks in his own name and owned his own factory, which he lost in 1831 to Hart & Way.[67]

---

[67] *Warren (Ohio) The Western Reserve Chronicle: 1816-1921*, The Trumbull County Public Library, special collections, microfilm, Warren, Oh., October 13, 1831.

The firm of Hart & Truesdale, makers of a group of five dials, utilized the three pillar, Plymouth arrangement for their clockworks.[68] The two corner pillars extended to support the dial, requiring a much wider space between the upper holes in the dial cleat. The third (center) pillar only extended from the back of the clockworks, providing a support for the pendulum rod. Data points for all dials except F-9 fall within the margin of error and the values for columns B & C move in unison. However, two dials (F-2&3) show identical values for all points, while dial F-1 shares values for columns B, C & D, suggesting that these values represent the mean. This reasoning places dials F-8 & 9 outside the margin of error for columns B & C, with variances in excess of .325 ($^{3}/_{32}$"). Additionally, the column A values for dials F-8 & 9 differ by 1.0 ($^{1}/_{4}$"), well beyond the margin of error allowed for interchangeability. Dials F-1,2&3 are classified as *type 11*, with dial F-8 assigned to *type 11a* and dial F-9 designated as type *11b*. The Hart & Truesdale dials belong to the group of operators whose names have appeared on clock dials.

The final dial (L-1) features an unknown nameplate, "H. Cook", "Medina." The dial's data points most closely match Hart & Truesdale dial F-9, with a variance of .25 ($^{1}/_{16}$") for column A and .125 ($^{1}/_{32}$) for columns B, C & D. These dials, designated as *type 11b* would be interchangeable, though no further relationship can be demonstrated using only the data points.

The classifications generated from the dial attachment point data seem to not only establish the factory of origin for most of the sample groups, but to divide them into production batches as well. However, there exist both overlapping data sets and

[68] Taken from inspection and measurement of all Hart & Truesdale clocks included in the study.

conflicting clockwork *type* designations that cannot be interpreted without the additional pattern information generated from the analysis of the dial faces.

The manufacturing of a clock dial involves several processes, with each of the steps likely performed by a different individual and requiring different tools and techniques . When asked to describe a ""good common face" to a wooden clock and say how the same should be made", Charles Lewis outlined the industrial processes as:

> "It should be planed out smoothly in the first place, to 1/4 inch in thickness and perfectly true and then should be made fast by putting two cleats in the back across the grain of the wood horizontally as the face naturally stands. The cleats should be dovetailed and put in snugly in order to keep the face from springing and to fasten it to the body of the clock. Then the face should be painted with white lead and oil in sufficient quantity to make a good and smooth ground work for the ornamenting. The ground work should be white and should be ornamented with plain, natural figures or flowers which is done to ornament the face. Then it should be figured in such a manner as to tell the time by the clock. The face should then be varnished with a good clear varnish to secure the ornamenting on the face." [69]

It is the next to last step, when the pattern and ink-work were applied to the dial so that it would "be figured in such manner as to tell the time by the clock" that will be the focus of the following inquiry.

The first step in the analysis was to trace the dials and compare the numeral forms and positions.[70] All tracings were prepared with the tracing sheet aligned with the lower edge of the dial. These tracings yielded the following observation:

1. The shapes of the shaded areas in the numerals and their positions relative to one another divided the dials roughly into three categories. The first and most easily

---

[69] *Lewis v Lewis*, deposition of : Charles Lewis (June 18, 1834).

[70] Of the eighty-four dials that were photographed for this thesis, forty-two were made available for tracing and are included in the analysis of dial fronts.

identifiable category contains ornate numerals positioned with the axis of the numerals oriented to the center of the dial, an arrangement known as tumbling. The next category utilized an austere New England style numeral, also tumbled. The largest category retained the austere New England style numeral, but with all elements positioned vertically. Variations within each of these three large categories yielded a final count of twenty-one dial groups. A description of the dial groups' variables will appear with the summation at the end of chapter IV.

The numerals were executed with a consistency that precluded freehand work. Closer inspection of the numerals revealed a few remaining pencil lines, indicating that the shaded areas were outlined first. No corresponding pencil lines were found for the line sections of the numerals. This indicates the use of a stencil-like template. Split ink lines were also noted in the inspection, a feature indicating the use of quills or pen nibs for the lettering. This combination of elements suggests that the open sections of the numerals were drawn with the assistance of a template, then linked when inked by the limner. Elements such as the balls that appear on the terminations of some 3's, 5's and 7's were most likely a part of the template, as they provided the termination point for the serifs. These balls may have been difficult to ink, as they were often omitted. The ink work throughout the sample of dials displays more skill and consistency than the decorative paintwork. Occasional flourishes of an individual limner, such as the two different methods of linking the sections of the 2's that appear on the H & T dials, suggest a very limited number of individuals were responsible for the numeral and chapter ring ink-work.

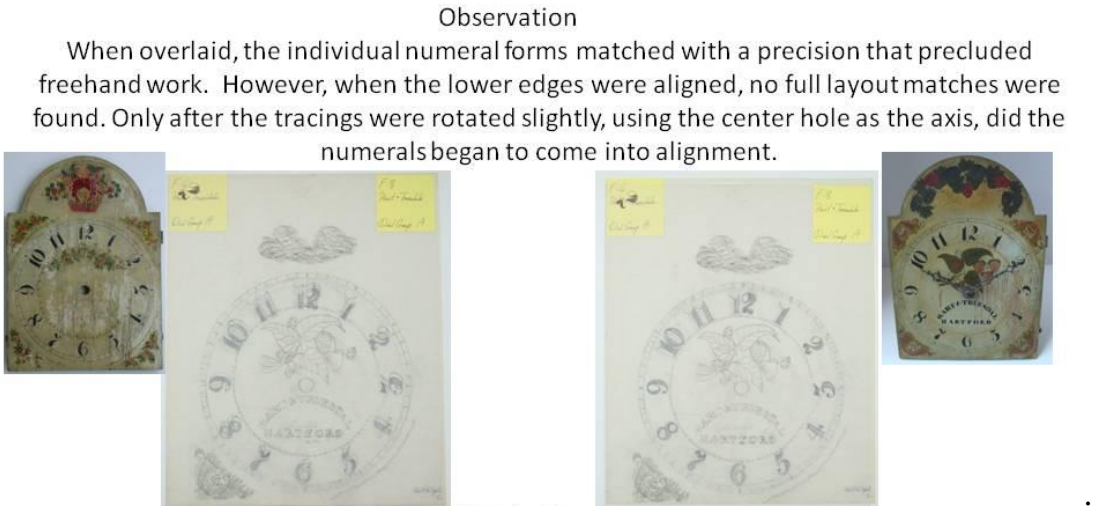


figure 2.2

2. When tracings were overlaid to establish the consistency of the numeral patterns, it was discovered that the patterns would not align when using the edges of the dial for positioning. (*figure 2.2*) However, rotating the tracings using the center hole of the dial as the axis brought the tracings into alignment. The patterns' orientations varied several degrees both left and right from vertical. This indicated that the template did not utilize the base or sides of the dial for positioning, but rather the center hole. As this method does not provide for a consistent repetition of the dial orientation, some other advantage must have been gained, one that the maker considered more important than the slightly skewed appearance of the dial.

3. A variety of decorative techniques were employed to create the chapter rings: continuous ink rings, segmented ink rings, and combinations of gesso and paint or metallic leaf. The chapter rings also showed occasional pencil layout lines, and the start

and finish points of the limner's inking are easily seen. Four methods for creating these rings were possible:

A. A series of square templates the size of the dial with different diameter circle cutouts, necessitating a different template for each size of ring. This would have required two to six templates to be used on each dial.

B. A series of circular templates with a center dowel to insert into the center hole, with a circular template for each size ring. Again, this would have required two to six templates to be used on each dial.

C. A compass fitted with a dowel or button to fit the center hole. This method presents the need to adjust the compass for each ring, or to keep several compasses set for fixed diameters.

D. A thin, flat piece of wood or metal fitted with a dowel or button to fit the center hole and a series of holes radiating out from the center point. This would have allowed the limner to select the proper distances from the center hole, insert a pencil and rotate the template to mark out the chapter rings.

The last method is the most efficient, and several holes for the variously scaled chapter rings were probably included in the same template that was used for the numerals. This would provide the reason for the apparent shortcomings noted above for the out-of-square dials; the template had to rotate in order to scribe the rings. The advantage of using one piece of equipment (the template) to create all the elements of the dial layout outweighed the aesthetic importance of the dials skewed appearance.

The divisions marking the minutes must also have been cut or drilled into the templates, as the ring and marks are consistent within each numeral pattern, but differ from pattern to pattern. Variation within a numeral pattern does exist contingent upon the use of gesso: short ink lines and/or small circles were used for a dial without gesso in the rings; no ink was used when gesso dots were applied.

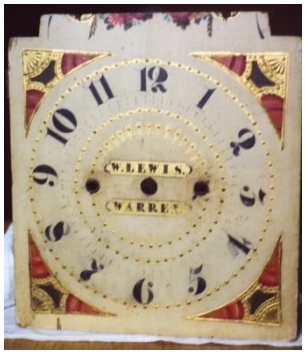
Based on the numeral size and orientation of the sample dials, at least twenty-one different templates were used in their creation. If on further investigation it appears that chapter ring distances were fixed for each template, the variations of radii would further increase the number of templates utilized.

The dial tracings were sorted into batches that exhibited identical form, spacing, and orientation of the numerals. The "dials groups" were developed by comparing the tracings from one batch with examples from its most similar batch, recording the variations that distinguished one batch from another. A notation for "dial group-A" through "dial group-U" was then assigned as each group was considered, beginning with the most complex dials and progressing to the simplest. The closer the dial group designations are alphabetically, the more characteristics the dials share.

Dial group-A

The most easily identifiable dials belong to the dial group-A (dials F-1, 2, 3, 6 & 8). All feature tumbled numerals that are more ornate than the traditional New England numerals. The robust form of the *2's, 3,4, 5* &*7* combined with the open downward orientation of the *3* provide a set of characteristics unlike any of the other locally produced dials.[71] Because these dials have not appeared with any other makers' names or works, they may be assumed to be products of the Hart & Truesdale factory which operated from 1827 through 1833.[72] A single Hart & Truesdale dial (F-9) which does not fit with dial group-A will be discussed with the dial group-H.

Five other dials seem to be variations sharing characteristics with the Hart & Truesdale template: one signed W. Lewis and four bearing A. Merrell labels.



Dial group-B

---

[71] This dial and works layouts are nearly identical to those produced by the "Chautauque Co.", New York firm of Shartwell & Chappel,. This firm's location in Busti, New York was on the trade road that linked Jamestown, New York to Warren, Ohio, suggesting that it may have been the source for the patterns and technology used by Hart & Truesdale. This is the author's supposition; further investigation is needed to make a more certain attribution. See Oeschle, *An Empire in Time*, page 105 for information on Shartwell & Chappel

[72] Klingemier, "Excerpts from the Azel Tracy Daybook," *Cog Counter's Journal, no. 29* (Spring - Summer 2007): 11-14.

Dial group-B contains only one tall clock dial, though a matching shelf clock dial exists.[73] The tall clock dial (C-3) signed "Wheeler Lewis" and "Warren," shared the basic form of the numerals from dial group-A except for having reversed the shaded areas inside the curl at the top of the *2*'s, similar to those in dial group-C. However, all numerals were shortened and the shaded areas widened, creating a distinctly different appearance. The chapter ring for the minutes was positioned within the numerals in the manner of a shelf clock, rather than in the common location encircling the numerals. This suggests that the dial group-B template was created to serve for laying out both types of dials, placing its use near the end of the industry.

Slight variations exist between the diameters of the numeral layout for the tall clock and the shelf clock that the author believes provide plausible evidence of the form of the template. The shelf clock utilizes a smaller center hole than a tall clock; thus, any template with an indexing dowel made to fit a shelf clock would not fit snugly into the center hole of a tall clock dial. A variation of $^{3}/_{32}$" in the diameter of the center hole would account for the increased radii of the tall clock numeral band.

---

[73] Loose dial drilled for groaner movement. Dial in the collection of Sutliff Museum, Warren, Oh. The dial descended in the Suttliff family, with the back of the dial marked in pencil as "Grandfather's" clock. It is the author's contention that this dial was a product of the Wheeler Lewis or Charles Lewis factories in Warren.

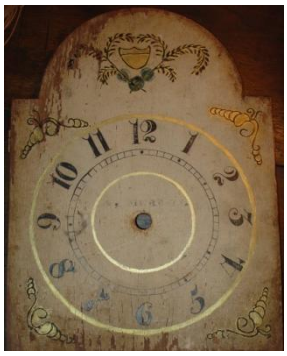
Dial group-C

Dial group-C (D-11) exhibited a smaller diameter and tighter arrangement, as well as the same numeral form as appear in group-B, but with numerals almost one-quarter taller. Additionally, marks were included for quarter hours, with the small numerals *15*, *30*, *45* &*60* appearing in a tumbled orientation. Further analysis of dial D-11 was hampered by its deteriorated condition. The templates for both dial group-B and group-C would most likely have been in use near the end of production.

Dial group-D

The two examples bearing the signature of A. Merrell in dial group-D (D-7&12) used smaller, narrower versions of the H&T numeral forms, but arrayed them in a tighter circle, with the orientation of the number *3* flipped to open upwards. Dial D-11 shows a

repositioned seconds ring on the interior of the numerals, while no remnants of the seconds ring are apparent on dial D-7.



Dial group-E

Dial group-E (D-6) maintains the scale and tighter radius of the group-D dials, but exhibits variations in the form of the lower loop of the *3*, the dimensions of the *8* and the *0*, the cap of the *5*, and the decreased width of all the numerals, especially the *1*'s. The lower shaded area of the *3*'s overlap between the two dial groups in a manner that precludes assigning the differences to wear or re-cutting; these are two related but distinct templates.

The next six groups of dials to be considered all feature a tumbled orientation of the more austere New England numerals. The increases in the width of the numerals in two of the groups may be evidence of changes in style and thus later templates. The six groups contain 14 dials with four different signatures, though ultimately, only the A. Hart, Brookfield dial (G-1) seems not to have been related to the L. W. Lewis factory in Vienna. The three variant signatures are for Hart & Truesdale, H. Cook and W, W, Ling.

Dial group-F

Dial group-F contains two matching tracings, dial B-3, signed L.W. Lewis and dial K-1, marked for W, W, Ling. Dial K-1, marked both "W, W, Ling" and "1817", is the most important dial within the study, as it represents an opportunity to use the data points and tracings to place a previously unknown signature into the Trumbull County context. The numeral tracings are an exact match with dial B-3, signed L.W. Lewis, and the clockworks (*type-3b*) are attributable to the L.W. Lewis factory. Additionally, the 1817 date places the two dials and the use of their numeral template in the earliest years of the clock industry.

Dial group-G

Dial group-G contains dials B-4, 7, 8, 12 & 21. This numeral template varies only slightly from the group-F dials, with differences occurring in the shaded areas of the *3*, *6* and *9* and the caps of the *5*'s in the quarter hour numerals. Dial B -12, marked L. W. Lewis, exhibits the only original seconds hand in the study samples. Dials B-4 & 12 were matched to *type1a* works, while dial B-7 utilized *type 1*; all are associated with the L. W. Lewis clock factory.

Dial group-H

The template used for the two dials included in dial group-H , dial B-6 marked L. W. Lewis and dial F-9 signed Hart &Truesdale, differ only slightly from dial group-G, with the *8* rendered with narrower shaded areas, and the caps of the *5*'s in the quarter hour numerals more closely matching those in dial group-G. The author believes that dial F-9 likely dated to the first two years of Hart & Truesdale's production when they may have jobbed out either the painting or the full production of the dials to the L. W. Lewis factory rather than commit to the investment needed for their own paint shop. The sharing of the features of dial groups-F & G indicates that these three templates were not

sequential, but rather that they shared a common source and that their use probably overlapped.

Dial group-I

The three examples, dials B-5,13&20, that make up dial group-I all carry the nameplate of L. W. Lewis and exhibit much wider numerals, with the *1*'s similar to those found on the Hart & Truesdale group-A dials. The slender *8* from dial group-H was carried over, and the quarter hour markings were omitted. These dials seem to reflect a style change that occurred near the end of the industry. Some small variations exist among the three dials in the shaded portions of the *2*'s,*3* & *5*; more related dials would be required to ascertain if these differences are the result of the limner's work or an additional template.

How long a template remained in use is unknown, but this change in style may hold a clue. The remaining dial from dial group-H (dial B-6) was matched to a *type 2* clockworks, as was L. W. Lewis labeled dial B-20, indicating a common production period. The dial group-H inclusion of Hart & Truesdale dial F-9 places both the dial

group-H template and by extension the *type 2* works in production during the period 1827 to 1829. This reasoning would confine the use of dial B-20's dial group-I to a period of less than 7 years at the end of the industry.

Dial group-J

Two examples, B-22 and dial L-1, makes up dial group-J. The form and arrangement of the numerals closely followed the dial group-G layout used by the L. W. Lewis factory, maker of Hart & Truesdale dial F-9. However, differences in the base of the 2, the caps of the 3 and the 5, the taper and width of the 4, and the resizing and positioning of the quarter hour numerals separate these dials from the other local examples. Dial L-1, marked "H. Cook" and "Medina", was the second nameplate included in the study with no known Trumbull County connections. The template shared with dial B-22 places dial L-1 as a probable product of the L. W. Lewis factory. The combination of the shared L. W. Lewis dial template, the match to the Hart & Truesdale *type 11b* works, and the previously demonstrated business relationship between Hart & Truesdale and L. W. Lewis argues for inclusion of the H. Cook dial as a Trumbull

County product, though the degree of involvement of the L. W. Lewis factory remains unknown.[74] The clockworks associated with dials F-9 and J-1 were discussed with the Hart & Truesdale labeled group-A dials.

Hart & Truesdale commenced business in 1827; this places the template for dial group-H in use circa 1827.

Dial group-K

A single dial signed "A. Hart", "Brookfield" (G-1) comprises dial group-K, the last of the templates utilizing tumbled numbers. The width, form and orientation of most of the numerals, particularly the slender *8*, closely resemble dial type-I, as does the omission of the quarter hour markings. The most noticeable variants are the form of the *2* with an opposing portion of the top curl shaded and a different base shape and the change from straight serifs to concave, though other significant variations are found in the shaded areas of the *3, 5, 6&9*. Additionally, both the broader form of the *1*'s and the minute ring's interior location to mimic a shelf clock may place the use of this template

[74] Ongoing research by Rebecca Rogers, Alden O'Brian from the Daughters of the American Revolution and this author has established that Lydia Loomis, a dial painter for L. W. Lewis, married Horace Cook and moved to Medina, Ohio. The *H. Cook , Medina* dial may well have been produced after Miss Loomis had left L. W. Lewis' employ.

into the last decade of the industry's production. The works classification (*type-4*) and the numeral variations, particularly the form of the *2*, confirm that this dial and clockworks are the sole example of the output of an as yet unidentified factory.

The final ten groups of dials all utilized the more austere New England style numerals displayed vertically, though three of the templates display the widening of the numerals previously attributed to changing styles near the end of the industry. Two nameplates, Wheeler Lewis and Garry Lewis, account for fourteen of the twenty dials. Of the remaining six, three were signed Ansel Merrell, one was marked for Phineas Deming, the fifth carried an L.W. Lewis nameplate and the last was unmarked.

Dial group-L

The two dials (A-1&5) that make up dial group-L both bear G. Lewis nameplates. The numeral template featured very slender shaded sections, particularly the *1*'s, *6* & *9*, a loop at the base of the *2*'s and an inverted base on the *7*. The quarter hour numerals show the largest degree of change throughout the remainder of the Garry Lewis signed dials. In these two dials the *1* in the *15* and the *4* in the *45* are set significantly lower than the

5's. These dials are nearly identical to dial group-M except for the positioning of the *45* in the quarter hour markings.

Dial group-M

Dial group-M contains a Garry Lewis marked dial (A-4) that shares all numeral characteristics with dial group-L with one exception in the quarter hour numerals. The position of the 45, approximately $^{1}/_{4}$" closer to the *9* than the group-L dials, would seem to be evidence of an error in copying an existing template.

Although dial A-1 from dial group-L (A-1&5) was designated as a *type-8* works for the Garry Lewis factory, it fell within the margin of error for Ansel Merrill dial D-7 (*type 10*). The clockworks accompanying dial A-5 carried an "AM" stamp on the end of the seatboard, indicating Ansel Merrell's involvement in its production, either as a maker or as a worker. This combination suggests that the dial group-L clockworks and dials marked for Garry Lewis originated in the Ansel Merrell factory and that dial A-1 should belong to works *type 10*.

Dial group-N

Dial group-N (A-7,8,9 & M-1) retains the basic form and position of the numerals from dial group-L, though all numerals have had the shaded sections widened. Again, this is indicative of a template in use near the end of the industry.[75] The *2*'s, 3, *5*'s, *6* &*9* all acquire ball terminations , though the *1*'s retain straight line serifs. The position of the *45* matches dial group-L, suggesting that the position of the group-M dial was an error.

All the dials from dial group-N (A-4,7,8&9) that were marked for Garry Lewis had accompanying measurements for the clockworks that matched works *type 7*; these are products of an as yet unidentified factory . The single dial group-N dial (M-1) marked for Charles Lewis matched works *type 7a*, a subset that was interchangeable with Wheeler Lewis marked works *type 9a* but without the disk on the third arbor that serves to identify the Wheeler Lewis made movements. The most likely explanation for this combination is that Charles Lewis was assembling clocks from plates sourced from the factory of Wheeler Lewis, with wheels from other factories and either manufactured or

[75] The unfinished flower in the lunette of dial M-1 provides additional evidence for the attribution of this template to the late period.

sourced the dials. The extent to which his factory functioned as an assembly shop will be explored in greater detail in the section recapping new findings.

Dial group-O

The only dial (A-2) in the dial group-O, marked with a G. Lewis signature, closely matched the layout and numeral from the dial group-N examples with two significant exceptions. The numeral 5 was rendered taller and with less slant and the straight serifs on the *1*'s were replaced with concave serifs, perhaps reflecting the influence of the Hart & Truesdale style numerals. Dial A-2 was matched to the lone *type 6* works in the data group. This would seem to be the only example of a clock from another as yet unidentified factory.

A second possibility exists for the source of dial A-2. A small enlargement of the top of the right top hole would make this dial interchangeable with a Wheeler Lewis type 9 works. The lack of accompanying clockworks for A-2 precludes any further attribution.

Dial group-P

The next two dials to consider, dial group-P, were marked for Ansel Merrell (D-1) and Phineas Deming (I-1). The numerals and spacing were nearly identical to dial group-S with minor variations to the shaded portion of the *3*, a much shorter cap on the *5*, the taller form of the *6*, the simpler cap for the *7*, and a more upright *5* in the *45* quarter hour mark. This template's use dates to the mid-to-late 1820s when both had factories, with Merrell continuing into the early 30's.

Ansel Merrell dial D-1 was matched to a *type 10a* works, attributed to the Ansel Merrell factory. However, the Phineas Deming signed dial (I-1) matched a *type 5* works which is statistically compatible with L. W. Lewis *type 1*. This raises the question as to whether the Deming factory manufactured clockworks or bought works and assembled clocks from parts produced by others. The most probable explanation for the common dial source would have been that the Phineas Deming factory produced dials and assembled clockworks with bartered Ansel Merrell wheels. However, the possibility exists that the Deming factory may have sourced plates and/or completed movements from the L. W. Lewis factory. A further discussion of these alternatives will be included in the concluding analysis.

Dial group-Q

Ansel Merrell dial D-3 has been designated as dial group-Q, with numerals that were rendered in the narrow form associated with the early and middle years of production. Dial group-Q and the closely related template for dial group-U were certainly the oddest dial templates in the study. The form of the base of the *2* has been simplified, and the caps of the *3* and the *7* have been rendered with flat tops. All the numerals in the group-Q template have been elongated, with variations ranging from $^{1}/_{8}$" for the *6* to nearly $^{1}/_{2}$" on the *2*'s and the *9*. The radius of the numeral band was increased a little more than $^{1}/_{4}$" when measured side to side, but less than $^{1}/_{8}$" from top to bottom , with the minutes ring in the traditional position.

Dial group-R

All but one of the signed dials in the next three groups bear the nameplate of Wheeler Lewis. That exception, dial B-14 marked for L. W. Lewis, is one of three dials (B-14, C-8 & 10) that make up dial group-R. These dials share virtually all characteristics with dial group-L dials except for an altered position of the *45* in the quarter hour mark that shifted the numerals downward $^{1}/_{8}$"and a slightly smaller cap for the *5*. A possible explanation for the shrinking caps on the *5* is that when transferring a pattern from the template to a clock dial, the pencil lines will always fall within the open area being outlined, resulting in the copied section being slightly smaller than the template. If this method was used to transfer the numeral patterns to successive templates without allowing for this variance, successively smaller open sections and thinner numerals with smaller caps would result. The template for dial group-R seems to be a later generation copy of the dial group-L template. The altered position of the 45 in the quarter hour marks is consistent with a slight rotation from the center axis caused by the template slipping. The clockworks for dial C-8 were classified as *type-3b*, while those associated with B-14 were assigned to *type-1b*. These two movements share no data points and the values in columns B, C & D do not move together, indicating that they are products of two different factories with a shared a dial source, most likely the factory of Wheeler Lewis. Dial C-10 provided no movement information due to a missing upper cleat.

Dial group-S

Dials C-2, 6, 9, 14 & X-1, all classified as dial group-S, closely follow the numeral placements and form of the dial group-R dials. The *5* in the hour numerals is taller and more upright. The *5*'s in *15* and *45* in the quarter hour markers are rendered smaller with the *4* located lower than the *5*. Some touch-up work to the numerals on dial C-9 may be responsible for a slightly larger cap on the *5* in the hours ring.

Dial group-T

This pair of dials, (C-1 & 5), bears the nameplate of W. Lewis and are designated as dial group-T. The template for these dials differed slightly from the group-S dials, with variations in the shaded areas of the *2*'s and the *9*, as well as a slightly larger, higher cap for *5*.

Dials C-1 & 5 from dial group-T and dial C-9 from dial group-S are all assigned to works *type 9*, while dial C-14 was assigned to *type 9a*. All are certain to have been

products of the Wheeler Lewis factory. Dials C-2 & 6 may also be assumed to be products of this factory, though the source of the clockworks cannot be established due to missing top cleats. [76]

Dial group-U

Dial D-9, labeled as dial group-U, carries the same proportions for all numerals as group-Q except for the use of concave serifs, the shaded section of the top loop of both *2*'s and an error to the base of the "two o'clock" *2* with the shaded portion positioned beneath the correct bottom line, resulting in a *2* nearly $^{3}/_{4}$" larger than other New England derived dials. Additionally, the minute ring was repositioned within the numeral band in the manner of a shelf clock. Both group-Q and group-U dials would seem to date to the end of the industry when decreased demand and the accompanying cost pressure were supposedly reflected in poorer quality products. The group-U dial certainly displays a carelessness in the ink work.

Conversely, dial D-3,the most finely decorated Trumbull County dial in the study, was executed for James Scott of Warren using the related template. The degree of

[76] No clockworks information was available for dial group-E dials C-2 & 6; cleats for both dials were either missing or altered.

decoration, as well as the appearance of the name J. Scott on the dial, marks this clock as a special order, though it seems as likely that it was made to satisfy a debt as a commission.

The combination of the attachment points on the dial back with the numeral templates resulted in the identification of Garry Lewis dial A-2 and A. Hart dial G-1 as the products of two of the as yet unidentified local factories. The three dial marked for Garry Lewis from dial group-N (A-7, 8 & 9) were demonstrated to have been products of a third as yet unidentified factory. Though marked for Charles Lewis, the unfinished dial M-1 matched the Garry Lewis dials from group-N. However, since the clockworks had been assembled with Wheeler Lewis plates and unidentified wheels and pinions, it seems unlikely that Charles Lewis was manufacturing any parts, instead utilizing the remaining stock of the failed factories. This line of reasoning leaves open the possibility that Charles Lewis had previously been operating a dial shop and that his operation may have been the source for the Garry Lewis marked group-N dials. [77]

The clockworks for the unmarked dial (X-1) were initially classified as *type 7a* and associated with the Garry Lewis factory. However, inspection of the clockworks found a disk on the third arbor of the time side, a characteristic of the Wheeler Lewis factory. Combining the clockwork's reclassification as works *type 9a* with the dial group-E designation places the Wheeler Lewis factory as the source for dial X-1. A subsequent re-evaluation of the G. Lewis marked dial A-4 resulted in its re-assignment to the Wheeler Lewis factory as well.

---

[77] The insight into the existence of unused or substandard stock comes from unpublished research by Rebecca Rogers.

A seatboard stamp on dial A-5 with a *type-8* clockworks of led to the attribution of both Garry Lewis marked dials A-1 & 5 to the factory of Ansel Merrell factory and a reclassification of the works as *type-10*. This reclassification resulted in the attribution of the lone group-M dial, A-4, to the Ansel Merrell factory as well.

The numeral template information, coupled with the data points, established that the dial marked W. W. Ling (K-1) was a product of the factory of L. W. Lewis. The dial template information and attachment points also demonstrated that both dial F-9 labeled for Hart & Truesdale and dial L-1 signed for H. Cook used clockworks that were made by Hart & Truesdale, but utilized dial templates associated with the L. W. Lewis factory. This relationship will be examined in greater detail in the discussion of the use of the dial templates to help establish relationships among the various factories and assembly or dial shops.

The emergence of repeating patterns within the *works type* data and the *dial group* samples serves to validate the methodology employed to generate the information. The measurements generated from the attachment points on the dial backs revealed subtle differences that not only separated the samples by factory, but by batches within that factory's output. The comparisons of dial tracings revealed both the existence of dial templates and the manner in which they functioned. These discoveries allowed the dials to also be separated into production batches, though, unlike the *works type*, the *dial group* batches are not always assignable to a single factory's output. These combinations of *works types* and *dial groups* provide for an artifact based examination of the wooden clock industry.

Chapter IV

Having completed the compilation of the data from the dial backs and faces, a restatement of the initial goals follows, with an examination of each as to the usefulness of the preceding analysis. The most important question asked was "simply whether the templates the factories used to drill the pillars and pivots were varied enough from one another in layout and construction to provide a discernible difference in the measurements." The answer seems to be “yes,” but with smaller and more numerous variations than anticipated.

Three discoveries within the results, all unexpected, made grouping of the data points as much art as science. The first was finding change over time within a factory's output. Five different but closely related movement types (*1, 1a, 1b, 2* & perhaps *3a*) were all produced by the L. W. Lewis factory over its near twenty year existence. Other factories with short periods of production such as Wheeler Lewis' displayed less variation. This made the second discovery, a large degree of inconsistency in the Ansel Merrill factory's output, very surprising.[78] Throughout the depositions, Merrell was consistently credited with making the best Waterbury movements, and yet the three movement types (*10, 10a* and perhaps *8*) that have been assigned to his shop could only be grouped by applying the maximum values for the margin of error inherent in the measuring system. It is possible that the *type 8* movement could be construed as

---

[78] *Depositions Taken in a Civil Court Case of Lambert W. Lewis, Pardon Sherman, Noahdiah Webster vs. Garry Lewis in Chancery, as Heard in Appeal to the Ohio Supreme Court: Twenty eight depositions contained within, spanning May 23, 1834 to November 12, 1834*. private collection, Poland, Mahoning County, Oh. Hereafter referred to as *Lewis v Lewis.*
Lewis v Lewis, deposition of : Ogden Combs (June 12, 1834).

evidence of yet another factory, but the lack of closely grouped data points in the rest of Merrill's output would make such a conclusion unsupportable.

The third and most important realization was that each of the local factories acquired its technology by copying a competitor's product, just as it is likely that the first Trumbull County maker copied a New England maker's work. Though it may not be known which local factory was operating first, it seems likely that the ensuing factories used movements that were copied from that first factory's output. The exceptions are Hart & Truesdale and possibly the unknown factory that produced dial G-1 for Ambrose Hart; they copied someone else. It may well be that the small variations existing from factory to factory are not due to design but rather to a technological inability to create an exact copy of the drilling template.

This clock dial analysis was undertaken to gain an understanding of the clock industry by interpreting the objects. It was expected that the combinations of dial measurements, signature blocks, and numeral templates could be interpreted to yield:

1. An estimate of the number of factories represented;
2. Which factories may have been simply assembly shops;
3. Whether or not a factory's dials were lettered in-house or jobbed out;
4. Which factories manufactured clocks for merchants released "in their name";
5. Ownership changes based on commonality of patterns;
6. A chart or charts with the characteristics that can be used to place unsigned dials into context by assigning them to a specific factory.

The first two points, the number of factories and which may have been assembly shops, are related and will be explored concurrently.

A total number of fifteen individuals and/or factories are represented by the dial samples and the information culled from the court depositions. The nameplates taken from the clock dials include Lambert W. Lewis, Wheeler Lewis, Charles Lewis, Garry Lewis, Ansel Merrell, Phineas Deming with Thomas Lewis, David R. Hartson with William Hartson, Hart & Truesdale, Hart & Way, Ambrose Hart and W. W. Ling. Four additional names were added from the depositions; Tyler & Hummason, Asa Scoville, Abraham Lewis and Levi Lewis. However, these fifteen names do not represent fifteen facilities. Hart & Way was a short term successor to Ansel Merrell and so must be considered as the same shop. Ambrose Hart was a merchant who purchased clocks from others; both H. Cook and W. W. Ling likely belong in this category as well. Garry Lewis functioned as a merchant who purchased clocks from others, but the question of the factory "said to belong to Garry Lewis" remains. No other mention of Garry Lewis' involvement in production or factory ownership occurs within the depositions, though as a principal in the litigation, his business and personal conduct were addressed by nearly every witness. It is the author's opinion after studying the twenty-eight surviving depositions that any ownership in a factory was most likely a finishing shop making and fitting dials to purchased works or a minor financial stake in an existing factory. Excluding Garry Lewis from the list of operators leaves eleven factories to consider.

The shop of Asahel Scoville can also be removed from the list by further narrowing the definition of a factory to a shop that possessed a wheel cutting machine. In depositions related to the lawsuit between L. W. Lewis and Garry Lewis, two witnesses stated separately that Asahel Scoville used wheels from Ansel Merrell and L.W. Lewis to create clocks that he peddled himself.[79] Additionally, Charles Lewis seems to have been an assembler, not a manufacturer and as such is excluded from the list. This reduces the factory list to nine.

Four factories can be proven to have possessed a wheel cutter : the Lambert W. Lewis and Ansel Merrell factories both sold wheels to Asahel Scoville; the Wheeler Lewis factory created wheels with a disk on the third arbor of the time side; and Hart & Truesdale, whose factory used a Plymouth style layout with wheels that were not interchangeable with the other local factories. [80] All but Hart & Truesdale could have sold the wheels that they produced to the other factories. Interestingly, these are the four large firms which appear with clock factory entries in the 1832 tax assessment[81].

Evidence for the other factories is less clear. The deposition of Orrin Johnson suggested the production of wheels with the statement that he worked "at clockmaking and made all the parts" while employed by the firm of Tyler & Hummason.[82] Orrin Johnson also worked "in Company with" Abraham Lewis for 5 years, yet no examples are known that are attributable to the Abraham Lewis factory. [83] Signed dials survive for

---

[79] *Lewis v Lewis*, deposition of : Norton Wheeler (June 12 , 1834), Rosewell Scoville (June 18, 1834) and Asahel Scoville (November 12, 1834).
[80] *Lewis v Lewis*, deposition of :Rosewell Scoville (June 18, 1834).
[81] Trumbull County, Oh, Real Estate and Personal Property Tax Ledger, Warren, Trumbull County, Oh., (1832) 55, 141, 141 &229.
[82] *Lewis v Lewis*, deposition of : Orrin Johnson (June 17, 1834).
[83] *Lewis v Lewis*, deposition of : Orrin Johnson (June 17, 1834).

both the Phineas Deming's and M^{c}Masters, Hartson & co.'s factories, though only the Deming dial was made available for measurement. Still, some relationships may be inferred.

The Phineas Deming signed dial (I-1) shared a dial group-P template with Ansel Merrill dial D-1 but was the only *type-5* works in the sample. The author contends that the most likely possibility is that the Deming factory lacked a wheel cutting apparatus and traded Ansel Merrell produced clock wheels and pinions for Deming made and decorated dials. This line of reasoning places the Phineas Deming's facility on the list of assembly shops along with Asahel Scoville and Charles Lewis.

A visual inspection of the photograph of dial J-1 labeled for D. R. Hartson does not reveal a near-matching template in the dial sample, suggesting that it was not related to the other factories' products. William Hartson identified himself in his deposition with "my occupation is that of clockmaker." [84](8) Absent any further information on the dials back, dial J-1 must be assigned to the factory of McMasters, Hartson & co. and assumed to be the sole example from that factory, though no assumptions can be made regarding the possession of a wheel cutting machine.

Three factory operators remain without identifiable examples: Abraham Lewis, Tyler & Hummason, and Levi Lewis. Three unidentified movement and dial combinations were established through the analysis of dial fronts and backs: dial G-1, dial group-K, works *type-4* marked for Ambrose Hart; dial A-2, dial group-O, works *type-6* marked for Garry Lewis; and dials A-7 & 8, dial group-N, works *type-7*, also marked for Garry Lewis. Though there is currently no way to match the dials to specific

[84] *Lewis v Lewis,* deposition of : William H. Hartson (May 23, 1834).

factories or to establish the possession of wheel cutting engines, it seems likely that these dials represent the products of these three previously undocumented factories[85].

The third goal of this analysis, to establish whether a firm's dials were produced in-house or jobbed out, has proven to be quite elusive. The dial analysis yielded twenty-one different dial templates, some showing distinct style differences while others displayed only minor variation. However, no reliable way has been discovered to assign the dial's production to the factory or a dial shop.

An example from the data analysis shows that Garry Lewis purchased clockworks from at least four factories, with the depositions adding L. W. Lewis as a fifth source. Excepting the salvaged Charles Lewis signed dial, the dial templates used appear only with a G. Lewis nameplate and each template appears only on the output of an individual factory. But, other than the order of clocks specified in the depositions, no information can be gleaned as to whether any of the dials may have been produced in a Garry Lewis shop, an independent shop, or by the firms that created the clockworks. Thus, a slightly different goal must be substituted; to use the dial templates to help establish relationships among the various factories and assembly or dial shops. This also aids in the exploration of the next two goals: which factories manufactured clocks for merchants released "in their name," and can ownership changes be inferred from commonality of patterns.

An understanding of the processes and construction that created the dials is required in order to place the dial templates' use into the proper context. The statements

[85] Despite the lack of a matching dial template, it can be argued that one of these three works types could have been a product of McMasters & Hartson as no measurements of the D. R. Hartson dial were available to exclude the possibility.

found in the depositions that relate to the decorating and lettering of the dials all treat dial production as four separate processes, and imply that each process is the responsibility of different workers. One again, the deposition of Charles Lewis provided the necessary information. In describing the ornamenting of a "good common face," Charles Lewis stated that it "should be painted with white lead and oil in sufficient quantity to make a good and smooth ground work for the ornamenting." [86] The next two steps were to ornament it "with plain, natural figures or flowers" and then to "figure(d)" it "in such a manner as to tell the time by the clock." Finally, it should be "varnished with a good clear varnish to secure the ornamenting on the face." By considering each of these processes individually, it should be possible to create a more complete picture of the inner-workings of the industry.

The first process, laying the ground-work was among the topics of inquiry involving factory employee Orrin Johnson. When asked "How many coats of ground work or paint was it necessary to put on clock faces to make good well finished common clocks," he answered "about eight to ten" and later stated that "It is necessary to be ground down with pumice stone after the paint is put on and before it is ornamented." [87] This portion of the dial-making process seems to have occurred on-site and was performed only by the male employees of the factory.

The depositions provided clues to the existence of paint facilities for applying groundwork for at least three of the firms, the shop of Charles Lewis and the factories of Phineas Deming, Lambert W. Lewis, and Wheeler Lewis. Orrin Johnson's statement that

---

[86] *Lewis v Lewis*, deposition of : Charles Lewis (June 18, 1834).
[87] *Lewis v Lewis*, deposition of : Orrin Johnson (June 17, 1834).

he had "worked at Thomas Lewis and Deming's factory in Vienna" establishes Thomas Lewis' link to the factory.[88] In his own deposition, Thomas Lewis stated that in the last seventeen years he" had painted or caused to be painted fifteen to twenty thousand (dial blanks). [89] These two bits of information certainly suggest that the Deming factory produced its own dials.

Clues to the source of the L. W. Lewis factory's dials can also be found in the depositions, though they establish the existence of the facility to paint clocks and not the painters. The statement of Henry Stiles notes the "small factory" located "about 10 rods distance" from the "factory in which he makes the parts of the clock."[90] This same building was referred to as the "ground-work shop near the factory" by Morgan Hart. [91] Charles Lewis' explanation of a ""good common face" to a wooden clock" states that "it should be painted with white lead and oil to make a good and smooth ground work" and that "the ground work should be white."[92] The "ground-work" building was the paint shop, separated from the dust and dirt of the cutting, turning and planing operations of the factory.

No evidence has yet been found to establish the existence of painting facilities for the remaining factories, though the author believes it likely that the larger producers, Hart & Truesdale, Abraham Lewis and perhaps Ansel Merrell would have constructed a facility. The deposition of Charles Lewis contained the statement "It is the practice of all to put something in to make the paint dry well and make the ground work sufficiently

---

88 *Lewis v Lewis*, deposition of : Orrin Johnson (June 17, 1834).
89 *Lewis v Lewis*, deposition of : Thomas Lewis (June 4, 1834).
90 *Lewis v Lewis*, deposition of : Henry Stiles (May 31, 1834).
91 *Lewis v Lewis*, deposition of : Morgan Hart (November 12, 1834).
92 *Lewis v Lewis*, deposition of : Charles Lewis (June 18, 1834).

hard, I generally use varnish and drying oils, " identifying him as a producer of dials, though it is unclear as to where he performed the work[93] Even the one man shop of Ashael Scovill seems to have made his own dial blanks, though possibly made to trade for the wheels and pinions received from Ansel Merrell.[94] It appears likely that in each case, the ground work was applied at the main factory. Much less can be inferred regarding the second step, ornamenting.

In Orrin Johnson's deposition, he described the types of clock faces: "I should say there was three kinds or three qualities: the best quality is raised leaf faces and some are made with yellow paint in imitation of gold leaf and common plain faces without any raised work or leaf on but ornamented with flowers," and "some of the faces have silver leaf on them." [95] The cost of each variety apparently increased by grade as gesso with gold, silver or bronze leaf were the most expensive, followed by gesso with or without gold paint. Common faces that lacked both gesso and metallic leaf were noted as being the standard in 1833, though not as good as those made two or three years before, a likely casualty of the declining fortunes of the clock industry.[96]

No individual in the depositions mentioned who created the ornament or where the work took place, an omission that can be interpreted to mean that males were not performing the work. Whether these female decorators always worked on-site, in another shop or at home probably cannot be known.[97] The diary of Candace Roberts, a tin painter

---

[93] *Lewis v Lewis*, deposition of : Charles Lewis (June 18, 1834).
[94] *Lewis v Lewis*, deposition of : Roswell Scoville (June 18, 1834).
[95] *Lewis v Lewis*, deposition of : Orrin Johnson (June 17, 1834).
[96] *Lewis v Lewis*, deposition of : Thomas K. Ballard (June 19, 1834).
[97] Often, a number can be found scrawled on the dial back in red or black crayon, perhaps indicating a piecework payment system for tracking work.

from Bristol, Connecticut records her father sending her away to live with clockmaker Eli Terry and paint dials for two and three month periods.[98] In the *Trumbull County Clock Industry 1812-1835*, Rebecca Rogers notes nine young women living in the Lambert W. Lewis household, most assumed to be dial painters.[99] Rogers lists the names of three painters, Lambert's daughter Hannah, a Mrs. Phila Nowling, and a Mrs. Wiliam Wiliams before her marriage. The diary of Sylvia Lewis Tyler supplied two additional possibilities in her entry from February, 1820: " Two Miss Loomiss & their brother came from Charlestown & stayed here wanted to paint clock faces."[100] A final name, Electa Jones Bushnell, is included without proof, only the author's suspicion. Born 1808, she lived immediately south of the clock factory. Her age, 18 years old when the Hart & Truesdale factory began, her proximity to the factory, and two small signed oil paintings with her signature that have remained with her house hint to a possible involvement. Absent the names and locations, only the ornament itself can provide the clues to this segment of the industry.

Though the artwork in the spandrels and lunette is outside the focus of this inquiry, a few observations are included. The first observation is to note the re-occurring themes in the lunettes. Seventeen patterns account for forty-four of the eighty-two dials with lunette paintings, nearly 54%. These images appear multiple times, but with widely varying quality, suggesting the use of multiple decorators referencing a book, pattern

---

[98] *Diary of Candace Roberts: 1801 - 1806*, The Bristol Public Library, Bristol, Ct.. Transcription by Maumee Roberts, 1946. unpublished, (February 26, 1806 & June 10, 1806).

[99] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990), 17.

[100] *Diaries of Sylvia Lewis Tyler: Volumes for 1818, 1819 & 1820 only*, NSDAR Americana Collection, acc. 2899, Washington, D.C.. Transcription by Alden O'Brien, 2000, (February 8, 1820).

folder or other source. The same compositions often appear with different maker's signatures, further evidence of commonality of the pattern sources.[101] The diary of Sylvia Lewis Tyler whose husband and brother were by 1818 active in the local industry suggested a source when she noted in the entry for March 29 of 1820 that "Diana Lewis came & took drafts of clock faces & some books."[102] One Wheeler Lewis marked dial, (C-4), featured a large Georgian influenced building which had been copied directly from the 1805 builder's handbook *Biddle's Young Carpenter's Assistant*.[103] Other, less obvious sources were also available. Thirteen of the locally decorated dials carry scenes similar to those illustrated in the Romantic literature of the period. These scenes, as noted in *American Painted Tinware*, were often applied to the English transferware pottery.[104]

In contrast to the copybook-like nature of the lunettes, the spandrels are somewhat fanciful and their repetition over several dials may provide a sort of decorator's signature. By way of an example, dials B-19, B-20 and dial A-4 carry similarly executed animals in the lunettes and nearly identical spandrels. The spandrels in all three dials indicate that the painter turned the dial 90^0 after executing each section, but the elements in dial A-4

---

[101] Dials B-3, A-5, F-6, and C-7 all feature an identical basket with one large distinctive flower; unfinished dial M-1 carries the basket and foliage, but omits the flower. These dials represent five different nameplates and clockworks from at least 4 different sources.

[102] *Diaries of Sylvia Lewis Tyler* (April 14, 1820).
One possible interpretation of "took drafts" is that she took time sketching or tracing sources.

[103] Owen Biddle, *Biddle's Young Carpenter's Assistant; or, A System of Architecture Adapted to the Style of Building in the United States* (1805, Reprinted with forward and spelling corrections, Mineola, NY, Dover Publications, Inc., 2006) 84.

[104] Gina Martin & Lois Tucker, *American Painted Tinware, A Guide To Its Identification*, in four Volumes (Cooperstown, NY., Historical Society of Early American Decorations, Inc., 1997), *xix*.
These earthenwares accompanied the well-to-do settlers to the Western Reserve, their presence in the region confirmed by shards of transferware and other imported earthenware vessels found locally and in possession of the author.

are reversed and repositioned, likely indicating at least two different painters, one likely left-handed.

Raised work using gesso, a combination of hide glue and chalk, added to the expense of creating a dial. Gesso appears on 72% of the dials (61 of 85), with different rates of use for each nameplate. Lambert Lewis, whose factory operated nearly twice as long as any other, included gesso work on 16 of 23 (69%) of the dials contained in this sample. Wheeler Lewis and Ansell Merrell incorporated gesso on 81% and 71%, respectively, of their labeled dials. All of the surviving Hart & Truesdale dials contain gesso ornament, while only 50% Garry Lewis dials were embellished.[105] Of the three dials released without a nameplate, two were decorated without gesso.

Because the decision to use raised gesso work added significantly to the time, and expense of the decorating process, its use likely declined with the mature industry. None of the 545 clocks referenced in the 1834 Civil Court depositions were decorated with either gesso or leaf. [106]

Though the use of gesso to form the minute markers was common on the better quality dials, its use calls into question the decorating sequence related by Charles Lewis. The raised work had to be completed prior to the painting and ink-work, but its use for the minute markers required that the numeral layout and chapter rings were already in place. Thus, the penciled numeral template must have been applied immediately after the ground coats and before decoration. The artist who later applied the ink-work simply

---

[105] Of the single issue dials, only the D. R. Hartson signed dial J-1was created without gesso ornament.
[106] *Lewis v Lewis*, deposition of : Norton Wheeler (June 12, 1834).

followed the pencil outlines. This places the templates' use either with the factory or dial shop prior to the artists receiving the dial blanks. [107]

Finally, contrasting the inconsistency of the artwork with the quality and consistency of the dials' ink-work suggest a large pool of artists decorating the dials, but a limited number of individuals executing the ink-work.

The ink-work that constituted the numerals and chapter rings also exhibited less variation owing to the use of the templates. The inclusion of balls on the serifs seems to have been an option for the artist as evidenced by dial group-I's use of both methods. This author believes that these balls would have been included on each of the templates to indicate the ending point for the serifs, regardless of whether the artist chose to use them. Another variant by the artists occurred in the dial group-A dials signed for Hart & Truesdale. The number 2 was rendered in two different manners, one continuous and the other broken into two segments. The template's open area remained the same, but the artists applying the ink-work used different techniques to render the numeral.

The nameplate was probably applied at the same time by the artist applying the ink-work to the numerals. Much of the testimony in the depositions revolves around alleged damage that occurred to the dials during the hastily arranged moving of the clocks from the L. W. Lewis factory in Vienna to the storage room of Harmon and Stiles in Warren. [108] These dials had not been packed for shipping, a process that involved "turn(ing) buttons and put(ting) it in the center holes between the faces. Then wire the

---

[107] This is another possibility for the "clock drafts" picked up by Diana Lewis; the previously stated possibility was copying or tracing dials and illustrations; there is the possibility that the drafts were dial blanks with the pencil layout applied. Thus she took books plus clock dials that had already been prepared.

[108] *Lewis v Lewis*, deposition of : Nathan Beach Lewis (November 12, 1834).

cleats so that the faces cannot touch each other and when packed that way they may be carried any distance without injuring," though the exact meaning of his "wire the cleats" instruction was not supplied.[109] However, remnants of the wiring to connect the cleats were discovered in dial C-5, leading to the identification of small holes in the ends of the cleats of all dials that had been packed for shipping.[110] No dials have been examined that contained marks to indicate that they were ever unpacked and then repacked, indicating that the nameplates were applied prior to being packed and leaving the facility.

The problem with damage inflicted to the clock dials by attempting to move them without proper packing would certainly have arisen if the dial's decorating and ink-work were executed in a home rather than in the factory or shop. Clockworks, however, could easily be moved from factory to shop. This line of reasoning leads to the conclusion that a company's decorating and ink-work were not jobbed out for at home work, but rather done entirely at one site, whether in a factory or an assembly or dial shop. If so, it is highly possible that the works might be produced and packed at the factory while the dials were decorated and packed at another site.

Continuing the analysis of the use the dial templates, each factory's output can now be used to infer relationships among the various factories and shops to ascertain the source of their dials. This allows for the simultaneous consideration of questions 4 and 5: which factories manufactured clocks for merchants "released in their name" and are there ownership changes that can be observed based on commonality of patterns?

---

[109] *Lewis v Lewis*, deposition of : Thomas Lewis (June 4, 1834).

[110] The origin and significance of these shipping marks will be discussed in the section comparing the conclusions of this paper with Rogers' *Trumbull County Clock Industry, 1812 - 1835.*

The dial analysis data assigned *type 1*and *1a* works and dial groups-G and I solely to the L. W. Lewis factory. Works *type 1b* have been attributed to the L. W. Lewis factory as well, though dial B-14 (dial group-R) was a product of the Wheeler Lewis factory. The *type 2* works and dial groups-F and H were also shared. L. W. Lewis marked dial B-3 shared its dial group-F designation with dial K-1 marked for W. W. Ling. This dial and the accompanying *type 2* clockworks have previously been demonstrated to have been a product of the L. W. Lewis factory. The Hart & Truesdale labeled dial F-9 shared its dial group-H designation with L. W. Lewis labeled dial B-6 which utilized a *type 1* works assigned only to the L. W. Lewis factory. This combination marks the L. W. Lewis factory as the most likely source for the Hart & Truesdale labeled dial F-9, though the clockworks were manufactured by Hart & Truesdale.

Dial M-1, labeled for Horace Cook of Medina also matches an L. W. Lewis affiliated template (dial group-J) and carries Hart & Truesdale works, though the relationship to the L. W. Lewis factory is less certain. In 1824, Horace Cook married Lydia Loomis, a dial painter who worked for several years for L. W. Lewis.[111] At the time of her marriage, Loomis sued L. W. Lewis for $100 in wages owed, probably indicating the end of her affiliation with the Lewis factory. Though it cannot be established that she painted the Cook labeled dial after her employment in the Lewis factory ended, it seems likely. The clockworks that accompany the Cook labeled dial could not have been produced prior to 1827 when Hart & Truesdale commenced

[111] Ongoing research into the *Sylvia Lewis Tyler Diaries* by Rebecca Rogers, Alden O'Brian from the Daughters of the American Revolution and this author has established that Lydia Loomis, a dial painter for L. W. Lewis, married Horace Cook and moved to Medina, Ohio.

production.[112] This suggests that Loomis not only painted the dials for her husband to market with the Hart & Truesdale made clockworks, but that she had possession of the dial template formerly used in the L. W Lewis factory. Possession and use of the template would seem to indicate that Loomis executed the pencil layout, the application of the gesso and leaf, the painting of the lunette and spandrels, and the final inkwork, though the person who provided the application of the groundwork cannot be inferred.[113]

All clockworks accompanying the Wheeler Lewis marked dials fell into the category of *type 9* & *9a* works. Additionally, unmarked dial X-1was matched to a *type-9a* dial, while A-4 marked for Garry Lewis carried a *type-9* works. The dial templates assigned solely to the Wheeler Lewis factory include dial groups- B and T, with dial group-S shared with unmarked dial X-1 and dial group-R shared with L. W. Lewis marked dial B-14. The matching *type-9a* works and dial group-S designation prove the unmarked dial was produced by the Wheeler Lewis factory. The type-1b works assigned to dial B-14 have been attributed to the L. W. Lewis factory, indicating that the Wheeler Lewis factory sold dials to Lambert. The Garry Lewis marked dial A-4 carried Wheeler Lewis factory clockworks, but as no other dial group-O dial was included in the sample, no conclusion can be reached as to whether this dial was a product of the Wheeler Lewis

---

[112] *Azel Tracy Account Book, 1818 - 1860*, private collection, Hartford, Trumbull County, Oh. Xerox copy on file Trumbull County Library, Warren, Ohio, 190.

Tracy, a cabinetmaker and wheelwright, had worked for Robinson Truesdale in the fall of 1827, the initial year of production for Hart & Truesdale.

[113] The groundwork carries a distinctly different color as compared to other H & T dials, though inconsistencies in the raw materials used to make the paint can vary the color, rendering it an unreliable indicator. Color alone is insufficient to conclude that the groundwork was not applied by Hart & Truesdale.

Her possession of a template raises the possibility that the Hart & Truesdale dial F-9 might have been the work of this former L. W Lewis employee, rather than a product of his factory. The variation in the style of the decoration and the form of the numerals on these two dials leads this author to believe that to be unlikely.

factory or of another assembly or dial shop. Dial A-4 will be reconsidered later within the context of Garry Lewis' business dealings.

The firm of Hart & Truesdale was the only local producer that utilized the Plymouth style clockworks. *Type 11, 11a & 11b* clockworks were all produced in their factory in Hartford. All but one dial, F-9, was produced in the Hartford factory. Dial F-9 was produced by L. W. Lewis' factory for Hart & Truesdale on dial blanks that were set up for Hart & Truesdale clockworks. It is the author's supposition that Hart & Truesdale's use of another factory for dial production probably dates to the first years of their factory's production, prior to investing in a separate building for painting.

The clockworks produced in Ansel Merrell's factory have been assigned to works *types-10 & 10a*. Though it was statistically compatible with Ansel Merrell produced *type-10* clockworks, a *type-8* works classification was initially assigned to Dial A-1 marked for Garry Lewis. It was the only dial assigned to works *type-8*. Dial A-1 shared dial group-L with one other example, dial A-5, which was not made available for measurements. However, an inspection of the clockworks associated with dial A-5 revealed an "AM" stamped on the seatboard of the works indicating Ansel Merrell as the maker. This stamp allows for the reclassification of Dial A-1 to Ansel Merrill works *type-10* and the assignment of the clockworks of both dials A-1 & 5 labeled for Garry Lewis to the factory of Ansel Merrell. The dial group-L associated with dials A-1 & 5 cannot be assigned to the Merrell factory with any certainty as it has appeared only with the Garry Lewis nameplate and may have been used solely by him.

Dial group-P contains both the Ansel Merrell labeled dial D-1 with a *type-10a* clockworks and the Phineas Deming labeled dial I-1 which is matched to the only *type-5* works in the sample. Though there is a common dial source, it remains uncertain as to whether the dials were produced by Merrell's factory, Deming's shop or an unknown dial shop. It is the author's opinion that the most likely combination is the Deming factory functioning as an assembly shop that also made dials, most likely trading dials for Merrell made clock wheels. The Ansel Merrell labeled dials from dial groups-J, L, M & N appeared with *types-10 & 10a* clockworks and were not shared with any other firms. Absent any evidence to the contrary, these dials are assumed to be the product of the Ansell Merrell factory in Vienna.

Dial H-1 marked for the firm of Hart & Way was not made available for tracing or measurement. However, a visual inspection matches the template to Ansel Merrell dial D-6, an anticipated outcome. Hart & Way advertised in September of 1831 that they had "purchased the interest of Ansel Merrell in the Clock Factory" and "intend to carry on business upon a large scale."[114]

Garry Lewis sourced clockworks from the factories of Ansel Merrell, (dials A-1, & 5 with *type 10* works), Wheeler Lewis (dial A-4 with *type 9* works), and two factories that remain unknown. (dial A-2 with *type 6* works) & (dials A 7 & 8 with *type 7* works) The fact that each works type was matched to a specific dial group and that each of these dial groups only appear with a Garry Lewis nameplate suggests that Garry Lewis sourced all clockworks but exercised some control over the manufacturing of the dials. This may

---

[114] W*arren (Ohio) The Western Reserve Chronicle: 1816-1921*, The Trumbull County Public Library, special collections, microfilm, Warren, Oh., (10/13/1831).

well be the source for Thomas Ballard's deposition remark regarding a "factory said to be owned by Garry Lewis."[115] The depositions also addressed Garry Lewis' contract to purchase clockworks with dials from the factory of L. W. Lewis. It is not known if these dials bore a nameplate, though the deposition of Morgan Hart, one of Lambert Lewis' workmen, contained the lawyer's question "Did you not say to Benjamin N. Scovill ..... that the clocks then on hand at L. W. Lewis's Factory were designed for Garry Lewis," suggesting that these dials may have been marked.[116]

The only dial that shared a template with a marked G. Lewis example was unfinished dial M-1 marked for Charles Lewis, a part of dial group-N. The *type-7a* movement accompanying dial M-1 seems to have been assembled from parts from other factories. As his listing by Rogers shows him as the last maker operating, these parts were likely the left over materials from the defunct local factories rather than newly fabricated parts.[117] The Charles Lewis shop may, however, have previously been the source for the dial group-N dials marked for G. Lewis. Charles Lewis stated in his deposition that " I generally use varnish and drying oils" when applying the groundwork to the dial blank, certainly an indication that his shop was producing dials.[118]

No definite assignments can be made for the factories of Levi Lewis, Hummason & Tyler or Abraham Lewis, though three distinct *types* of clockworks (*types-4, 6 & 7*) have been isolated that likely represent the products of these factories. Each of these clockworks is attached to a dial with a unique dial template (G-1, dial group P; A-2, dial

---

115 *Lewis v Lewis*, deposition of :Riley Alderman (November 12, 1834).
116 *Lewis v Lewis*, deposition of : Morgan Hart (November 12, 1834).
117 Rogers, *Trumbull County Clock Industry, 1812 - 1835*, 12.
118 *Lewis v Lewis*, deposition of : Charles Lewis (June 18, 1834).

group O;; and A-7 & 8, dial group N), reinforcing the argument that these represent the three factories.

The final goal was the creation of a chart or charts listing the characteristics that can be used to place unsigned dials into context by assigning them to a specific factory. Four diagnostic tables have been created:

Table I carries the raw data from the graphing the dial back.

dial #	maker's name	lunette & spandrells	bottom cleat	bottom cleat upper edge	bottom cleat width	C Width o Uncert	C midpoint o o	top cleat lower	top cleat upper edge	top cleat width	C o o2	l.h. left	l. h. right	l.h x	C c l.h. ox	l.h. lower
D-7	Ansel Merrell	Arches	-18 50	-17 50	1.00 ± 0 25		-18 00 ± 0 125	13 00	17 25	4 25 ± 0 25		-0 75	0 50		-0 13 ± 0 125	15 75
A-8	Garry Lewis	Reserve village	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	14 00	18 00	4 00 ± 0 25		-0 50	0 50		0 00 ± 0 125	15 50
A-1	Garry Lewis	Romantic buildings	-18 00	-17 25	0 75 ± 0 25		-17 63 ± 0 125	13 00	17 00	4 00 ± 0 25		-0 50	0 50		0 00 ± 0 125	16 00
A-7	Garry Lewis	Strawberries	-18 00	-17 25	0 75 ± 0 25		-17 63 ± 0 125	13 50	17 50	4 00 ± 0 25		-0 50	0 50		0 00 ± 0 125	15 50
D-11	Ansel Merrell	European scene	-18 25	-17 25	1 00 ± 0 25		-17 75 ± 0 125	13 50	17 25	3 75 ± 0 25		-1 00	0 25		-0 38 ± 0 125	16 00
A-9	Garry Lewis	Flower basket	-18 25	-17 00	1 25 ± 0 25		-17 63 ± 0 125									
D-1	Ansel Merrell	Masonic emblems	-17 00	-16 25	0 75 ± 0 25		-16 63 ± 0 125	14 50	18 25	3 75 ± 0 25		-0 50	0 50		0 00 ± 0 125	16 50
A-2	Garry Lewis	Germanic flowers	-18 00	-17 25	0 75 ± 0 25		-17 63 ± 0 125	13 75	17 75	4 00 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
B-12	L. W. Lewis	Oval & urn	-18 00	-17 25	0 75 ± 0 25		-17 63 ± 0 125	13 75	17 50	3 75 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
I-1	Phineas Demming	Large house	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 75	17 75	4 00 ± 0 25		-0 50	0 75		0 13 ± 0 125	15 50
D-12	Ansel Merrell	Two roses	-18 50	-17 50	1 00 ± 0 25		-18 00 ± 0 125	13 50	17 25	3 75 ± 0 25		-0 75	0 50		-0 13 ± 0 125	16 00
C-2	Wheeler Lewis	Georgian house	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 50	18 00	4 50 ± 0 25						
B-3	L. W. Lewis	Flower basket	-17 75	-17 00	0 75 ± 0 25		-17 38 ± 0 125	13 75	18 00	4 25 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
B-5	L. W. Lewis	Chopped lunette	-18 25	-17 00	1 25 ± 0 25		-17 63 ± 0 125	13 00	17 75	4 75 ± 0 25		-0 5	1 00		0 25 ± 0 125	14 75
C-10	Wheeler Lewis	Chopped lunette	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	12 50	17 00	4 50 ± 0 25						
C-1	Wheeler Lewis	Strawberries	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 50	18 00	4 50 ± 0 25		0 00	1 25		0 63 ± 0 125	15 25
X-1	unknown	Butterflies	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 50	17 00	3 50 ± 0 25		-0 50	0 50		0 00 ± 0 125	15 50
C-9	Wheeler Lewis	Oval & rose	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 75	18 00	4 25 ± 0 25		-0 50	0 75		0 13 ± 0 125	15 25
C-14	Wheeler Lewis	Flower swags	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	14 00	18 00	4 00 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 50
C-5	Wheeler Lewis	Masonic emblems	-18 00	-16 75	1 25 ± 0 25		-17 38 ± 0 125	14 00	18 00	4 00 ± 0 25		-0 50	0 50		0 00 ± 0 125	15 50
C-11	Wheeler Lewis	Large house	-17 50	-16 75	0 75 ± 0 25		-17 13 ± 0 125	14 00	18 50	4 50 ± 0 25		-0 50	0 50		0 00 ± 0 125	15 50
G-1	Ambrose Hart	Basket of flowers	-17 75	-16 75	1 00 ± 0 25		-17 25 ± 0 125	14 25	18 00	3 75 ± 0 25		-1 50	0 25		-0 63 ± 0 125	15 50
B-7	L. W. Lewis	Yellow bird	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 25	17 25	4 00 ± 0 25		-0 50	0 75		0 13 ± 0 125	15 00
B-13	L. W. Lewis	Two roses	-17 75	-17 00	0 75 ± 0 25		-17 38 ± 0 125	14 00	18 00	4 00 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
B-17	L. W. Lewis	Flower pot	-17 75	-17 00	0 75 ± 0 25		-17 38 ± 0 125	13 75	17 75	4 00 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
B-10	L. W. Lewis	European scene	-17 50	-16 50	1 00 ± 0 25		-17 00 ± 0 125	14 00	18 00	4 00 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
C-8	Wheeler Lewis	Strawberries	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 75	18 00	4 25 ± 0 25		-0 50	0 50		0 00 ± 0 125	15 25
B-6	L. W. Lewis	Golden urn	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	14 00	17 75	3 75 ± 0 25		-0 50	1 00		0 25 ± 0 125	15 00
K-1	W. W. Ling	Two roses	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	14 00	18 00	4 00 ± 0 25		-0 75	0 75		0 00 ± 0 125	15 25
B-20	L. W. Lewis	Eagle & shield	-17 50	-16 50	1 00 ± 0 25		-17 00 ± 0 125	14 00	18 25	4 25 ± 0 25		0 00	1 25		0 63 ± 0 125	15 50
D-3	Ansel Merrell	Queen Anne	-18 00	-16 50	1 50 ± 0 25		-17 25 ± 0 125	14 25	18 00	3 75 ± 0 25		-0 75	0 25		-0 25 ± 0 125	16 00
A-4	Garry Lewis	Flying eagle	-18 00	-17 00	1 00 ± 0 25		-17 50 ± 0 125	13 50	17 50	4 00 ± 0 25		-0 75	0 50		-0 13 ± 0 125	15 25
B-4	L. W. Lewis	Gilded urn /w swag	-18 25	-17 00	1 25 ± 0 25		-17 63 ± 0 125					-1 50	0 25		-0 63 ± 0 125	15 00
F-1	Hart & Truesdal	Dodecagon	-16 00	-14 75	1 25 ± 0 25		-15 38 ± 0 125					-8 25	-6 25		-7 25 ± 0 125	14 75
F-2	Hart & Truesdal	Drapes	-15 75	-14 50	1 25 ± 0 25		-15 13 ± 0 125					-8 50	-6 50		-7 50 ± 0 125	15 00
F-3	Hart & Truesdal	Eagle & shield	-16 00	-14 75	1 25 ± 0 25		-15 38 ± 0 125					-9 25	-7 00		-8 13 ± 0 125	14 75
F-8	Hart & Truesdal	Raspberries	-15 50	-14 00	1 50 ± 0 25		-14 75 ± 0 125					-8 50	-6 50		-7 50 ± 0 125	15 00
F-9	Hart & Truesdal	strawberries & deer	-15 00	-14 00	1 00 ± 0 25		± 0 000					-8 50	-6 75		-7 63 ± 0 125	15 25
B-14	L. W. Lewis	urn & spray	-18 00	-17 00	1 00 ± 0 25		-17 50 0 125	13 25	17 75	4 50 ± 0 25		-1 00	0 50		-0 25 ± 0 125	15 25
I-1	H. Cook	floral	-15 00	-13 50	1 50 ± 0 25		-14 25 ± 0 125					-8 50	-7 25		-7 88 ± 0 125	15 50
M-1	C. Lewis	floral	-18 00	-17 00	1 00 ± 0 25		-17 50 0 125					-0 50	0 50		0 00 ± 0 125	15 50

dial #	maker's name	l. h. upper	l.h. y	C l.h. oy	r. h. left	r. h. right	r.h. x	C r.h. ox	r. h lower	r. h. upper	r.h. y	C r.h. oy	dist btwn	C obtwn	lh height	C o lh	rh height	C o rh	Colun	Column12
D-7	Ansel Merrell	16 75	16 25 ±	0 125	13 25	14 50	13 875 ±	0 125	15 50	16 50	16 00 ±	0 125	14 00 ±	0 25	34 25 ±	0 25	34 ±	0 25	0 25	
A-8	Garry Lewis	16 50	16 ±	0 125	13 50	14 50	14 ±	0 125	15 00	16 25	15 63 ±	0 125	14 00 ±	0 25	33 5 ±	0 25	33 125 ±	0 25	0 38	
A-1	Garry Lewis	17 00	16 5 ±	0 125	13 50	14 75	14 125 ±	0 125	15 50	16 50	16 00 ±	0 125	14 13 ±	0 25	34 125 ±	0 25	33 625 ±	0 25	0 5	1
A-7	Garry Lewis	16 50	16 ±	0 125	13 50	14 75	14 125 ±	0 125	15 00	16 25	15 63 ±	0 125	14 13 ±	0 25	33 625 ±	0 25	33 25 ±	0 25	0 38	
D-11	Ansel Merrell	17 25	16 625 ±	0 125	13 25	14 50	13 875 ±	0 125	16 00	17 25	16 63 ±	0 125	14 25 ±	0 25	34 375 ±	0 25	34 375 ±	0 25	0	
A-9	Garry Lewis																		0	
D-1	Ansel Merrell	17 50	17 ±	0 125	13 75	15 00	14 375 ±	0 125	16 50	17 50	17 00 ±	0 125	14 38 ±	0 25	33 625 ±	0 25	33 625 ±	0 25	0	
A-2	Garry Lewis	16 25	15 625 ±	0 125	14 00	15 25	14 625 ±	0 125	15 00	16 25	15 63 ±	0 125	14 38 ±	0 25	33 25 ±	0 25	33 25 ±	0 25	0	
B-12	L. W. Lewis	16 25	15 625 ±	0 125	14 00	15 25	14 625 ±	0 125	14 75	16 00	15 38 ±	0 125	14 38 ±	0 25	33 25 ±	0 25	33 ±	0 25	0 25	
I-1	Phineas Demming	16 25	15 875 ±	0 125	13 75	15 00	14 375 ±	0 125	14 50	15 75	15 13 ±	0 125	14 25 ±	0 25	33 375 ±	0 25	32 625 ±	0 25	0 75	1
D-12	Ansel Merrell	17 00	16 5 ±	0 125	13 75	14 75	14 25 ±	0 125	15 75	17 00	16 38 ±	0 125	14 38 ±	0 25	34 5 ±	0 25	34 375 ±	0 25	0 13	
C-2	Wheeler Lewis																		0	
B-3	L. W. Lewis	16 25	15 625 ±	0 125	14 00	15 25	14 625 ±	0 125	14 75	16 25	15 50 ±	0 125	14 38 ±	0 25	33 ±	0 25	32 875 ±	0 25	0 13	
B-5	L. W. Lewis	16 25	15 5 ±	0 125	14	15 25	14 625 ±	0 125	14 25	15 75	15 00 ±	0 125	14 38 ±	0 25	33 125 ±	0 25	32 625 ±	0 25	0 5	
C-10	Wheeler Lewis																		0	
C-1	Wheeler Lewis	16 50	15 875 ±	0 125	14 00	15 25	14 625 ±	0 125	15 00	16 25	15 63 ±	0 125	14 00 ±	0 25	33 375 ±	0 25	33 125 ±	0 25	0 25	
X-1	unknown	16 75	16 125 ±	0 125	13 75	15 00	14 375 ±	0 125	15 00	16 25	15 63 ±	0 125	14 38 ±	0 25	33 625 ±	0 25	33 125 ±	0 25	0 5	
C-9	Wheeler Lewis	16 50	15 875 ±	0 125	13 75	15 00	14 375 ±	0 125	15 00	16 25	15 63 ±	0 125	14 25 ±	0 25	33 375 ±	0 25	33 125 ±	0 25	0 25	
C-14	Wheeler Lewis	16 75	16 125 ±	0 125	13 75	15 25	14 5 ±	0 125	15 25	16 50	15 88 ±	0 125	14 25 ±	0 25	33 625 ±	0 25	33 375 ±	0 25	0 25	
C-5	Wheeler Lewis	16 50	16 ±	0 125	13 75	15 00	14 375 ±	0 125	15 25	16 50	15 88 ±	0 125	14 38 ±	0 25	33 375 ±	0 25	33 25 ±	0 25	0 13	
C-11	Wheeler Lewis	16 50	16 ±	0 125	13 75	15 00	14 375 ±	0 125	15 25	16 50	15 88 ±	0 125	14 38 ±	0 25	33 125 ±	0 25	33 ±	0 25	0 13	
G-1	Ambrose Hart	16 50	16 ±	0 125	13 75	15 00	14 375 ±	0 125	15 00	16 50	15 75 ±	0 125	15 00 ±	0 25	33 25 ±	0 25	33 ±	0 25	0 25	
B-7	L. W. Lewis	16 25	15 625 ±	0 125	14 00	15 25	14 625 ±	0 125	14 25	15 50	14 88 ±	0 125	14 50 ±	0 25	33 125 ±	0 25	32 375 ±	0 25	0 75	1
B-13	L. W. Lewis	16 50	15 75 ±	0 125	14 00	15 50	14 75 ±	0 125	14 50	16 00	15 25 ±	0 125	14 50 ±	0 25	33 125 ±	0 25	32 625 ±	0 25	0 5	
B-17	L. W. Lewis	16 50	15 75 ±	0 125	14 00	15 50	14 75 ±	0 125	14 50	16 00	15 25 ±	0 125	14 50 ±	0 25	33 125 ±	0 25	32 625 ±	0 25	0 5	
B-10	L. W. Lewis	17 00	16 ±	0 125	14 00	15 50	14 75 ±	0 125	14 75	16 25	15 50 ±	0 125	14 50 ±	0 25	33 ±	0 25	32 5 ±	0 25	0 5	
C-8	Wheeler Lewis	16 50	15 875 ±	0 125	14 00	15 25	14 625 ±	0 125	14 75	16 00	15 38 ±	0 125	14 63 ±	0 25	33 375 ±	0 25	32 875 ±	0 25	0 5	
B-6	L. W. Lewis	16 50	15 75 ±	0 125	14 25	15 50	14 875 ±	0 125	14 75	16 00	15 38 ±	0 125	14 63 ±	0 25	33 25 ±	0 25	32 875 ±	0 25	0 38	
K-1	W. W. Ling	16 75	16 ±	0 125	14 00	15 75	14 875 ±	0 125	17 75	16 25	17 00 ±	0 125	14 88 ±	0 25	33 5 ±	0 25	34 5 ±	0 25	-1	1
B-20	L. W. Lewis	16 75	16 125 ±	0 125	14 25	15 50	14 875 ±	0 125	15 25	16 75	16 00 ±	0 125	14 25 ±	0 25	33 125 ±	0 25	33 ±	0 25	0 13	1
D-3	Ansel Merrell	16 75	16 375 ±	0 125	13 75	14 75	14 25 ±	0 125	15 50	16 75	16 13 ±	0 125	14 50 ±	0 25	33 625 ±	0 25	33 375 ±	0 25	0 25	
A-4	Garry Lewis	16 75	16 ±	0 125	13 50	14 75	14 125 ±	0 125	15 00	16 25	15 63 ±	0 125	14 25 ±	0 25	33 5 ±	0 25	33 125 ±	0 25	0 38	1
B-4	L. W. Lewis	16 50	15 75 ±	0 125	13 25	15 00	14 125 ±	0 125	14 50	16 00	15 25 ±	0 125	14 75		33 375		32 875		0 5	
F-1	Hart & Truesdal	16 75	15 75 ±	0 125	12 25	14 25	13 25 ±	0 125	14 75	16 75	15 75 ±	0 125	20 50		31 125		31 125		0	
F-2	Hart & Truesdal	17 00	16 ±	0 125	12 25	14 25	13 25 ±	0 125	15 00	17 00	16 00 ±	0 125	20 750		31 125		31 125		0	
F-3	Hart & Truesdal	16 75	15 75 ±	0 125	11 50	13 75	12 625 ±	0 125	14 75	16 75	15 75 ±	0 125	20 75		31 125		31 125		0	
F-8	Hart & Truesdal	17 00	16 ±	0 125	12 00	14 00	13 ±	0 125	15 00	17 00	16 00 ±	0 125	20 50		30 75		30 75		0	
F-9	Hart & Truesdal	17 00	16 125 ±	0 125	13 50	14 25	13 875 ±	0 125	15 25	17 00	16 13 ±	0 125	21 50		16 125		16 125		0	
B-14	L. W. Lewis	17 00	16 125 ±	0 125	13 50	15 00	14 25 ±	0 125	14 25	16 00	15 13 ±	0 125	14 50		33 625		32 625		1	
I-1	H. Cook	17 25	16 375 ±	0 125	13 00	14 75	13 875 ±	0 125	15 25	17 25	16 25 ±	0 125	21 75		30 625		30 5		0 13	
M-1	C. Lewis	16 50	16 ±	0 125	14 00	15 00	14 5 ±	0 125	15 00	16 00	15 50 ±	0 125	14 50		33 5		33		0 5	

Table II condensed the raw data from table 1 and shows the data points, grouped into movement *types.*

-17.500	14.500	±	0.25	33.125	±	0.25	32.375	±	0.25	0.75	B-6	L. W. Lewis	Golden urn	type 1
-17.500	14.500	±	0.25	33.125	±	0.25	32.375	±	0.25	0.75	B-7	L. W. Lewis	Yellow bird	type 1
-17.000	14.500	±	0.25	33	±	0.25	32.5	±	0.25	0.5	B-10	L. W. Lewis	European scene	type 1a
-17.375	14.500	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-13	L. W. Lewis	Two roses	type 1a
-17.375	14.500	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-17	L. W. Lewis	Flower pot	type 1a
-17.625	14.500	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-12	L. W. Lewis	Oval & urn	type 1a
-17.625	14.375	±	0.25	33.125	±	0.25	32.625	±	0.25	0.5	B-5	L. W. Lewis	Chopped lunette	type 1a
-17.375	14.375	±	0.25	33	±	0.25	32.875	±	0.25	0.125	B-3	L. W. Lewis	Flower basket	type 2
-17.000	14.250	±	0.25	33.125	±	0.25	33	±	0.25	0.125	B-20	L. W. Lewis	Eagle & shield	type 2
-17.625	14.750	±	0.25	33.375	±	0.25	32.875	±	0.25	0.5	B-4	L. W. Lewis	Gilded urn	type 1a
-17.500	14.630	±	0.25	33.375	±	0.25	32.875	±	0.25	0.5	K-1	W. W. Ling	Two roses	type 3a or 1a
-17.500	14.625	±	0.25	33.375	±	0.25	32.875	±	0.25	0.5	C-8	Wheeler Lewis	Strawberries	type 3b
-17.250	15.000	±	0.25	33.25	±	0.25	33	±	0.25	0.25	G-1	Ambrose Hart	Basket of flowers	type 4
-17.500	14.250	±	0.25	33.375	±	0.25	32.625	±	0.25	0.75	I-1	Phineas Demming	Large house	type 5
-17.500	14.500	±	0.25	33.625	±	0.25	32.625	±	0.25	1	B-14	L. W. Lewis	Urn	
-17.625	14.125	±	0.25	33.25	±	0.25	33.25	±	0.25	0	A-2	Garry Lewis	Germanic flowers	type 6
-17.500	14.000	±	0.25	33.5	±	0.25	33.125	±	0.25	0.375	A-8	Garry Lewis	Reserve village	type 7
-17.625	14.125	±	0.25	33.625	±	0.25	33.25	±	0.25	0.375	A-7	Garry Lewis	Strawberries	type 7
-17.500	14.000	±	0.25	33.5	±	0.25	33.125	±	0.25	0.375	A-4	Garry Lewis	Flying eagle	type 7 or 9
-17.500	14.375	±	0.25	33.625	±	0.25	33.125	±	0.25	0.5	X-1	unknown	Butterflies	type 7a or 9a
-17.500	14.500	±	0.25	33.5	±	0.25	33	±	0.25	0.5	M-1	Charles Lewis	Floral	type 7a
-17.625	14.375	±	0.25	34.125	±	0.25	33.625	±	0.25	0.5	A-1	Garry Lewis	Romantic buildings	type 8
-17.500	14.250	±	0.25	33.625	±	0.25	33.375	±	0.25	0.25	C-14	Wheeler Lewis	Flower swags	type 9a
-17.500	14.000	±	0.25	33.375	±	0.25	33.125	±	0.25	0.25	C-1	Wheeler Lewis	Strawberries	type 9
-17.500	14.250	±	0.25	33.375	±	0.25	33.125	±	0.25	0.25	C-9	Wheeler Lewis	Oval & rose	type 9
-17.375	14.375	±	0.25	33.375	±	0.25	33.25	±	0.25	0.125	C-5	Wheeler Lewis	Masonic emblems	type 9
-17.125	14.375	±	0.25	33.125	±	0.25	33	±	0.25	0.125	C-11	Wheeler Lewis	Large house	type 9
-18.000	14.000	±	0.25	34.25	±	0.25	34	±	0.25	0.25	D-7	Ansel Merrell	Arches	type 10
-17.750	14.250	±	0.25	34.375	±	0.25	34.375	±	0.25	0	D-11	Ansel Merrell	European scene	type 10
-18.000	14.375	±	0.25	34.5	±	0.25	34.375	±	0.25	0.125	D-12	Ansel Merrell	Two roses	type 10
-16.625	14.375	±	0.25	33.625	±	0.25	33.625	±	0.25	0	D-1	Ansel Merrell	Masonic emblems	type 10a
-17.250	14.500	±	0.25	33.625	±	0.25	33.375	±	0.25	0.25	D-3	Ansel Merril	Queen Anne	type 10a
-14.750	20.500	±	0.25	30.75	±	0.25	30.75	±	0.25	0	F-8	Hart & Truesdale	Raspberries	type 11a
-15.375	20.500	±	0.25	31.125	±	0.25	31.125	±	0.25	0	F-1	Hart & Truesdale	Geometric	type 11
-15.375	20.750	±	0.25	31.125	±	0.25	31.125	±	0.25	0	F-3	Hart & Truesdale	Eagle & shield	type 11
-15.125	20.750	±	0.25	31.125	±	0.25	31.125	±	0.25	0	F-2	Hart & Truesdale	Flower & drape	type 11
-14.500	21.500			30.625			30.625			0	F-9	Hart & Truesdale	Strawberries	type 11b
-14.250	21.750			30.5			30.5			0.125	L-1	H. Cook	floral	type 11b

Table III compares variations in the numeral forms.

Dial — Ornate numerals with tumbled orientation

group-A

Found locally only on Hart & Truesdale, the 3 is opened downward. 2's may be continuous or broken. Note shaded area in upper loop of 2's. Identical template used in Busti, NY.

group-B

Found on W. Lewis tall and shelf clocks. All numerals shortened. Extremely wide shaded areas. Note shaded area in upper loop of the 2's. Only tumbled template used by Wheeler.

group-C

Used by A. Merrell. Smaller diameter rings. Numerals 25% taller than groups A, B, D & E. Numeral forms most resemble group-B. Note shaded area in upper loop of the 2's. This is the only tumbled template with ornate numerals that included marks for the quarter hours, w/ 15, 30, 45 & 60 appearing in a tumbled orientation.

group-D

Used by A. Merrell. Closely resembles group-A numerals, but rendered smaller and narrower. The 3 opens upward. 2's are inked continuously. Smaller diameter for numeral ring.

group-E

Used by A. Merrell. Closely resembles group-A numerals, but rendered smaller and narrower. The 3 opens upward. 2's are inked continuously. Smaller diameter for numeral ring. Varies from group-D dials with shading in base of the 3, dimensions of the 8 and the 0, and a shortened cap on the 5.

Dial — Spare numerals with tumbled orientation

group-F

This template carries an 1817 date on the dial marked for W. W. Ling. Note the odd shaded area in the loop of the 2 that is not repeated in the 12. Accentuated tapers used on the 4 omitted on the 1's. Only dial group-K is not a product of the L. W. Lewis factory. Undersized cap on the 5's that appear as the quarter hour markers.

group-G

Varies slightly from group-F dials with variations in the shaded areas of the 3, 6, & 9, also in the size of the cap an the 5 in the quarter hour. This group contains the only seconds bits found in the sample, likely placing it in the early years of the industry.

group-H

Slight variations exist between this template and dial group-G. The shaded areas in the 6 and 9 are less rounded, a tendency that is also shared with dial group J. The dial decorated for Hart & Truesdale utilized this template. Note the excessive taper in the base of the 4, a feature seen on dial group F.

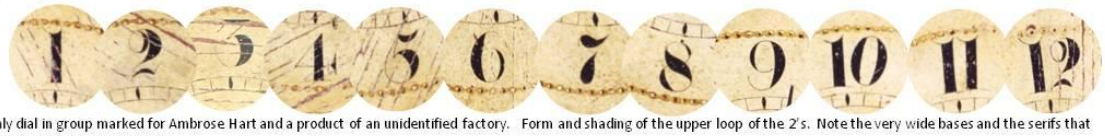
group-J

Closest to group-G dials with variations in the base of the 2's, the width and taper of the 4, and the narrow shaded areas on the 10. The quarter hour markers most closely resemble dial group-F.

Dial group-I — Spare numerals with tumbled orientation: late period

Wider shaded areas, particularly on the 1's indicative of the late period of production. Numeral 8 remains slender, similar to group-H. Straight serifs replaced with curved. Minimal taper on 4. Quarter hour markers omitted.

group-K



Only dial in group marked for Ambrose Hart and a product of an unidentified factory. Form and shading of the upper loop of the 2's. Note the very wide bases and the serifs that extend on both sides of the 1's.

Dial group-L — Spare numerals with vertical orientation

Only appears with Garry Lewis nameplate. Very slender shaded sections, particularly in 1's, 6 & 9, a loop at the base of the 2 (this may be confined to an individual), and an inverted base for the 7. Largest variation in G. Lewis dials is in the quarter hour markers. The 1 and the 4 are larger than their counterpart and are set lower.

group-M

Only appears with Garry Lewis nameplate. Identical to dial group-L except 4 an improper positioning of the 45 minute marker, which is set ¼ inch closer to the 9. This appears to have been an error in copying an existing template.

group-N

Appears with Garry Lewis nameplate, also only example of Charles Lewis (unfinished). Shaded section have widened indicating use near the end of the industry. The 2's, 3, 5, 6 & 9 have ball terminations; the 1's retain straight serifs. The position of the quarter hour markers matches dial group-L, indicating the position of the 45 in dial group-M was an error.

group-O

Only appears with Garry Lewis nameplate. Closely matches dial group-N except for a taller 5 with less slant and the replacement of straight serifs with concave.

group-P

Appears with both Ansel Merrell and Phineas Deming nameplates. Shares numerals and spacing with dial group-S. Variation in the shaded portion of the 3, very short cap on the 5, taller form for 6, simplified cap on 7, and a more upright position of the 5 in the 45 quarter hour marker. Both dials likely produced by Thomas Lewis.

Dial group-Q — Spare numerals with vertical orientation

Used by Ansel Merrell. All numerals elongated with the 2's and 9 nearly ½ inch taller. Flat tops appear on the 3 and the 7. Numeral band widened by ¼ inch. Note the shape of the 5's in the quarter hour markers. Most closely related to group-U dials.

group-R

Used by Wheeler Lewis.; one L. W. Lewis signed dial recorded. Nearly identical to dial group-L, probably a later generation copy. The numerals in the 45 quarter hour mark were shifted downward ¼ inch, perhaps caused by a slip that rotated the template slightly. Both the 1 and the 4 in the quarter hour markers are larger than their counterpart.

group-S

Used by Wheeler Lewis. Most closely related to dial group-R. Small variations in the size and position of the quarter hour markers. The large 5 is rendered taller with a smaller cap.

group-T

Used by Wheeler Lewis; also found unsigned. Probably a later generation copy of group-S. Largest variation is found in the shaded portion of the 3 and the 8, also an oversized 1 in the 15 minute mark. The 4 acquires a taper.

group-U

Used by Ansel Merrell. All numerals elongated with the 2's and 9 nearly ½ inch taller. Flat tops appear on the 3 and the 7. Concave serifs apperar on the 1's. Numeral band widened by ¼ inch. The quarter hour markers are omitted. The shaded portion of the base of the 2's has been repositioned below the original bottom line . Most closely related to group-Q dials.

Table IV combines all information including works *type*, dial group, dial signature, and lunette description and theme.

Dial #	Name on Dial	Works Type	Traced		Dial Type	Lunette Notes	Matching artwork	art category
A-1	G. LEWIS.	type-8 (type-10)	X		DIAL-L	Building w/ crenelated octagonal tower	A-12, D-11	Romantic
A-2	G. LEWIS.	type- 6	x		DIAL-O	Large flowers in the style of the German wag movement clocks		Germanic
A-3	G. LEWIS.					Musical instruments - lyre and horns		
A-4	G. LEWIS.	type-7 (type-9)	x		DIAL-M	Flying eagle w/ *e pluribus unum* banner		Patriotic
A-5	G. LEWIS.	stamped AM	x		DIAL-L	Basket with large single flower	B-3,C-7,F-6, M-1	Floral
A-6	G. LEWIS. Warren.					Shield w/ swags - cornucopia	H-1	Shield
A-7	G. LEWIS. Vienna.	type-7	x		DIAL-N	Three strawberries	C-1,C-8,F-9	Strawberries
A-8	G. LEWIS. Vienna.	type-7	x		DIAL-N	Local village		Village
A-9	G. LEWIS.		x		DIAL-N	Single basket of flowers		Floral
A-10	G. LEWIS.					Hunting scene with dog flushing two birds		
A-11	G. LEWIS.					Sailing ship	D-5	Ship
A-12	G.LEWIS.					Masonic? Poor image		
B-1	L. W. LEWIS.					Small sailboat and village, european type tower, domestic house forms		Romantic
B-2	L. W. LEWIS.					Gilded basket w/ two flowers		Floral
B-3	L. W. LEWIS	type-2	x		DIAL-F	Basket w/ large single flower	A-5,C-7,F-6, M-1	Floral
B-4	L. W. LEWIS.	type-1a	x		DIAL-G	Gilded urn w/swags of flowers beneath	B-6,B-18	Urn
B-5	L, W, LEWIS,	type-1a	x		DIAL-I	lunette removed		
B-6	L. W. LEWIS	type-1	x		DIAL-H	Gilded urn w/swags of flowers beneath	B-4,B-18	Urn
B-7	L. W. LEWIS.	type-1	x		DIAL-G	Yellow bird w/ flowers	J-1	
B-8	L. W. LEWIS		x		DIAL-G	Two roses	B-13,B-15,B-16,C-4,D-4,D-12	Floral
B-9	L. W. LEWIS					Drape and swag		Floral
B-10	L. W. LEWIS	type-1a			repainted	Ship w/ large European building and tower		Romantic
B-11	L, W, LEWIS,					Two buildings w/ towers		Romantic??
B-12	L. W. LEWIS	type-1a	x		DIAL-G	Classical urn within gesso oval	C-16	Urn
B-13	L, W, LEWIS,	type-1a	x		DIAL-I	Two roses (repaint)	B-8,B-15,B-16,C-4,D-4,D-12	Floral
B-14	L. W. LEWIS	type-1b	x		DIAL-R	Shield w/ swags of flowers beneath	D-6	Shield
B-15	L. W. LEWIS.					Two Roses	B-8,B-13,B-16,C-4,D-4,D-12	Floral
B-16	L. W. LEWIS.					Two Roses	B-8,B-13,B-15,C-4,D-4,D-12	Floral
B-17	L. W. LEWIS	type-1a				Naive vase of flowers in the style of the German wag movement clocks		Germanic
B-18	L. W. LEWIS					Naive shield		Shield
B-19	L W LEWIS					Eagle and shield	B-20	Patriotic
B-20	L W LEWIS	type-2	x		DIAL-I	Eagle and shield	B-19	Patriotic
B-21	L. W. LEWIS		X		DIAL-G	Flowers w/ oval scenes		
B-22	L. W. LEWIS		X		DIAL-J	Two Roses		
B-23	L. W. lEWIS					Naive shield	B-23	
C-1	W. LEWIS. WARREN.	type-9	X		DIAL-T	Three strawberries	C-8,F-9	Strawberies
C-2	W. LEWIS. WARREN.		x		DIAL-S	Georgian house		
C-3	W. LEWIS. WARREN.		x		DIAL-B	lunette removed		
C-4	W. LEWIS. WARREN.					Two roses	B-8,B-13,B-15,B-16,D-4D-12,K-1	Floral
C-5	W. LEWIS. WARREN.	type-9	x		DIAL-T	Masonic symbols	C-6,D-1,D-2	Masonic
C-6	W. LEWIS. WARREN.		x		DIAL-S	Masonic symbols	C-5,D-1,D-2	Masonic
C-7	W. LEWIS, WARREN.					Basket w/ single large flower	A-5,B-3,F-6, M-1	Floral
C-8	W. LEWIS, WARREN.	type-3b	x		DIAL-R	Three strawberries	C-1,F-9	Strawberies
C-9	repainted signature	type-9	x		DIAL-S			
C-10	W. LEWIS. WARREN.		x		DIAL-R	lunette removed		
C-11	W. LEWIS WARREN.	type-9				Large European styled building	C-12,I-1	Romantic
C-12	W. LEWIS WARREN.					Large European styled building	C-11, I-1	Romantic
C-13	W. LEWIS, WARREN.	type-9a				Basket w/ two flowers		Floral

(continued on next page)

C-14	W. LEWIS. WARREN.	type-9a	x		DIAL-S	Drape and garland / perhaps unfinished		
C-15	W. LEWIS. WARREN					Large European styled building		Romantic
C-16	W. LEWIS, WARREN.					Classical urn within gesso oval	B-12	Urn
D-1	A. MERRELL	type-10a	x		DIAL-P	Masonic symbols	C-5,C-6,D-2	Masonic
D-2	A. Merrell Vienna					Masonic symbols	C-5,C-6,D-1	Masonic
D-3	A. MERRELL. VIENNA.	type-10a	X		DIAL-Q	Modified shield in gesso & gold w/ portrait and village scenes below		
D-4	A. MERRELL					Two roses	B-8,B-13,B-15,B-16,D-12,C-4,K-1	Floral
D-5	A. MERRELL VIENNA.					Sailing ship	A-11	Ship
D-6	A, MERRELL,		x		DIAL-E	Naïve shield	B-14	Shield
D-7	A. MERRELL.	type-10	x		DIAL-D	lunette too damaged to include		
D-8								Ship
D-9	A. MERRELL. VIENNA.		x		DIAL-U	Two bunches of grapes		
D-10	A. MERRELL. VIENNA.					European village	F-5	Romantic
D-11	A. MERRELL	type-10	x		DIAL-C	Building w/ crenelated octagonal tower	A-11	Romantic
D-12	A. MERRELL.	type-10	x		DIAL-D	Two roses	B-8,B-13,B-15,B-16,C-4,D-4,K-1	Floral
D-13	A. MERRELL.					Two flowers		Floral
D-14	A. MERRELL VIENNA					Seaside cliff and ship	X-3	
F-1	HART & TRUESDAL HARTFORD	type-11	x		DIAL-A	Geometric w/cornucopia	F-8 gesso	Cornucopia
F-2	HART & TRUESDAL HARTFORD	type-11	x		DIAL-A	Flower and drape		
F-3	HART & TRUESDAL HARTFORD	type-11	x		DIAL-A	Eagle and shield	F-7	Patriotic
F-4	HART & TRUESDAL HARTFORD					Local village		Village
F-5	HART & TRUESDAL HARTFORD OHIO					European village	D-10	Romantic
F-6	HART & TRUESDAL HARTFORD OHIO		x		DIAL-A	Basket w/ large single flower	A-5,B-3,C-7, M-1	Floral
F-7	HART & TRUESDAL HARTFORD					Eagle and shield	F-3	Patriotic
F-8	HART & TRUESDAL HARTFORD	type-11a	x		DIAL-A	Raspberries w/ cornucopia	F-1 gesso	Cornucopia
F-9	HART & TRUESDAL HARTFORD	type-11b	x		DIAL-H	Three strawberries	C-1,C-8	Strawberries
G-1	A. HART. BROOKFIELD	type-4	x		DIAL-K	Basket w/ large single flower		Floral
H-1	HART & WAY BROOKFIELD					Sheild w/ swags - cornucopia	A-6,	Shield
I-1	P. DEMING.	type 5	x		DIAL-P	large European styled building	C-11,C-12	Romantic
J-1	D. R. HARTSON.					Yellow bird in strawberries	B-7	
K-1	W. W. LING 1817	type-3a (type-2)	x		DIAL-F	Two roses	B-8,B-13,B-15,B-16,C-4,D-4,D-12	Floral
L-1	H.COOK MEDINA	type-11b			DIAL-J	Flowers		
M-1	C.LEWIS	type 7a	x		DIAL-N	Basket w/ large single flower / unfinished	A-5, B-3, C-7, F-6	
X-1	unmarked	type-7a (type-9a)	x		DIAL-S	Yellow butterfly w/ flowers		
X-2	unmarked					Local village		Village
X-3	unmarked					Seaside cliff and ship	D-14	

These four charts provide a method for recording additional dials and identifying them within the context of the local industry.

Chapter IV

Rebecca Rogers' monograph *Trumbull County Clock Industry, 1812 - 1835* has remained the definitive source on the local industry for nearly twenty years and served as the foundation upon which all subsequent research has been based. The ultimate test of this dial analysis is to use the information derived only from the clocks to compare and ultimately build upon that foundation. To that end, an attempt has been made to develop the dial data independent of that existing narrative history. Essentially, the methods of industrial archaeology allowed the objects speak for themselves.

A short examination of the economic conditions in the Western Reserve during the first third of the nineteenth century is included below, followed by a summary of the conclusions derived from the dial data, to provide a context in which to interpret the interconnections of each of the factories and the associated individuals. These business and trade relations, combined with information from the *Trumbull County Clock Industry,* are then presented with attention given to areas that represent either contradictory or new information.

The economy of the Western Reserve, like most of the nation, functioned with limited cash, utilizing a barter-by-book system that required each individual to maintain an account listing for every person with whom they dealt, tracking values earned and owed.[119] Accounts were seldom settled, often running years with unpaid balances. A third party, usually a merchant, could facilitate the balancing of an account between two

---

[119] *Azel Tracy Account Book, 1818 - 1860,* private collection, Hartford, Trumbull County, Oh. Xerox copy on file Trumbull County Library, Warren, Ohio.

of his customers by crediting one customer's account and debiting the other's. This process, known as discounting, served to channel much of the economic activity of a community through its merchants, who accepted payment in the form of farm animals and domestic products which they in turn transported to distant city markets, returning with tobacco, spirituous liquors, and merchandise for their store or wagon.[120,] Unfortunately for the merchant, these same farm products were being produced throughout the region, guaranteeing a large supply, a low market price and minimal profits. The entry of the clock industry altered this pricing dynamic by providing a saleable product that was relatively scarce and therefore profitable.

In the local absence of specie, these clocks came to be used as a substitute for cash. In 1818, at the beginning of clock production, Abel Tyler carried clocks to the nearby Heaton Iron Furnace to purchase supplies. [121] Garry Lewis held completed clocks in storage as surety for a ca. 1827 note from the Western Reserve Bank.[122] In 1828, factory worker Orrin Johnson supplied clocks which merchant Robert Cochran credited to Johnson's account at full value, $2.50.[123] However, by the 1830s, the proliferation of makers and the resulting overproduction led directly to lower prices and profits.[124] These lower prices forced the devaluation of the notes and account balances that had been

---

[120] *The John Cochran Accounts Book, 1828 - 1845*, private collection, Poland, Mahoning County, Oh., (1827 - 1831).

[121] *Diaries of Sylvia Lewis Tyler:: Volumes for 1818, 1819 & 1820 only*, NSDAR Americana Collection, acc. 2899, Washington, D.C.. Transcription by Alden O'Brien, 2000, (August 3,1818).

[122] Garry Lewis Note (November 2, 1827).
Garry Lewis, receipt stating "Rcd. Warren Nov 2nd 1827 of A Adams one dollar in full of all demands to this date except said Adams' receipt for one hundred clocks which he has in security for being surety for me at the Western Reserve Bank.." private collection, Hartford Ohio.
The Garry Lewis surety note was originally set at fifty clocks , but was crossed out and changed to 100.

[123] *The John Cochran Accounts Book, 1828 - 1845* (10-07-1828).

[124] *The John Cochran Accounts Book, 1828 - 1845* (10-07-1828, 9-15-1830 and 4-30-1831.
Clock values of $2.50, $1.50, and $1.25 are shown for 10-07-1828, 9-15-1830 and 4-30-1831, respectively.

underwritten by the value of the existing inventory of clocks. In 1830, Ansel Merrell was paying employees with clocks that they in turn bartered for as little as $1.25 for household goods, again with merchant Robert Cochran; soon after, in 1831, portions of Merrell's inventory were seized and exposed to public auction to settle judgments.[125] The 1834 Civil Court Case utilized for this study, Lambert W. Lewis, Pardon Sherman, Noahdiah Webster vs. Garry Lewis, hinged upon the use of "good common clocks" to be accepted as payment for a consolidation of debts. The constraints of this barter-by-book system dictated the business behavior of the individuals involved in the clock industry; lacking cash, the operators and investors found themselves trapped in a constant cycle of leveraging both their current finished inventory and the notes representing clocks sold on credit in order to assemble enough new credit to finance future production.

This expansion functioned much like a pyramid scheme, forcing interdependence and co-operation among competitors as they scrambled to create new barter contracts among themselves for current materials and components, pledging the finished article or components to pay for past contracts. All of these contracts depended upon ultimately receiving cash for finished inventory and credit sales, an event that never occurred. When, in the late 1820s, oversupply began to affect retail values, the devaluation of the barter value of the clocks triggered a severe business contraction and the failure of the companies of Ansel Merrell, Phineas Deming, and McMaster, Hartson & C. The remaining companies limped into the 1830s, sacrificing quality to adjust to the lower retail values of wooden tall clock movements. Only Hart & Truesdale, the firm that

---

[125] *Warren (Ohio) The Western Reserve Chronicle: 1816-1921*, The Trumbull County Public Library, special collections, microfilm, Warren, Oh.. (September 26, 1831). Both a Coroner's sale and a Sheriff's sale advertised the auction of seized Ansel Merrell clocks.

made the largest commitment to patent clock production, seems to have managed an orderly exit from clockmaking; L.W Lewis, Wheeler Lewis, Garry Lewis, Charles Lewis, Ansel Merrell, Phineas Deming and McMaster, Hartson &C. all ended in court.[126] The industry collapsed completely in the early 1830s, taking with it the "on paper" wealth that it had created.

The interdependence imposed by the barter system can be inferred by following the flow of materials and work among the participants . Lambert W. Lewis' factory made their own clockworks and dials which they released in both their name and labeled for others, such as the dials marked for W. W. Ling and Hart & Truesdale. Their factory in Vienna had the capacity to make all portions of the clockworks and dials. Despite operating a complete production facility, Lambert's factory sourced dials from the Wheeler Lewis factory and may have accepted plates or dial blanks from Asa Scoville in trade for wheels.

The factory administered by Wheeler Lewis made its own clockworks, identifiable by the disk on the third arbor of the time side, as well as their own dials which were likely painted in their factory in Warren. These dials were released under Wheeler's name, as well as unmarked. The Wheeler Lewis factory also sold at least a few dials to the L. W. Lewis factory. Wheeler's factory seems the likely source for the tall clock plates and perhaps some of the wheels used by Charles Lewis at the end of the industry. Though Wheeler sold clockworks to Garry Lewis, the "G. Lewis" marked dials seem not to have been associated with the Wheeler Lewis factory.

---

[126] Rebecca M. Rogers, *The Trumbull County Clock Industry, 1812-1835* (Dayton Oh; Sterling Graphics, 1990), 23,24.

The firm of Hart & Truesdale manufactured clockworks and dials in their factory in Hartford and released them under their name. They also sourced dials marked with their name from the Lambert W. Lewis factory, likely prior to undertaking their own decorating. The factory also supplied clockworks to Horace Cook. Though the dial blank was likely a Hart & Truesdale product, the layout and ornament seems to have been done by Cook's wife, Lydia, who had previously been a dial painter for L. W. Lewis.

Hart & Truesdale had likely converted to shelf clock production by 1831, and ceased operations before April of 1833 when they leased the factory to former employees John and William Hartson. The Hartson's production seems to have been confined to patent clocks.

Ansel Merrell manufactured clockworks in his factory in Vienna for clocks released in his name, as well as selling clock wheels to Asa Scovill and others. The Merrell factory supplied movements for Garry Lewis, though Garry seems to have sourced his own dials. Though the Merrill factory may have manufactured some of their own dials, it is also likely that they traded wheels and pinions to the Phineas Deming factory in return for Thomas Lewis made dials.

The factory of Hart & Way was the short term successor to Ansel Merrill, assembling his previously manufactured parts and selling off completed inventory.

Garry Lewis purchased clockworks from the factories of Ansel Merrell and Wheeler Lewis, as well as two of the three factories that remain unidentified. Though the source for all Garry Lewis marked dials in the sample cannot be determined, only one of the dial templates in the study was shared with another nameplate, Charles Lewis. This

consistency suggests that Garry controlled at least two of the sources, the dials matched to the Merrell and Wheeler Lewis clockworks. The remaining dials may have been products of the unknown factory that supplied the clockworks or an unknown dial shop, a possibility that may account for the testimony regarding a "factory said to be owned by Garry Lewis." Though the depositions indicate that Garry Lewis had sourced clockworks and dials from the L. W. Lewis factory, no examples have been located for study.

Phineas Deming's factory in Vienna assembled its own clockworks, likely with wheels purchased from Ansel Merrell. The Ansel Merrill factory shared a dial type with the Deming factory, suggesting that the Deming factory was the probable source for a portion of the Ansell Merrell dials.

Charles Lewis' shop assembled clockworks with parts from other, possibly defunct, local factories. His use of the unfinished Garry Lewis type dial, coupled with his deposition's reference to the paint that he used for ground work marks his shop as the likely source for one dial group, and places him as a probable source for other Garry Lewis dials

Without an opportunity to further examine the lone surviving example from McMasters, Hartson & co., it must be assumed that they manufactured their own clockworks and dials.

No known examples are attributable to the factories of Abraham Lewis, Levi Lewis or the short-lived Tyler & Hummason in Vienna, though one of them is the likely source for the unidentified dial marked for Ambrose Hart. Similarly, the later dials marked for Garry Lewis that could not be attributed to a specific factory may have been

products of the Abraham Lewis or Levi Lewis factories. No known examples are attributable to the shop of Asa Scovill in Vienna.

This evidence gleaned from the dial analysis is quite consistent with the *Trumbull County Clock Industry* narrative, affirming the existence of the listed factories of L. W. Lewis, Hart & Truesdale, McMasters, Hartson & co., Ansel Merrell and Wheeler Lewis.[127] Additionally, the dial data provides evidence to prove the existence of three additional clockworks producing factories, likely those of Abraham Lewis, Levi Lewis, Asa Scoville, or Abel Tyler and Joel Hummason, all of whom Rogers noted "may have had either shops or factories." Garry Lewis' role as a "financier,... making large contracts with clock factories" was certainly confirmed, as the data points established his dealings with four factories, with the depositions adding L. W Lewis's factory as a fifth.[128] The discovery of a signed Phineas Deming dial, combined with the dial data, confirms the statement that he "signed clocks as P. Deming" and establishes this factory as an assembly shop which likely produced dials and assembled clockworks with bartered wheels.[129] Similarly, the single marked Charles Lewis example was shown to have been manufactured using parts sourced from others, confirming Rogers' assessment that Charles' "factory" that was listed in the tax records may only have been a clock assembly shop."[130]

Examples have been discovered of three additional nameplates, unknown at the time of the publication of the *Trumbull County Clock Industry,* that provide additional

---

127 Rogers, *Trumbull County Clock Industry, 1812 - 1835* (1991) 12.
128 Rogers, *Trumbull County Clock Industry, 1812 - 1835* (1991) 21.
129 Rogers, *Trumbull County Clock Industry, 1812 - 1835* (1991) 12.
130 Rogers, *Trumbull County Clock Industry, 1812 - 1835* (1991) 21.

information on the local industry. A newspaper ad from 1831 indicated that Ansel Merrill had sold to Hart & Way and that existing stock was being offered; the appearance of a Hart & Way marked dial with an Ansell Merrell dial template confirmed both the transfer and continued production.[131] The identification of the dial marked for W. W. Ling as a product of the L. W. Lewis factory was dependent entirely on the dial template and works *type* data. Additionally, the dial template and works *type* data both established the relationship between L. W. Lewis and Hart & Truesdale and made possible the discovery and attribution of the dial marked for H. Cook, Medina.

At the time of its publication, the photos of the twelve tall clock dials gathered for the Rogers' *Trumbull County Clock Industry* constituted the largest and perhaps only, collection of local material available to a researcher. The recent release of *American Wooden Movement Tall Clocks, 1712* - 1835 increased that number to nineteen.[132] The current sample of eighty five dials has provided opportunity to search for patterns in commonalities and quirks that these small sample could not, with each additional dial adding to the complexity of the patterns. Even the discovery of the use of dial templates was made possible by the increased number of dial examples. While the original small sample led Rogers to envision an industry where "most dials were ornamented at one place, the Lambert W. Lewis factory, where nine young women lived and worked," it is now apparent from the patterns of use of the multiple templates that production took place in several factories, assembly shops or dial shops with active trading among the

---

131 *Warren (Ohio) The Western Reserve Chronicle* (September 26, 1831).

132 Both Rogers and Morris pictured the same clocks for Ansel Merrell and Ambrose Hart in their books.

entities.[133] Each of the major producers, Ansel Merrell, Hart & Truesdale, L. W. Lewis and Wheeler Lewis, either sourced from or supplied dials to a competitor. Unfortunately, the patterns in dial template use can only show that a transaction occurred, not that one did not occur. By way of example, the previously noted data for Garry Lewis marked dial types can be interpreted either to argue that Garry owned an assembly shop that made all his dials or that he sourced all dials from other factories and made nothing; neither can be disproved with the current data. Only the continued collection and comparison of dial tracings will be able to settle these arguments.

Despite the regional focus of the *Trumbull County Clock Industry*, much of the information that Rogers gleaned from the court depositions applied to the general industry. The references she extracted from the depositions that were related to packaging works and dials for transportation represented new, though very puzzling, information. That the faces were "placed painted surface to painted surface with a turned wooden bolt, called a button or nut, set into the center," was quite clear, but the exact procedure described as "the cleats that braced and held the faces flat were wired together" was not known.[134] The recent discovery of the remnants of those wires in Wheeler Lewis dial C-5 has led to a more complete understanding of the practice. The button or nut was likely a round wooden spacer, slightly thicker than the diameter of the center holes and certainly no longer than an 1", with a taper similar to a modern football. Two clock dials would have been placed on edge with the cleats oriented vertically, painted side to painted side with the button inserted into both center holes to maintain a distance between

---

[133] Rogers, *Trumbull County Clock Industry, 1812 - 1835* (1991) 17.
[134] Rogers, *Trumbull County Clock Industry, 1812 - 1835* (1991) 17.

the surfaces. A very light gauge wire was then formed into a staple with the legs of the staple driven into the end grain of the opposing cleats. After all four cleat ends had been fastened together, the dial pair could be easily handled without damage. The most likely method for transporting these dial pairs would have been to place them on edge into a shipping box, alternating the direction of the lunettes left side to right side, thereby offsetting the cleats and maximizing the number of dials in the crate. The appearance of the holes and tracks left by the wires are evidence of packaging for shipment; absence of those marks would seem to be an indicator for a clock sold locally. Both the Ansel Merrell dial D-3, made for James Scott, and the Garry Lewis signed dial A-4 lack these packaging marks, suggesting that they were sold locally and that the accompanying tall clock cases may be local products as well.

The *Trumbull County Clock Industry* also documented the existence of the limited production of *patent* clocks, with marked examples illustrated for Wheeler Lewis, Charles Lewis, Phineas Deming and Hart & Truesdale. In the intervening years, examples have been located for Ansel Merrell, John Hartson and William Hartson. The dial data developed from the common clock production has some limited value in the identification of locally produced patent clocks.

One of the most significant differences between the design of a patent clock and a common clock involves the attachment of the dial. While the tall clock works and dial were joined together with the posts and cleats, the shelf clock dial was attached to the case. This means that the dial provides very little evidence of the associated clockworks, effectively negating the method used to identify the *type* of the tall case works. The tall

case dial numeral templates, however, do seem to exhibit some commonality with the shelf clock examples.

figure 5.1

Two marked shelf clock examples that were products of the Hart & Truesdale factory used a version of the dial group-A template that appeared on that factory's tall clocks.[135] The second pair of matched templates includes tall clock dial H-1, marked for Hart & Way, and the only known Ansel Merrell shelf clock dial, housed in a curly maple pillar and scroll case with a patent style movement.[136] A third dial template appears on both a tall clock (C-3) marked for Wheeler Lewis and a loose dial that descended through

---

[135] Hart & Truesdale and William Hartson shelf clocks, private collection, Hartford, Oh.

[136] Ansel Merrell pillar and scroll shelf clock, private collection, Mahoning County, Oh.
A fourth match appears to exist between the Phineas Deming labeled tall clock dial (I-1)and one of the two known Deming labeled pillar and scroll shelf clocks. This shelf clock was not available for comparison; the attribution could not be verified.

the family of clock peddler Levi Sutliff.[137] This template, designated dial group-B, also matches two groaner movement clock dials, marked for Charles Lewis and Wheeler Lewis, respectively.[138]

Though beyond the scope of this thesis, the originality of the dials appearing on the remainder of the locally produced shelf clocks must be re-examined within the context of the dial group templates. Shelf clock dials are often found to have been switched, with replacement seeming to have been more common than repair. The local tall clock dial groups provided verification of three shelf clock dial templates, creating a baseline against which questionable dials may be judged.

The mechanics of the preceding dial analysis provided an analytical method to isolate patterns in construction and decoration within a related group of handmade clock dials. A final examination of the results obtained highlighted both the strengths and limitations of this method. It was anticipated by the author that the analysis of the dials' backs would yield usable results when applied to the relatively small sample provided by the local industry; the results of the study confirmed that belief. However, the commonality of the layout of the works coupled with production inconsistencies within the local product generated more overlapping data than was anticipated. It would seem likely that the occurrence of these overlapping data sets would increase so quickly in a larger, industry based sample of dials as to render the information indecipherable.

In contrast, the information derived from the dials' numeral layouts promises a better result when applied to the larger industry. The possible combinations of style, size

---

[137] Loose shelf clock dial drilled for groaner movement. Dial in possession of Sutliff Museum, Warren, Oh.

[138] Wheeler and Charles Lewis groaner clocks, private collections, Columbiana County, Oh.

and position for each numeral provide more points for comparison and a better chance that unique patterns can be established. The comparison of the tracings of dial fronts revealed the existence of the templates and the manner in which they were used. The discovery of shared templates for tall clock dials and the dials used for shelf clock production established the validity of the method and suggests a possible application to the broader wooden works clock industry. While a cursory inspection prior to beginning the research suggested that perhaps eight or nine patterns were in use; the final total was twenty-one dial templates, some of which seem to be second and third generation copies; additional local dial templates surely await discovery. Though the number of traced dials represented less than one-tenth of one percent of the estimated output of the industry, it has proved to be a large enough sample to reveal its major patterns.

CODA

The modern industrial age began with the simplest of traditional materials,… wood. The techniques and technologies that began the transformation of the craft- based world of the 18th century into the machine driven world of the late 19th century were developed in New England with wooden machinery and products. The author of *America's Wooden Age* called wooden clocks "the bridge between handmade brass clocks and mass-produced brass."[139] No other industry pushed the frontiers of production technology faster than the clock industry, even experimenting with ivory and glass to create clock wheels.[140] The wood works clockmakers established and refined the practice of mass producing interchangeable parts, creating an industry driven by competition and innovation. Within a 30 year span, the industry blossomed and died, the victim of its own relentless push to develop a better, more profitable product.

During that 30 year period, Trumbull County clock production provided employment for laborers, sawyers, factory workers, decorators, metal workers and whitesmiths. Peddlers sold Trumbull County clocks in at least seven states and Canada, bringing back barter profits and scarce cash. The economy of Trumbull County was inextricably linked with the fortunes of the wood movement clock producers.

---

[139] Brooke Hindle, *America's Wooden Age: Aspects of its Early Technology* (Terrytown NY, Sleepy Hollow Restorations, 1975), 7.

[140] Morris, *American Wooden Movement Tall Clocks, 1712 - 183*1 (Hoover, AL., Heritage Park Publishing, Inc., 2011),248-249.

Thomas P. Jones, M.D., ed, *The Journal of the Franklin Institute of the State of Pennsylvania; Devoted to the Mechanic Arts, Manufacturers, General Science and the Recording of American and other Patents* (Philadelphia: The Franklin Institute, J. Harding, printer, 1830), 364,385; available online from Google.Books.Com.

Relatively little written information survived from that local wooden works industry, mostly related to the legal difficulties of the makers and merchants. A handful of the entrepreneurs and innovators of the New England branch of the industry later wrote accounts claiming to have been the first or the best, but the people and everyday practices involved with making and selling clocks remain largely undocumented[141] This study has provided an artifact based interpretation of the local wooden clock industry through an analysis of a small segment of that industry's output, confirming much of the previous research, while yielding new information on the businesses and products of the industry, and providing a collection of local dials placed in context for further study. Additionally, the degree to which this study's conclusions have correlated with the written records may be seen as a validation of the thesis; "that each factory's dials will exhibit a unique set of measurements for the cleats and attachment holes in the back of the dial,… but that the combinations of names and numbering styles used on the face of the dial will not be consistent for every factory; … these combinations of dial measurements, signature blocks, and numeral templates can be… used to expand the existing literature related to the local industry, clarifying the business relationships among the manufacturers, jobbers, and merchants to further the understanding of the birth, growth and collapse of the Trumbull County wooden works clock industry." The evidence of the Trumbull County wooden clock industry lies in the objects that the workers and artisans created; it is the historian's challenge to decipher that evidence.

---

[141] Jerome, Chauncey. *History of the American Clock Business for the Past Sixty Years, and Life of Chauncey Jerome.* 1860; (reprint, Bristol, Ct., National Watch and Clock Collectors, Inc., 2001), 33-58.

Kenneth D. Roberts and Snowdon Taylor, *Eli Terry and the Connecticut Shelf Clock*, 2nd ed., revised (Fitzwilliam, NH, Ken Roberts Publishing Company, 1994), 46-49.

Bibliography

In the absence of sufficient documentary evidence, the objects must become the primary resources. The approach draws upon the methodology of industrial archeology, utilizing variations within a group of related objects to infer differences within the production and distribution processes thereby interpreting both the object and the industry.

Primary sources: Three dimensional

Eighty-four wooden works tall clock dials, eighty-two of which are marked with names documented to have been associated with the Trumbull County wooden works clock industry. Forty-four dials carry associated clockworks, though condition varies from remnant to very good. The majority of the dials are drawn from two private collections in Northeast Ohio. All photos, tracings and measurements are in the possession of the author.

Six additional shelf clock dials, five with accompanying paper labels identifying the clocks as products of the Trumbull County clock industry. All photos, tracings and measurements are in the possession of the author.

Clock dial A-1

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-L

Works *type-10*

Condition: good original condition, original clockworks, replaced hands

Walnut Sheraton case, Meadville Pa vicinity

Clock dial A-2

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-O

Works *type-6*

Condition good original condition, matched to proper works and hands

Original walnut Empire inspired case with trapezoidal base, top crest composed of rosettes.

Clock dial A-3

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced N/A

Dial group-

Works N/A

Condition: good original condition, damaged clockworks, no hands

Original poplar grained case, mass produced in Trumbull County

Clock dial A-4

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-M

Works *type-9*

Condition: good original condition, original clockworks, replaced hands

Sheraton case in curly maple, cherry & walnut, likely Trumbull County origin

Clock dial A-5

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Pell City Al

Traced – yes

Dial group-L

Works N/A (Ansel Merrell stamped)

Condition: good original condition, original clockworks and hands

Unrelated case

Clock dial A-6

Signed G. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint, gesso & leaf

Photo courtesy Gardner Galleries, Ontario Canada

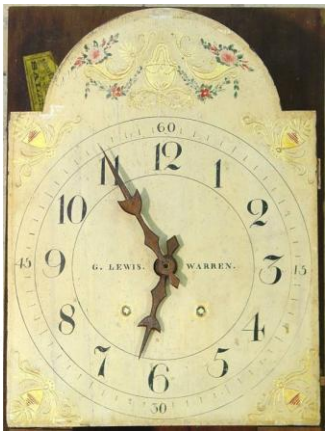
Traced N/A

Dial group-

Works N/A

Condition: good original condition, clockworks unknown, replaced hands

Walnut Hepplewhite cathedral top case; Winona, Columbiana Co, Oh



Clock dial A-7

Signed G. LEWIS. VIENNA.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-N

Works *type-7*

Condition: good original condition, original clockworks and hands

Original Cherry Hepplewhite case attributable to Read Bros. of Xenia

Clock dial A-8

Signed G. LEWIS. VIENNA.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-N

Works *type-7*

Condition: Fair original condition, original clockworks, missing hands

Uncased

Clock dial A-9

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: Wood & paint

Private collection, Salem Oh

Traced – yes

Dial group-N

Works N/A

Condition: fair original condition, no clockworks or hands

Uncased

Clock dial A-10

Signed G. LEWIS.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Salem Ohio

Traced N/A

Dial group-L

Works N/A

Condition: good original condition, original clockworks and hands

Cherry Hepplewhite case, possibly local origin

Clock dial A-11

Signed G. Lewis.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Photo courtesy of Garths Auction, Delaware Oh

Traced N/A

Dial group- unknown

Works N/A

Condition: good original condition, replaced works and hands

Original poplar grained case, mass produced in Trumbull County; stripped and refinished

Clock dial A-12

Signed G. LEWIS

Materials: wood, paint & gesso

Ca. 1820 – 1835

Photo from E-Bay online auction posting, Buffalo NY

Traced N/A

Dial group-L1

Works N/A

Condition: Fair original condition, replaced hands and works

Uncased

Clock dial B-1

Signed L. W. LEWIS.

Ca. 1815 – 1835

Materials: wood, paint & gesso

Photo courtesy of Garths Auctions Delaware, Oh

Traced N/A

Dial group

Works N/A

Condition: good original condition, original clockworks and hour hand, minute hand replaced

Unrelated case

Clock dial B-2

Signed L. W. LEWIS.

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Photo courtesy of Constantine & Pletcher Auction, Fox Chapel Pa

Traced N/A

Dial group-

Works N/A

Condition: good original condition, replaced clockworks and hands

Cased, relationship unknown

Clock dial B-3

Signed L. W. LEWIS.

Ca. 1825 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-F

Works type-2

Condition: good original condition, original clockworks, correct hands (may be replacements)

Original poplar grained case, mass produced in Trumbull County

Clock dial B-4

Signed L. W. Lewis.

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private collection, Rocky River Oh

Traced – yes

Dial group-G

Works type-1a

Condition: good original condition, original clockworks and hands

Uncased

Clock dial B-5

Signed L, W, LEWIS.

Ca. 1815 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-I

Works type-1a

Condition: poor original condition, (converted to shelf clock, lunette removed), no clockworks or hands

Uncased

Clock dial B-6

Signed L. W. LEWIS

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private collection, Hartford Oh

Traced – yes

Dial group-H

Works type-1

Condition: good original condition, original clockworks, replaced hands

Uncased

Clock dial B-7

Signed L. W. LEWIS

Ca. 1815 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-G

Works type-1

Condition: very poor original condition, portions of clockworks, no hands

Uncased

Clock dial B-8

Signed L. W. LEWIS.

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private collection, Hartford Oh

Traced – yes

Dial group-G

Works – N/A

Condition: fair original condition (damage from paint stripper on edges), original clockworks (damaged), replacement hands

Original walnut Hepplewhite case, made in Fayette Co., Pa

Clock dial B-9

Signed L. W. LEWIS

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private owner, photographed supplied by Rebecca Rogers

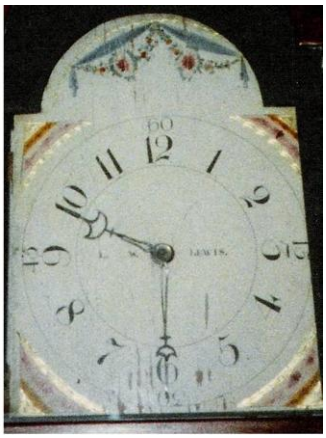
Traced – N/A

Dial group-

Works type- N/A

Condition: good original condition, original clockworks and hands

Uncased



Clock dial B-10

Signed L. W. LEWIS

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private collection, Hartford Oh

Traced – repainted

Dial group N/A

Works type-1a

Condition: good original paint in lunette, Otherwise poorly repainted, original clockworks, replaced hands

Curly maple and walnut American Empire style case, probably Centennial

Clock dial B-11

Signed L. W. LEWIS

Ca. 1815 – 1835

Materials: unknown

Photo courtesy of the Museum of American Folk Art

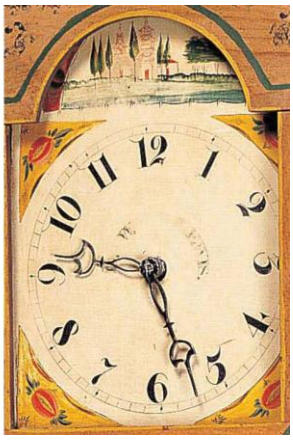
Traced N/A

Dial group-

Works N/A

Condition: unknown

Finely decorated flat topped case related to cases from dials C-20 and H-1



Clock dial B-12

Signed L. W. LEWIS.

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private collection, Hartford Oh

Traced – yes

Dial group-G

Works type-1a

Condition: good original condition, original works , proper replacement hands

Original poplar grained case, mass produced in Trumbull County

Clock dial B-13

Signed L, W, LEWIS

Ca. 1815 – 1835

Materials: wood & paint

Private collection, Salem Oh

Traced – yes

Dial group-I

Works type-1b

Condition: poor condition, extensively repainted, no clockworks or hands

Uncased

Clock dial C-1

Signed W. LEWIS. Warren.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-T

Works type-9

Condition: good original condition, original clockworks, replacement hands

Uncased

Clock dial B-15

Signed L, W, LEWIS,

Ca 1815 – 1835

Materials: wood & paint

Private collection, New Carlisle Oh

Traced N/A

Dial group-

Works N/A

Condition: good original condition, no clockworks or hands

Uncased

Clock dial B-16

Signed L W LEWIS.

Circa 1815 -1835

Materials: wood & paint

Photo courtesy Old Economy Village, Ambridge Pa

Traced N/A

Dial group

Works N/A

Condition: good original condition, improper replacement clockworks and hands

Uncased

Clock dial B-17

Signed L. W. LEWIS.

Ca. 1815 – 1835

Materials: wood, paint & gesso

Photo courtesy of Old Economy Village, Ambridge Pa

Traced N/A

Dial group-

Works type-1a

Condition: good original condition, no clockworks or hands

Uncased

Clock dial B-18

Signed L. W. LEWIS.

Ca. 1815 – 1835

Materials: wood, paint & gesso

Private owner, Wilcox Pa

Traced N/A

Dial group

Works type N/A

Condition: fair original condition, original clockworks, replaced hands

Unrelated case

Clock dial B-19

Signed L W LEWIS

Ca. 1815 – 1835

Materials: wood & paint

Photo courtesy of Old Economy Village Ambridge Pa

Traced N/A

Dial group

Works N/A

Condition: fair original condition, no clockworks or hands

Uncased

Clock dial B-20

Signed L W LEWIS

Circa 1815 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-I

Works type-2

Condition: good original condition, original clockworks, replaced hands

Folk decorated case, likely the same shop as B-11 and H-1

Clock dial B-21

Signed L. W. Lewis

Ca. 1815 – 1835

Materials: wood, paint, gesso and gold

Private collection, Hartford Oh

Traced – yes

Dial group-G

Works type N/A

Condition: good original condition, original clockworks, replaced hands

Original poplar grained case, mass produced in Trumbull County, simple version without chamfers or side frets

Clock dial B-22

Signed L. W. Lewis

Ca. 1815 – 1835

Materials: wood, paint, gesso & gold

Private collection, Hartford Oh

Traced – yes

Dial group- J

Works type N/A

Condition: good original condition, replaced hands and brass clockworks

Original poplar grained case, mass produced in Trumbull County

Clock dial B-23

Signed L. W. Lewis

Ca. 1815 – 1835

Materials: wood, paint, gesso and gold

Private owner, photographed by permission in Fort Mitchell Ky

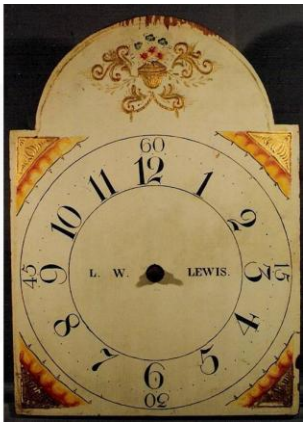
Traced – N/A

Dial group-

Works type N/A

Condition: good original condition, original clockworks, missing hands

Uncased



Clock dial C-1

Signed W. LEWIS. Warren.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-T

Works type-9

Condition: good original condition, original clockworks, replacement hands

Uncased

Clock dial C-2

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-S

Works N/A

Condition: poor fair original condition, no clockworks or hands

Uncased

Clock dial C-3

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint, gesso & gold

Private collection, Poland Oh

Traced – yes

Dial group-B

Works N/A

Condition: good original condition (appears to have been immediately modified to fit a groaner works shelf clock), no clockworks or hands

Uncased

Clock dial C-4

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Tennessee State Museum, Nashville Te

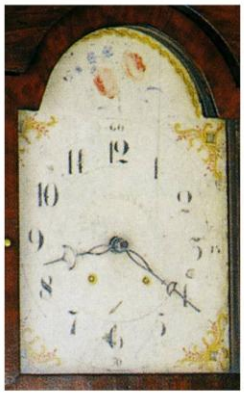
Traced N/A

Dial group-

Works N/A

Condition: good original condition, original hands and clockworks

Mahogany Sheraton case with attribution to Nashville, Te



Clock dial C-5

Signed W. LEWIS. WARREN

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-T

Works type-9

Condition: fair original condition, signature retouched, original clockworks and hands

Original poplar grained case with gold painted decoration, mass produced in Trumbull County

Clock dial C-6

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private owner, Vienna Oh

Traced – yes

Dial group-S

Works N/A

Condition: good original condition, no clockworks or hands (holes from attachment to unrelated clockworks)

Uncased

Clock dial C-7

Signed W. LEWIS. WARREN

Ca. 1820 – 1835

Materials: wood, paint & gesso

Photo courtesy of Garths Auction, Delaware Oh

Traced N/A

Dial group

Works N/A

Condition: Poor original condition, incorrect clockworks, proper replacement hand

Unrelated case

Clock dial C-8

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Salem Oh

Traced – yes

Dial group-R

Works type-3b

Condition: good original condition, replaced clockworks and hands

Uncased

Clock dial C-9

Signed WILET WARREN
(W. Lewis overpainted signature)

Ca. 1820 – 1835

Materials: wood, paint, gesso & gold

Private collection, Salem Oh

Traced – yes

Dial group-S

Works type-9

Condition: poor condition, overpainted, original works, hands unknown

Cased, N/A

Clock dial C-10

Signed W. LEWIS, WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private owner, Vienna Oh

Traced – yes

Dial group-R

Works N/A

Condition: poor original condition, lunette removed, no clockworks or hands

Uncased (never drilled for shelf clock use, possible use in early flat top case without arched door)

Clock dial C-11

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced N/A

Dial group-

Works type-9

Condition: fair original condition, paint de-laminating, no clockworks or hands

Uncased

Clock dial C-12

Signed W. LEWIS. WARREN.

CA. 1820 – 1835

Materials: wood & paint

Private owner, Lexington Ky

Traced – N/A

Dial group-

Works N/A

Condition: good original condition, clockworks unknown, replaced hands

Walnut case with Gothic elements; relationship and age unknown

Clock dial C-13

Signed W. LEWIS, WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private owner, Findlay Oh

Traced N/A

Dial group

Works type N/A

Condition: good original condition, original clockworks and hands

Original walnut case, spindled Sheraton base, paneled waist, Chippendale fretwork bonnet, likely southwestern Pennsylvania origin

Clock dial C-14

Signed W. LEWIS. WARREN.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group-S

Works type-9a

Condition: good original condition (some touch-up to paint along center line), no clockworks or hands

Uncased

Clock dial C-15

Signed W. LEWIS. WARREN.

Ca 1820 – 1835

Materials: wood, paint, gesso & gold

Salem Historical Society, Salem Oh

Traced N/A

Dial group-I

Works type N/A

Fair original condition, original clockworks and portion of hour hand

Flat top case, likely made locally, dated 1823. date is problematic; this may be second set of works

Clock dial C-16

Signed W. LEWIS, WARREN.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Fort Mitchell Ky

Traced – N/A

Dial group

Works type-N/A

Condition: good original condition, original clockworks, replaced hands

Uncased

Clock dial D-1

Signed A. Merrell.

Ca. 1820 - 1835

Materials: wood, paint & gesso

Private collection, Hartford, Oh

Traced - yes

Dial group-P

Works *type-10a*

Condition: good original condition, original clockworks, hands replaced.

Sheraton case in curly walnut, origin unknown.

Clock dial D-2

Signed A. Merrell Vienna

Ca. 1820 – 1835

Materials: wood, paint, gesso & leaf ?

Private collection, Sugar Grove, Pa

Traced - N/A

Dial group - Q

Works – N/A

Condition: good original condition; signature blocks questionable Original clockworks, hands unknown

Uncased

Clock dial D – 3

Signed A. MERRELL. VIENNA. J. SCOTT.

Ca. 1820 – 1835

Materials: wood, paint, gesso & leaf

Trumbull County Historical Society, Warren, Oh

Traced

Dial group-Q

Works- *type 10a*

Condition: excellent original condition, hands and clockworks replaced

Hepplewhite case in cherry, possibly Charles White or Asa Lowe

Clock dial D-4

Signed A. MERRELL.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Toronto, Ontario, CA

Traced N/A

Dial group-D

Works N/A

Condition: good original condition, clockworks unknown, hands replaced

Poplar grained case, mass produced in Trumbull County; exported to Burford, Ontario w/ additional stenciling applied by J. Woodruff. (author's research)

Clock dial D-5

Signed A. MERRELL. VIENNA.

Ca. 1820 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Poland Oh

Traced N/A

Dial group-Q

Works N/A

Condition: good original condition, original clockworks and hands

Matched to poplar grained case, mass produced in Trumbull County

Clock dial D-6

Signed A, Merrell,

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Kinsman Oh

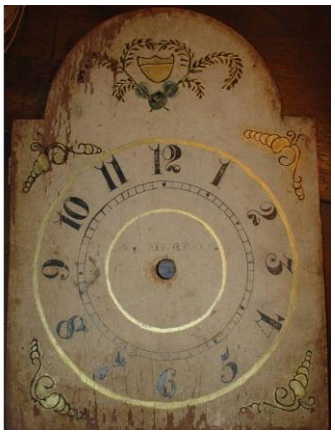
Traced - yes

Dial group-E

Works N/A

Condition: poor condition, some repaint, clockworks and hands replaced.

Unrelated case



Clock dial D-7

Signed A. MERRELL.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Salem Oh

Traced N/A

Dial group-D

Works N/A

Condition: poor original condition, no clockworks or hands

Uncased

Clock dial D-8

Signed ? (Ansel Merrell)

Ca. 1820 – 1835

Materials: wood, paint, gesso? & leaf?

Private collection, Dayton Oh

Traced N/A

Dial group N/A

Works N/A

Condition: unknown

Uncased

Photo unavailable

Clock dial D-9

Signed A. MERRELL VIENNA.

1820 – 1835

Materials: wood & paint

Private collection, Pell City Al

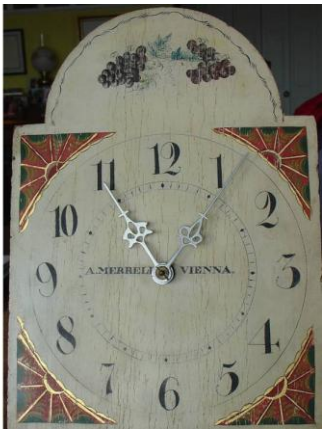
Traced – yes

Dial group-Q1

Works unknown (stamped AM)

Condition: good original condition, original clockworks, replaced hands

Original case (check photos)



Clock dial D-10

Signed A. MERRELL VIENNA.

Ca. 1820 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Salem Oh

Traced N/A

Dial group-Q1

Works N/A

Condition: good original condition, original clockworks, original hands

Cherry Hepplewhite case, origin unknown.

Clock dial D-11

Signed A. MERRELL

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

Traced – yes

Dial group- C

Works *type-10*

Condition: original condition, over cleaned, original clockworks and hands

Uncased

Clock dial D-12

Signed A. MERRELL.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Hartford Oh

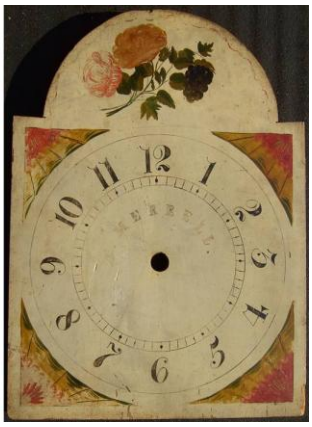
Traced – yes

Dial group-D

Works *type-10*

Condition: good original condition, no clockworks or hands

Uncased



Clock dial-D-13

Signed A. MERRELL.

Ca. 1820 – 1835

Materials: wood, paint, gesso & leaf

Private owner, Buffalo NY

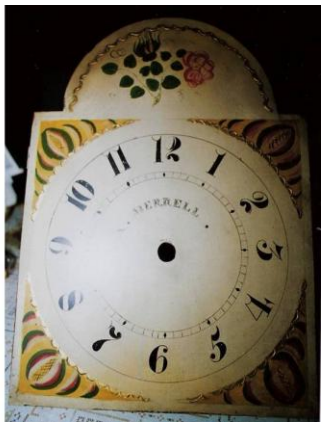
Traced N/A

Dial group-D

Works N/A

Condition: good original condition, unknown works and hands

Case unknown



Clock dial D-14

Signed A. MERRELL VIENNA.

Ca. 1820 – 1835

Materials: wood, gesso & paint

Private owner, photographed by permission in Fort Mitchell Ky

Traced – N/A

Dial group-

Works *type-N/A*

Condition: good original condition, no clockworks or hands

Uncased

Clock dial-F-1

Signed HART & TRUESDAL HARTFORD

Ca. 1825 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Akron Oh

Traced – yes

Dial group-A

Works type-11

Condition: good original condition, no clockworks or hands

uncased

Clock dial F-2

Signed HART & TRUESDAL HARTFORD

Ca. 1825 -1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-A

Works type-11

Condition: good original condition, original clockworks, replaced hands

Original walnut Hepplewhite case, family provenance to Athens County, Oh

Clock dial F-3

Signed HART & TRUESDAL HARTFORD

Ca. 1825 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Hartford Oh

Traced – yes

Dial group-A

Works type-11

Condition: good original condition, original clockworks (badly damaged), replacement hands

Unrelated case

Clock dial F-4

Signed HART & TRUESDAL
HARTFORD

Ca. 1825 – 1835

Materials: wood, paint, gesso & leaf ?

Daughters of the American Revolution Museum, Paris Ky

Traced N/A

Dial group-A

Works type-11

Condition: good original condition, original clockworks and hands

Original walnut Hepplewhite case, E. Warner maker, Lexington Ky

Clock dial F-5

Signed HART & TRUESDAL
HARTFORD OHIO

Ca. 1825 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Fort Wayne In

Traced N/A

Dial group-A

Works N/A

Condition: excellent original condition, original clockworks and hands

Unrelated case

Clock dial F-6

Signed HART & TRUESDAL
HARTFORD OHIO

Ca. 1825 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-A

Works N/A

Condition: fair original condition, original clockworks, replacement hands

Uncased

Clock dial F-7

Signed HART & TRUESDALE
HARTFORD

Ca. 1825 – 1835

Materials: wood, paint & gesso

Private collection, Salem Oh

Traced N/A

Dial group N/A

Works N/A

Condition: good overall condition, numerals repainted, original clockworks and hands

Naive country case, poplar, descended in family of H & T factory worker

Clock dial F-8

Signed HART & TRUESDAL
HARTFORD

Ca. 1825 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Salem Oh

Traced – yes

Dial group-A

Works type-11a

Condition: good original condition, original clockworks (badly damaged), original hands

Original Hepplewhite hardwood case, western New York, complete family provenance

Clock dial F-9

Signed HART & TRUESDAL

Ca. 1825 – 1835

Materials: wood, paint, gesso & leaf

Private collection, Hartford Oh

Traced – yes

Dial group-H

Works type-11b

Condition: good original condition, original clockworks, no hands

Uncased

Clock dial G-1

Signed A. HART. BROOKFIELD.

Ca. 1820 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-K

Works type-4

Condition: good original condition, clockworks possibly replaced, hands replaced

Original poplar grained case, mass produced in Trumbull County

Clock dial H-1

Signed HART & WAY BROOKFIELD

Ca. 1830 -1835

Materials: wood, paint, gesso & silver

Private collection, New Cannaan Ct

Traced N/A

Dial group-E

Works N/A

Condition: good original condition, original clockworks, replaced hands

Paint decorated, flat topped country case, one of three from an identifiable regional shop: case related to B-20

Clock dial I-1

Signed P. DEMING.

Ca. 1820 – 1835

Materials; wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-P

Works type-5

Condition: good original condition, original clockworks (substantially repaired), replaced hands

Uncased

Clock dial J-1

Signed D. R. HARTSON.

Ca. 1820 – 1835

Materials: wood & paint

Private collection, Sunbury Oh

Traced N/A

Dial group N/A

Works N/A

Condition: fair original condition, no clockworks or hands

Uncased

Clock dial K-1

Signed W. W. LING 1817

Ca. 1815 – 1835

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-F

Works type-2

Condition: good original condition, original clockworks, replaced hands

Original poplar grained case, mass produced in Trumbull County (stripped)

Clock dial L-1

Signed H. COOK. MEDINA.

Ca. 1826 – 1834

Materials: wood, paint & gesso

Private collection, Hartford Oh

Traced – yes

Dial group-J

Works type -11b

Condition: good original condition, clockworks and hands replaced, top splat flipped and glued.

Cherry case by Warner, relationship unknown.

Clock dial M-1

Signed C. LEWIS

Ca. 1830 – 1835

Materials: wood, paint & gesso

Private collection, Mahoning County

Traced – yes

Dial group-N

Works type – 7a

Condition: good original condition, original clockworks, replaced hands

Original poplar grained case, mass produced in Trumbull County

Clock dial X-1

Unsigned

Ca. 1820 – 1835

Materials: wood, paint, gesso & bronze

Private collection, Hartford Oh

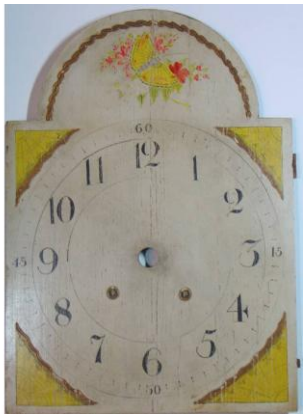
Traced – yes

Dial group-S

Works type-9a

Condition: good original condition, original clockworks and hands

Uncased



Clock dial X-2

Unsigned

Ca. 1820 – 1835

Materials: wood & paint

Old Economy Village, Ambridge, Pa

Traced N/A

Dial group-

Works N/A

Condition: good original condition, clockworks and hands replaced

Unrelated case

Clock dial X-3

Unsigned

Ca. 1820 – 1835

Materials: wood & paint

Private collection, photo courtesy of Mark Baker

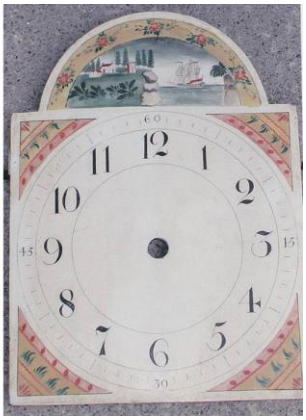
Traced – N/A

Dial group

Works type-

Condition: fully repainted, clockworks and hands unknown

Unknown case



Primary sources: manuscript

28 *Depositions Taken in a Civil Court Case of Lambert W. Lewis, Pardon Sherman, Noahdiah Webster vs. Garry Lewis in Chancery, as Heard in Appeal to the Ohio Supreme Court. Twenty eight depositions contained within, spanning May 23, 1834 to November 12,1834.* Transcription by Rebecca Rogers, n.d., unpublished. (The county archivist can no longer locate the originals on microfilm; only Rogers unedited transcription of the originals remain.)

Robert Cochran Store Ledger,1828 – 1832. Private collection, Poland, Mahoning County, Ohio.

Garry Lewis Surety Note. November 2, 1827. Clocks pledged as surety. Private collection, Hartford, Trumbull County, Ohio.

Diary of Candace Roberts: 1801 - 1806. The Bristol Public Library, Bristol, Connecticut. Transcription by Maumee Roberts, 1946, unpublished.

Azel Tracy Account Book, 1818 - 1863. private collection, Hartford, Ohio. Xerox copy on file with Trumbull County Library, special collections, Warren, Ohio.

Diaries of Sylvia Lewis Tyler of Bristol, 1801-1829. (volumes for 1818, 1819 & 1820 only) NSDAR Americana Collection, acc. 2899. Transcription by Alden O'Brien, 2000, unpublished.

Western Reserve Chronicle(Warren, Ohio). Trumbull County (Ohio) Public Library, special collections. microfilm.

Trumbull County (Ohio) archives. Records of the Probate and Civil Courts, Property Tax Records and Plat Maps. Warren, Ohio.

Primary sources: published

Jerome, Chauncey. *History of the American Clock Business for the Past Sixty Years, and Life of Chauncey Jerome.* 1860; reprint, Bristol, Ct: National Watch and Clock Collectors, Inc.. 2001.

The Journal of the Franklin Institute of the State of Pennsylvania; Devoted to the Mechanic Arts, Manufacturers, General Science and the Recording of American and other Patents. Thomas P. Jones, M.D., ed.. Philadelphia: The Franklin Institute, J. Harding, printer. December,1830, p. 385. Digitized by Google @ Books.Google.Com.

Secondary sources:

America's Wooden Age: Aspects of its Early Technology. Edited by Brooke Hindle. Tarrytown, N.Y.: Sleepy Hollow Restorations, Inc., 1975.

Biddle, Owen. *Biddle's Young Carpenter's Assistant; or, A System of Architecture Adapted to the Style of Building in the United States.* 1805, Reprinted with forward and spelling corrections, Mineola, NY: Dover Publications, Inc., 2006.

The Cog Counter's Journal. privately published, originals bequeathed to and on file with the NAWCC Museum in Bristol, Connecticut. updates on file with same.

Francillon, Ward. *Pre-Porter Wooden Tall Clocks - Terry's Contemporaries and Their Products, a Comparison*. Lecture presented at the 18th annual NAWCC Seminar, Bristol, Connecticut, October 23 - 25, 1997. Columbia, Pa.: National Association of Watch and Clock Collectors, Inc., 1997.

Gibbs, James W.. *Buckeye Horology, A Review of Ohio Clock and Watch Makers.* Columbia, Pa.: The Art Crafters, 1971.

Heffner, Paul V.. *Ohio Clock Exhibit: 1810 - 1850, Guide to the Collection*. Lebanon, Ohio: jointly published by NAWCC Buckeye Chapter #23 and the Warren County Historical Society, 1984.

Hodges, Theodore B.. *Erastus Hodges, 1781-1847: Connecticut manufacturer, merchant & entrepreneur*. West Kennebunk, ME.: National Watch and Clock Collectors, Inc. and The Torrington Historical Society, Inc.with Pheonix Publishing,1994.

Hoke, Donald R.. *Ingenious Yankees: The Rise of the American System of Manufactures in the Private Sector.* NY: Columbia University Press, 1990.

Martin, Gina and Lois Tucker. *American Painted Tinware, A Guide To Its Identification.* 4 vols. Cooperstown, NY: Historical Society of Early American Decorations, Inc., 1997.

Morris, Philip E.. *American Wooden Movement Tall Clocks, 1712 - 1835.* Hoover, AL: Heritage Park Publishing, Inc., 2011.

Palmer, Brooks. *The Book of American Clocks*. NY: Macmillan Publishing, 1928, 1950.

Roberts, Kenneth D. and Snowdon Taylor. *Eli Terry and the Connecticut Shelf Clock*, 2nd ed., revised. Fitzwilliam, NH: Ken Roberts Publishing Company, 1994.

Rogers, Rebecca M.. *The Trumbull County Clock Industry, 1812-1835.* Dayton, OH: Sterling Graphics, 1990.

Spittler, Sonya & Thomas and Chris Bailey. *American Clocks - Volume 3, American Clockmakers and Watchmakers.* Fairfax , VA: Arlington Book Company, Inc, 2000.

Taylor, Snowdon. "Characteristics of Standard Terry-type 30-hour Wooden Movements as a Guide to Identification of the Movement Maker," *Bulletin of the National Watch and Clock Collectors, Inc.* #208, part 1, volume XXII (October 1980).

Williams & Bro., editors. *History of Trumbull and Mahoning Counties with Illustrations and Biographical Sketches*, 2 vols. 1882: reprint 2 vols. in 1 with index of names, Evansville, Indiana: Unigraphics, IN, n.d..

Zea, Philip and Robert C. Cheney. *Clock Making in New England, 1725 - 1825, An Interpretation of the Old Sturbridge Collection.* Sturbridge MA: Old Sturbridge Village, 1992.