

# *Harlow's* **WOODEN MAN**

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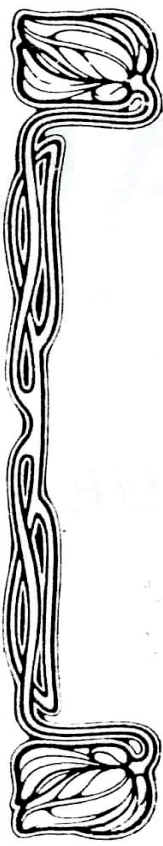
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## *SESQUICENTENNIAL ISSUE*



*William Austin Burt*

## **SCENE SHIFT**



Mother Nature shifts the scenery,  
Setting Spring's stage with fragrant greenery.  
Presto, transient snow has vanished,  
As Winter's chiaroscuroic gloom is banished.  
Songbirds sweep up from forest spires  
To celebrate Spring in jubilant choirs.  
Spring's manifest has tallied the many goods  
Which endow the Superior woods.  
Mayflowers on the vine now whisper, "Hustle.  
We're going to decorate Earth's bustle."  
Bluejays sit around and chat,  
Woodpeckers drum with some eclat.  
Mother Nature did engage  
To activate the Springtime stage.

Yours faithfully,

*Harlow's Wooden Man (RHC)*

## **W.A. BURT SURVEY DIORAMA** *A Sesquicentennial Exhibit*

The development of Marquette County is indebted to the Burt survey party's discovery of vast deposits of iron ore on the Marquette Range. It is thus fitting that the Historical Society is honoring William Austin Burt in this special sesquicentennial exhibit. In addition, Mr. Burt's accomplishments as an inventor have distinguished him as an interesting personality study.

What awaits the museum visitor is a chance to visit with William Austin Burt shortly after the discovery of iron ore in 1844 as he relates the perils of his survey and the actual details of the discovery. Figures cast of vinyl were made of Burt and his compassman, Harvey Mellen, who stands beside Burt, sighting through the famous solar compass. Both figures are placed in a woodland setting, the illusion of a forest created through photomurals. A recorded message is presented either through a telephone answering device, or for group situations, a speaker system.

The creation of the figures and audio station proved to be a costly endeavor making additional funding necessary. The Marquette County Commissioners appropriated funding, designating this exhibition as Marquette County's Sesquicentennial project. It was also suggested that a traveling exhibit be developed for communities in remote areas of the county. A sesquicentennial grant was also received from the Michigan Department of Commerce.

A special thanks to all the individuals who have helped to make this diorama possible.

# **A MOUNTAIN OF IRON**

## ***Discovery***

*by John S. Burt*

*Editor's note: The following excerpt from Chapter 10 of John S. Burt's new book They Left Their Mark: William Austin Burt and His Sons, Surveyors of the Public Domain is reprinted with permission from Landmark Enterprises. Copies of the book will soon be available for purchase at the Historical Society. The author is a direct descendant of William Austin Burt.*

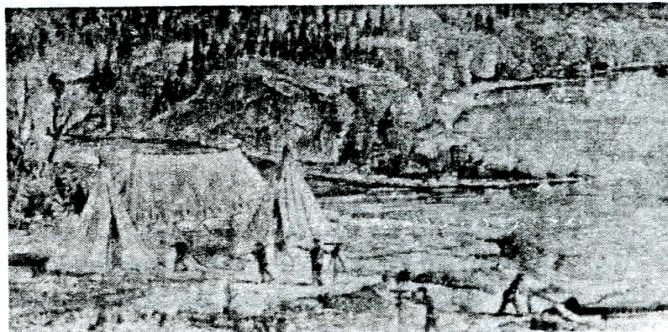
By late 1843 Douglass Houghton had formulated a convincing argument for combining the Michigan geological survey with the U.S. linear surveys. Without such a plan, the geological mapping of the state would be delayed several months, perhaps years, since state funds were not available to finance it. The plan called for Dr. Houghton to coordinate the combined survey that would require the U.S. Government surveyors to make geological observations in addition to their linear responsibilities. They would report on the character of the ledges along the lines, one mile apart, and collect specimens from them. The added cost would be less than one-half cent per acre. Later, trained geologists would follow the surveyors lines and make more detailed observations and reports.

On June 17, 1844, Congress approved Houghton's plan and appropriated \$20,900 for the survey "with reference to mines and minerals." On June 25th Houghton signed a contract with the Commissioner of the General Land office, and William A. Burt was selected as his principal assistant in the field. The survey "with reference to mines and minerals" encompassed 4,000 miles of township and sectional lines in the Upper Peninsula, and it was to be completed within three years.

From Range 23 West, the township lines were to be extended west and north of the fourth correction line, "taking care not to encroach on the probable boundary line of Wisconsin." The northern portion of the boundary between Michigan and Wisconsin would require a new survey before the range lines could properly intersect it. At 52, when most men begin to dream of retirement, William Austin Burt was about to achieve new heights in his career.

Douglass Houghton and William Austin Burt possessed markedly contrasting personalities. Michigan historian John Bartlow Martin wrote:

Houghton had a sense of history-making which Burt, the tireless surveyor, totally lacked. Houghton was acutely conscious of the romanticizing of earlier explorers, [while] to Burt accuracy was a matter to be assumed.



*Burt survey camp*

During July 1844 Burt quickly selected and assembled his crew: William Ives as compassman; Harvey and Richard Mellen, along with James King, to serve as chainmen and axemen; and Jacob Houghton, brother of Douglass, to operate the barometer. Later, two Indians, John Taylor and Bonney, would join the group as packmen. On August 1st the surveyors boarded the steamship *Illinois* in Detroit Harbor. At Mackinaw they rendezvoused with Douglass Houghton, W. Norman McLeod, and the two Indian packmen.

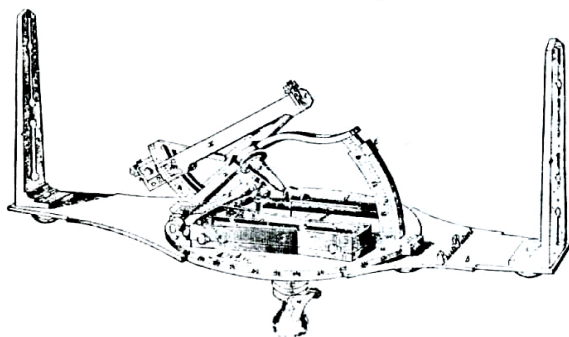
From Mackinaw the men headed west by boat to the mouth of the Escanaba River. Here, Dr. Houghton and McLeod left the survey party and returned to Mackinaw. It was explained that "since the summer of 1844 was almost over . . . [Houghton] could accomplish little except in the line of preparations for the following year's work." Burt did not see Dr. Houghton again until after the season's survey was concluded.

On August 14th William Austin and his crew carried their equipment and supplies several miles along the Escanaba River bank until they reached a sawmill. With lumber he had purchased Burt built a flatbottom boat, filled it with provisions, and hauled it about 15 miles up river to the south boundary of Township 43 North. Here their survey work began.

Heading north, on the line between Ranges 24 and 25 West, they took accurate measurements, establishing the quarter-section, section, and township corners along the way. On September 15th the line intersected Lake Superior, and Burt spotted the entrance to Presque Isle harbor (near present-day Marquette). The line between Townships 47 and 48 North was then extended westward.

This was rugged wilderness, with thick forests, hills, and swamps. The forest was too dense to permit the use of pack horses, so the men back-packed all the provisions. During the evening of September 18th the surveyors set the post on the township line at the corner between Ranges 26 and 27 West and camped on the edge of Teal Lake.

By the light of the campfire William Austin reviewed his plans for the next day. From the corner post a random line was to be run six miles south to the southeast corner of Township 47 North, Range 27 West (T47N, R27W). The men would then return on the true range line.



*Solar Compass*

pass. Now Mellen was about to take part in the most significant event of his life.

The following morning Burt succinctly wrote:

East Boundary of Township 47 North, Range 27 West. This line is very extraordinary, on account of the great variations of the needle, and the circumstances attending the survey of it. Commenced in the morning, the 19th of September; weather clear; the variation high and fluctuating; on the first mile, section one.

Jacob Houghton's account was more descriptive:

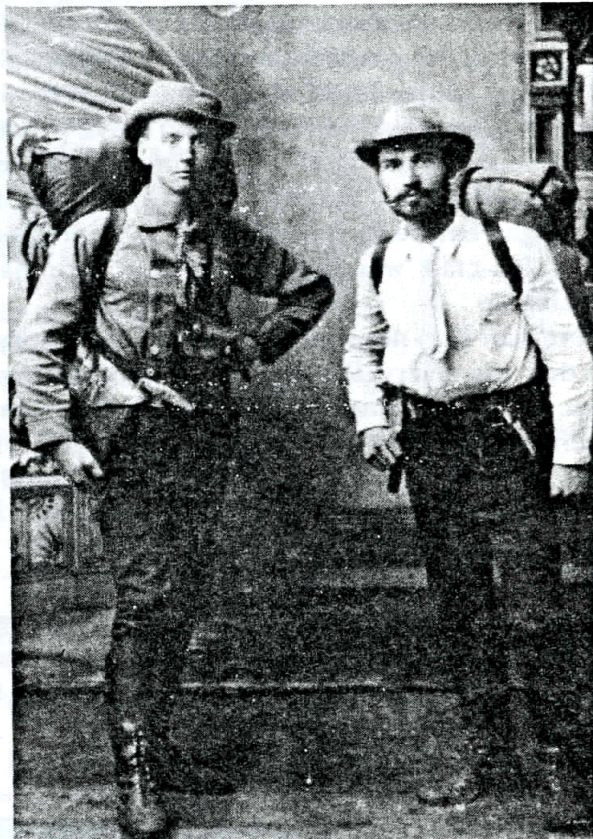
Burt had already filled 26 pages of field notes and recorded in his diary several observations made during the survey. He noted that compassman William Ives had been unable to keep up with the group after a thorn became embedded in his leg. Consequently, Burt replaced him with Harvey Mellen. It was the same Harvey Mellen whose accident with the magnetic compass in 1836 revealed the true value of Burt's Solar Com-

On the morning of the 19th of September, 1844, we started to run the line south between ranges 26 and 27. As soon as we reached the hill to the south of the lake the compassman began to notice the fluctuation in the variation of the magnetic needle. We were of course using the solar compass, of which Mr. Burt was the inventor, and I shall never forget the excitement of the old gentleman when viewing the changes of the variation-the needle not actually traversing alike in any two places. He kept changing his position to take observations, all the time saying, "How would they survey this country without my compass? What could be done here without my compass?" It was the full and complete realization of what he had foreseen when struggling through the first stages of his invention. At length the compassman called for us to come and see a variation which will beat them all. As we looked at the instrument, to our astonishment the north end of the needle was traversing a few degrees to the south of west. Mr. Burt called out, "Boys, look around and see what you can find." We all left the line, some going to the east, some going to the west, and all of us returning with specimens of iron ore mostly gathered from outcrops. This was along the first mile from Teal Lake. We carried out all the specimens we could conveniently.

Following their discovery of iron ore, Burt and his party resumed surveying. There was much to do before the severe weather forced them to leave the Upper Peninsula. While heading north along the east boundary of T47N, R27W, Burt recorded that the magnetic needle of his compass was deflected by as much as 87 degrees. He added:

In some places on the North half, the Needle would not take any direction but dip to the bottom of the box. Two good solar compasses were used on this T. Line & the Variation of the Needle determined by both. When the variation was above 45° or 50° the needle appeared to be weak like one nearly destitute of magnetism. Spaltoric and Haemaltic Iron ore abound on this line.

It rained the entire day September 20th, and the following morning the ground was blanketed with six inches of snow. Without sunshine the sur-



*Surveyors*

veyors were stranded, unable to run the line with the solar compass. The respite, however, gave a limping William Ives the opportunity to catch up with the crew. Although he missed out on one of the greatest mineral discoveries of all time, Ives' work during the 1844 survey was described as "unusually faithful and historically important."

On September 22nd the weather cleared long enough for the surveyors to extend the range line northward along the east side of section 24. The following day, however, thick clouds prevented the sun's rays from reaching the solar compass. Burt was concerned, for their food supply was nearly exhausted. He later wrote:

I had plenty of [food] about eight miles distant in the direction we were endeavoring to run the line. No one dare risk the needle as a guide or go themselves, it being cloudy weather.

Fortunately the men survived by dining on three porcupines they had captured and roasted, and when the weather cleared they completed their work. It had taken five days to run only six miles of range line.

A total of 11 samples of iron ore were collected and cataloged by Burt during his 1844 survey. Each piece was placed into a small cotton cloth that was marked with a number and the location from which each specimen was taken. They were then referenced in the field notes and eventually turned over to Dr. Houghton.

On a page in William Austin Burt's field notes, Houghton wrote, "This metamorphic region will prove most important for its valuable iron ores . . ." Burt had located the first of the Great Lakes iron ranges, the Marquette range. Nearly a century later the disclosure was called "one of the famous discoveries in America" and "one of the greatest events in the industrial history of the United States." A new economic course for Michigan was set in motion, and soon hundreds of Irish, Cornish, and Swedish workers would leave productive occupations elsewhere to risk the chance for a brighter future in the U.P. mining industry.

Coincidentally, although significant iron deposits were not known to exist in Michigan before Burt's discovery in September 1844, the U.S. Navy launched its first iron-clad warship nearly nine months earlier and named it the U.S.S. Michigan.

Neither Burt nor a single member of his survey crew ever attempted to capitalize on their discovery. Perhaps that is not surprising. Dr. Houghton had warned copper speculators that instant wealth was unlikely, and that profit from iron ore would be even more difficult to obtain. Unlike copper, which existed in a pure state, the heavy iron had to be extracted from the rock. It would also be costly and time consuming to market the heavy iron ore. In fact, it was 1862 before the Jackson Iron Mine, established on the site of Burt's discovery, returned a dividend to its stockholders.

Burt's enthusiasm for his solar compass was justified, for its value had been fully confirmed. Millions of dollars would be saved as a result of its general use in the U.S. land surveys. For William Austin Burt, this was far greater satisfaction than personal financial gain.



# THE BURT INVENTIONS

by Kathy Peters

*Editor's note: Ms. Peters is the Education Coordinator at the Historical Society.*

The records of the United States Patent Office credit William Austin Burt (1792-1858) with three patents of major importance: the Typographer in 1829, the Solar Compass in 1836, and the Equatorial Sextant in 1856.

William Austin Burt received limited formal education while growing up in upstate New York. After his first school experience, his "mind took a mechanical turn and thirst for knowledge." He carved little saw and grist mills and "persistently pursued" the study of arithmetic until he had mastered all the rules. After studying the traverse table and method of determining latitude from an old treatise on navigation, Burt constructed some instruments with which he determined the latitude of his home. By comparing a large number of almanacs, he learned astronomy. He made his first survey using a repaired surveying compass.

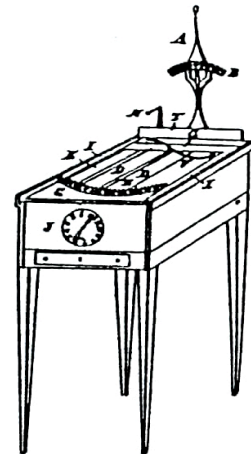
In 1812, William Austin Burt married his former neighbor, Phebe Cole. They settled near Buffalo, N. Y., where Burt worked in the millwright trade and served as Justice of the Peace, Postmaster, and County Surveyor. After a business partnership with his father-in-law failed, Burt became restless and took a trip west in 1817, going as far as St. Louis and returning by way of the Michigan Territory. He returned to the Territory in 1822, purchased land in Mt. Vernon, Macomb County, moved his family and continued his occupation of millwright.

## TYPOGRAPHER

Burt was soon appointed judge of a Michigan Territorial court and elected as one of two members of the Territorial Legislative Council of Michigan. As a member of the Council, he soon found that the great volume of hand correspondence was burdensome. To solve the problem, he conceived the idea of a writing machine. With parts forged at his own workshop and type supplied by John Sheldon, the editor of a Detroit newspaper, Burt built the first Typographer. The machine was housed in a wooden box and took only a few months to construct. Among the Typographer's interesting features was the capability of "compounding"; several letters could be typed at the same time and each would be original. However, Burt's typewriting machine did not reduce the burden of correspondence as its progress was exceedingly slow. When Sheldon saw a copy of the first "typographed" letter, he was ecstatic at the commercial possibilities. In May 1829, he typed a letter to Secretary of State Martin Van Buren with Burt's sworn testimony printed on the back to indicate that he was the inventor of the machine. Within two months a patent was granted giving Burt "full and exclusive right and liberty of making, constructing, using, and vending to others" this new machine.

In 1831, Judge Burt was appointed Surveyor for Macomb County, then District Surveyor, and in 1833, Deputy United States Surveyor. This work required his full attention; thus thoughts of the commercial success of the Typographer passed from his mind.

Burt apparently had sold interest in producing the Typographer to a Cyrus Spalding, who spent considerable time and money attempting to build a commercially produced machine. Spalding gave up after his mechanics said the machine would "never be useful and it would be very liable to get out of order." The patent on Burt's first invention was allowed to run out.



*Typographer*



*Extension of the principal meridian*

## **SOLAR COMPASS**

Burt had been appointed Deputy United States Surveyor in 1833, but his first surveying contract in Sanilac County was probably a financial loss since adverse conditions of heavy snow, mosquitoes, and swamps delayed the completion of the contract. However, Burt's work was commended by the Surveyor General; previous surveyors had turned in fraudulent field notes.

During the winter of 1834, Burt was given a contract to survey 12 townships in what is now Wisconsin. His sons Alvin and Austin were on his team. They walked 400 miles in 21 days using ponies to carry the equipment and food. Austin later wrote "while this survey was in progress, my father was sorely disturbed and perplexed on account of the wild closes of lines, especially in the western part of the district." The cause was not due to carelessness but was attributed to the observed diurnal variations and local attractions of the compass needle.

Burt left Wisconsin for a few months in the summer of 1835 and went home to Mt. Vernon. There he conceived a working model of a Solar Compass that used the sun instead of the magnetic needle for a reference to determine true North.

The first model of the Solar Compass was built by William J. Young of Philadelphia for about \$25. A patent was issued February 25, 1836. The instrument was first used by Burt's son Alvin during the winter 1835-36, to survey 12 townships in Wisconsin, north of those surveyed with such difficulty the previous winter. The device was exhibited by the inventor at the Franklin Institute in Philadelphia in 1836. For an improved model, Burt received a Scott's Legacy medal and \$20 in gold in 1840.

In June 1840, Burt carried out a difficult and important assignment for Michigan and the Federal Government. He extended the principal meridian across the Straits of Mackinac and on up to the shores of Lake Superior. He had gained the reputation of a surveyor whose accuracy was a model for others to follow.

It was during the contracted survey of the Upper Peninsula from 1840-47 that Burt, using his Solar Compass, noted the most extreme deflection of the magnetic needle. These variations were recorded and the cause identified as iron ore. Burt had identified the source of 13 of the most productive mines in the Upper Peninsula during this survey, including the Marquette Iron Range.

Burt's patent on the Solar Compass was about to expire when he went to

Washington, D.C., in December 1849. He planned to obtain a patent on the many improvements made since 1836 and anticipated no difficulty. Unfortunately, Land Office officials and several congressmen had other ideas. They urged him to sell out his patent rights by petitioning Congress for compensation, while allowing his patent to expire.

Burt was aware that the cost of the Solar Compass limited sales to surveyors who could not do their job without it. Since its use would mainly be confined to government surveys, the Land Commissioners reasoned that future sales would depend upon their regulations and therefore control should be free of royalty payments to the patentee. To a man of Burt's dedication, this appeal must have been most convincing. However, such an award for compensation had not yet been made by Congress. A bill recommending this action passed several times in either the House or Senate but never in the same session. A disappointed Burt again petitioned Congress in 1857 to at least grant him a patent for the improvements he had made on his compass. When the petition was introduced in the House in February 1858 but not acted upon, it was the final blow to Burt's long battle for a just compensation.

Burt did receive recognition for his Solar Compass when it was exhibited at the London World's Fair in 1851. He was awarded a premium medal from the jurors on astronomical instruments. Writing his wife from London, he said, "I am aware that no person except they who are rugged and healthy ought to undertake so laborious a business as attending the exhibition or even traveling in this country among the crowds of people." He never complained about his travels in the wilderness!

Burt authored "A Key to the Solar Compass and Surveyor's Companion" in 1855, revised in 1858. This work contained instructions on the use of the solar compass and detailed information to prepare the surveyor for a journey into the wilderness.

### ***EQUATORIAL SEXTANT***



*Equatorial Sextant*

Burt's early interest in navigation never waned. When returning from England, he booked passage on a sailing vessel to observe the accuracy of the course laid by the ship's magnetic compass. During the six week journey, the course proved to be most inaccurate. Burt next began work on his third invention, the Equatorial Sextant.

Burt's opportunity to try out his new invention came in 1855 when he was on board the steamer *Illinois* on the first trip through the newly constructed Soo lock. While on board, Burt compared the variations of the magnetic needle of the traditional compass when opposite mineral regions with his new invention, the Equatorial Sextant, otherwise known as the Astronomical Marine Compass. An article in the *Lake Superior Journal* (6-7-1855) confirmed the importance of this navigational invention. "The great number of iron vessels in use and the amount of iron in the cargoes and fixtures of ships, together with the consideration of human life imperiled" make the investigation of a solution to navigation problems a matter of increasing importance. A patent was granted for the Equatorial Sextant on November 4, 1856.

During the winter of 1857-58, Burt was instructing a class of seagoing captains in the use of the Equatorial Sextant. A fatal heart attack cut his purpose short, and the instrument failed to get into seagoing service.

### ***VALUE OF THE INVENTIONS***

While a mechanical success, the Typographer was not a business success. The original model was burned in a fire at the Patent Office in 1836. In 1892, the Patent

Office decided to present models of all the great American inventions at the Columbian Exposition in Chicago. Burt's grandson, Austin, spent 314 hours making a replica of the machine from the original drawings. The materials cost \$18. Some principles and mechanisms of the Typographer are present in the modern typewriter. In both, the paper remains stationary while the typeprinter moves. Burt received no profit from this patent.

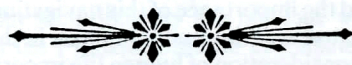
In 1852, it was estimated that the Solar Compass reduced the cost of surveys from \$20 to \$6 per mile. In 1887, an estimate placed the area of lands surveyed with the Solar Compass at more than 800,000 square miles. Burt's compass was required in all public land surveys beginning in 1894. In 1955, the surveys were using an improved solar transit where the solar compass was mounted on a telescope. Because Burt was not allowed to renew his patent, the most he received from this invention was about \$80. Neither he nor his heirs ever received any money from the U.S. Government although attempts were made through 1900.

The Equatorial Sextant has been virtually forgotten. As late as 1940, a Burt descendant attempted to interest the U.S. Navy in adopting the instrument for use in aerial and navigational problems.

Burt did not become famous or rich as the result of his inventions. However, his unfinished autobiography indicated that his own personal goal in life was to "attain to the highest and most useful calling . . . to the good of the world." Each of his inventions solved a particularly troublesome problem which others, too, had encountered. He undoubtedly succeeded in his own personal goal.

## ***BOOKENDS***

The John M. Longyear Research Library is fortunate to have in its collection many original William Austin Burt papers. Such materials include survey field notes, reports from the general land office, personal and business letter-books, business records, Soo Canal controversy papers, Burt versus the United States Government papers, and a copy of Burt's *A Key to the Solar Compass*. We even have a facsimile of the first letter written by Burt on his typographer. In addition to these primary sources, we have biographies of Burt by his descendants, letters of family members, photographs, and a host of other Burt family papers. These materials are just a sampling of the Longyear Library's resources dealing with Upper Peninsula history. For further information, please contact Linda Panian, Librarian, at the Historical Society.



## ***SPRING MEETING***

The Spring Meeting of the Marquette County Historical Society will be held at the Holiday Inn on April 21, 1987, at 7:30 p.m. Dr. Weldon Petz, an authority on Abraham Lincoln, will be the featured speaker. In his presentation, "The Pilgrimage with Abraham Lincoln," Dr. Petz will use slides and artifacts to illustrate the humanism of Lincoln's life. Members of the Historical Society and the general public are invited to attend. For further information, please contact the Historical Society, Monday through Friday from 9 a.m. to 4:30 p.m.