

MENOMINEE



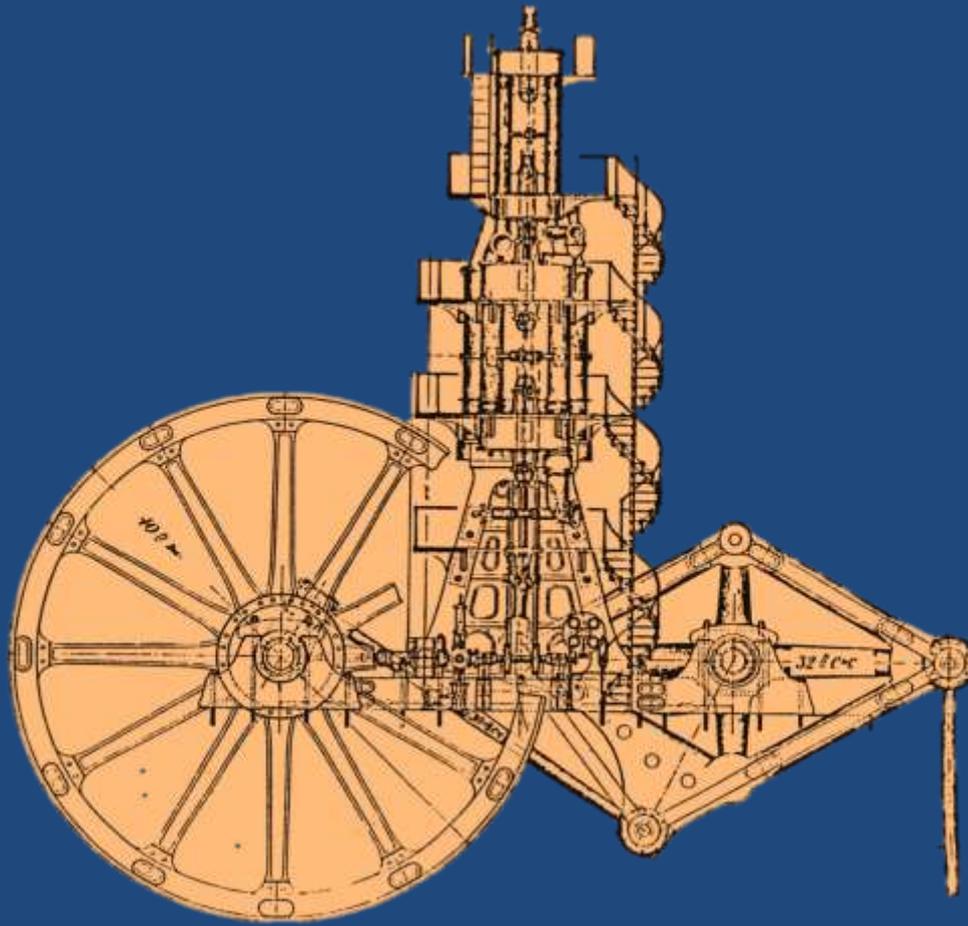
RANGE



MEMORIES

PRESENTS

Iron Mountain's Cornish Pumping Engine and the Mines It Dewatered



Chapin Mine

Ludington Mine

Hamilton Mine

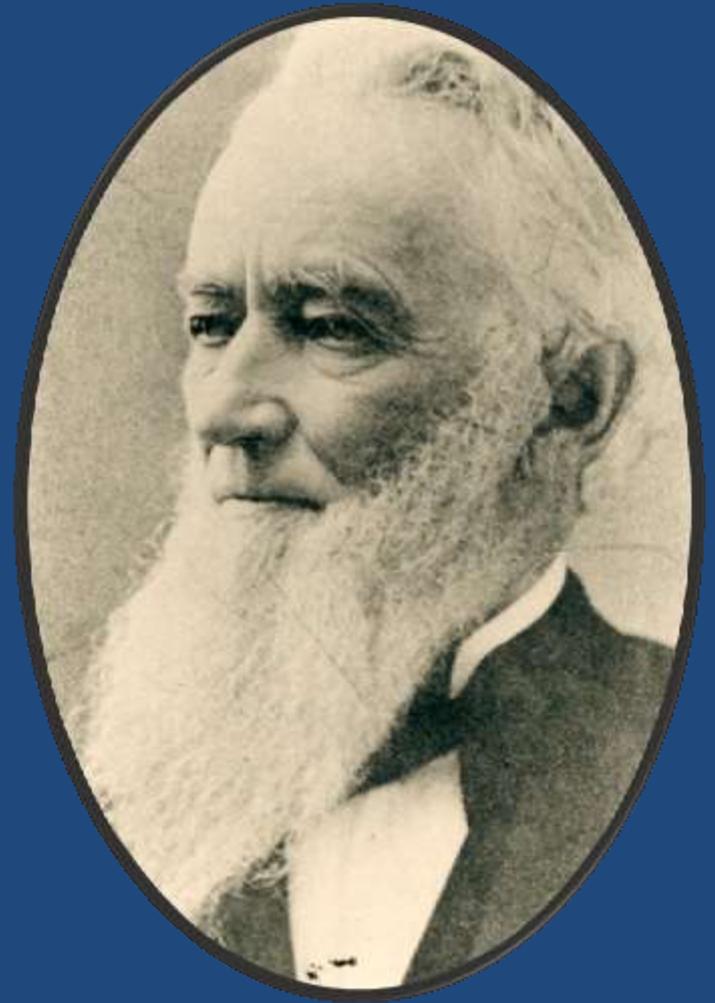
*Compiled by William John Cummings
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2012*

UNRAVELING THE MYSTERY OF THE PREACHER WITH THE DEED TO THE CHAPIN MINE – 1

The particulars regarding Henry Austin Chapin's acquisition of the land upon which the mine bearing his name was located have long been a matter of historical conjecture. Michigan's Governor Chase S. Osborn's colorful account in his 1922 book *The Iron Hunter*, later adapted and embellished without attribution by Walter Havighurst in his history of the Pickands Mather Company, *Vein of Iron*, is responsible in part for this controversy.

In a chapter entitled "Accidental Fortunes from Iron Ore, Osborn wrote:

The story of the big Chapin mine on the Menominee Range presents facets of exquisite humor and at the same time illustrates how little significance was attached by owners to early land holdings. The Chapins lived in Niles, Michigan. They entered the Chapin Mine forty at a dollar and a quarter an acre, equaling fifty dollars. A wedding occurred in the family. To the officiating preacher was given a deed for the forty acres in question. The guileless dominie did not even record the deed and paid no attention to it whatever. A few years later the big mine was found. It has produced ore worth more than twenty million dollars and still has rich reserves. A wide-awake young lawyer heard of the preacher and investigated the story. He had a hard time finding the minister, but finally trailed him to the Pacific Coast in an obscure little town. Suit against the Chapins was begun. After hanging fire in the courts for a more or less tedious time, a compromise was made with the preacher for a cash consideration of two hundred thousand dollars. This was divided evenly with the lawyer and the Chapin mine lawsuit was heard no more.



Henry Austin Chapin

UNRAVELING THE MYSTERY OF THE PREACHER WITH THE DEED TO THE CHAPIN MINE – 2

A little genealogical sleuthing clarified several points in Osborn's account.

Henry Austin Chapin was born into the farming family of Lorenzo and Maria (Kent) Chapin October 15, 1813, in Leyden, Franklin County, Massachusetts. The family moved west to Mantua Centre, Portage County, Ohio, the following year. Chapin grew to manhood there, marrying a village native, Ruby N. Nooney, March 22, 1836. She was born to Hezehiak and Sarah Nooney August 28, 1815.

The newlyweds went to Niles, Berrien County, Michigan, but soon left for nearby Edwardsburg, in Cass County, where Chapin owned and operated a general merchandise store for a decade. Three children were born there: Sarah M. (1838-1862), who married the Rev. John A. Banfield; Carrie (1840-1871), who married the Rev. Thomas Bracken; and Charles A. (1845-1913), who married Emily Coolidge.

Returning to Niles in 1846, Chapin ran the first general store there in partnership with S.S. Griffin, eventually buying him out. A second son, Henry E., was born in 1851, dying three years later. During the financial crisis at the beginning of the Civil War, Chapin, like many businessmen, lost his store in the spring of 1861. Hard work marketing produce and insurance enabled him to settle with his creditors within three years.

Combining the above family history with research of the land records for the property upon which the Chapin Mine was established in 1879 sheds considerable light on Osborn's somewhat distorted account.

Using Military Bounty Land Warrant No. 84525 at Marquette's general land office on September 15, 1864, John A. Banfield obtained 111.97 acres encompassing the SW¹/₄ of the SE¹/₄ and the S¹/₂ of the SE¹/₄ of Section 30, Township 40 North, Range 30 West. The warrant had been issued to George White, an illiterate veteran of the War of 1812, living in Washington County, Iowa. White had assigned the warrant to Banfield, in whose favor the tract was located. At the time, land warrants were frequently purchased and used by third parties. The original entry record, transferring the land from the United States to John A. Banfield, was dated May 21, 1864.

Chapin purchased this land by warranty deed from Banfield May 20, 1865, paying \$1,119 or about \$10 per acre, although the transaction wasn't recorded until January 29, 1867. Amazingly, despite the sale of this land to Chapin, Banfield's patent from White wasn't recorded until February 22, 1879.

UNRAVELING THE MYSTERY OF THE PREACHER WITH THE DEED TO THE CHAPIN MINE – 3

As mentioned above, Chapin's eldest daughter, Sarah, married the Rev. John Banfield. This information is contained in a program for the laying of the cornerstone of the Chapin Memorial Presbyterian Church in Niles dated June 4, 1915. Apparently Chapin purchased the land from his son-in-law three years after Sarah's death, and apparently Banfield was the preacher in Osborn's story.

The fact that Banfield was Chapin's son-in-law was further substantiated in Alfred P. Swineford's *Annual Review of the Iron Mining and Other Industries of the Upper Peninsula* for 1883. However, the *Marquette Mining Journal* editor's account of Chapin's acquisition of the property adds to the mystery. Swineford wrote:

The fee for the property was entered by his son-in-law many years ago, then editor of the Marquette Mining Journal, who knowing that the old gentleman was the owner of a bounty land warrant and some agricultural or other land and scrip, wrote to him saying that if he would sent the warrant and scrip to him (the son-in-law) he thought he could place them where they would do him the most good in later years. The old gentleman sent the warrant, which called for 120 acres, and the scrip, both of which were applied in the location of lands on what is now known as the Menominee Range, then an unbroken wilderness. It afterwards transpired that the state had received and used more of this certain kind of scrip than the amount to which it was entitled, and the entries made with that sent up by Mr. Chapin were cancelled. The warrant covered the 120 acres on which the Chapin mine is located and for which a warrant was duly issued to Mr. Chapin. In the course of time, Mr. Chapin failed and turned over to his creditors all of his property, including the land in question, reserving only that which was exempt by law from execution. The creditors, being anxious to realize as much cash as possible, and deeming the land worthless, or at least unavailable, proposed to Chapin that if he would turn out \$250 worth of exempt property he might keep the land, which proposition he accepted. What he gained by the transaction, and what the creditors, or whoever might have purchased the land had it been sold on execution, lost, may be partially estimated from the fact that he has already received over \$200,000 in royalty, paid him by the lessee, while he or his heirs can confidently anticipate an annual income of from \$50,000 to \$150,000 from the same property for years to come. From penury it has not only raised him to affluence, but made him, prospectively, one of the richest men in the state of Michigan.

UNRAVELING THE MYSTERY OF THE PREACHER WITH THE DEED TO THE CHAPIN MINE – 4

If Banfield did indeed enter the warrant on Chapin's behalf, why wasn't it issued in Chapin's name? Why did Chapin pay Banfield \$1,119 for what was supposedly his own land, according to Swineford's account? Apparently Swineford, like Osborn, was working from an incomplete set of facts.

Perhaps Banfield performed a marriage, as Osborn noted, involving a relative of White, receiving the veteran's land warrant himself as payment, later selling the land to Chapin. After all, Banfield didn't record the patent for almost fifteen years, in keeping with Osborn's account.

Banfield was indeed an editor of the Marquette *Mining Journal* prior to purchasing the *Lake Superior News and Journal* in Marquette in 1864. This newspaper was published until its offices were destroyed by fire in 1868. However, another publishing company, with Stephen Rice as editor, had control of the paper for some time previous to the fire.

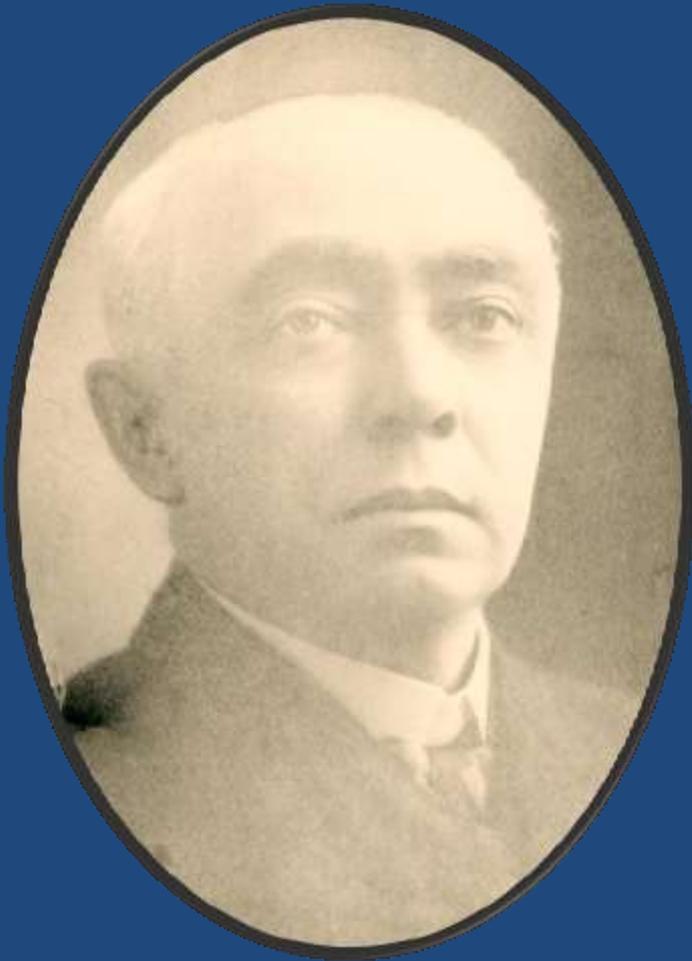
Land records further indicate that Chapin signed a lease with the Menominee Mining Company for his land April 18, 1879, less than a month after Banfield recorded his patent.

Banfield's name appears in the land records relating to this property once more. He and his wife Lydia signed a quit-claim deed to Chapin in Marquette November 30, 1887. The record indicates one dollar exchanged hands, and the Banfields, at the time residents of Placer County, California, no longer claimed any "mine rents, issues and profits on or arising therefrom or heretofore due" on this land.

Evidently this quit-claim deed was the result of an agreement between Chapin and the preacher living in "an obscure little town" on the Pacific coast following the lawsuit mentioned in Osborn's account. According to Chapin's obituary in *The Iron Mountain Press* (December 22, 1898), Banfield did indeed bring suit against his former father-in-law, stating Chapin had promised to give him a portion of the proceeds if the investment in the land proved a good one. Chapin maintained there was no such agreement, and the "case was settled out of court on the payment of a large sum of money to the plaintiff." The obituary later states Chapin "settled with him" for \$50,000, adding Banfield "lost it all in California."

The Chapin family originally earned 50 cents, and later 40 cents, royalty for each ton lifted from their property. Since fee owners paid no taxes, royalty income was all profit, and Chapin collected between \$100,000 and \$300,000 annually.

UNRAVELING THE MYSTERY OF THE PREACHER WITH THE DEED TO THE CHAPIN MINE – 5

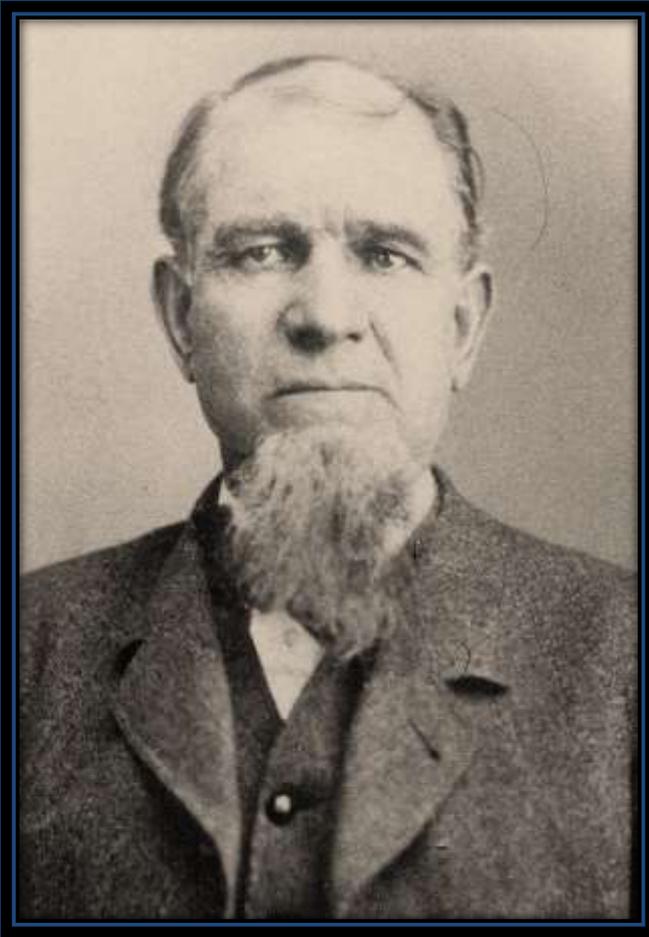


Charles A. Chapin

Because the Chapins apparently never openly discussed how they acquired the land which made them wealthy, many questions remain unanswered. No mention exists of them visiting their Iron Mountain property, and no bequests or memorials were ever presented to the community from which their new-found prosperity originated.

Henry Austin Chapin died December 16, 1898, in Niles, leaving a personal estate of \$240,000, and real property valued at \$61,000. His wife died October 30, 1902, leaving their only surviving child, Charles A., and his children, their only grandchildren, heirs to the royalties which continued to flow from the Menominee Range's most productive iron mine.

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 1



Captain John Wicks

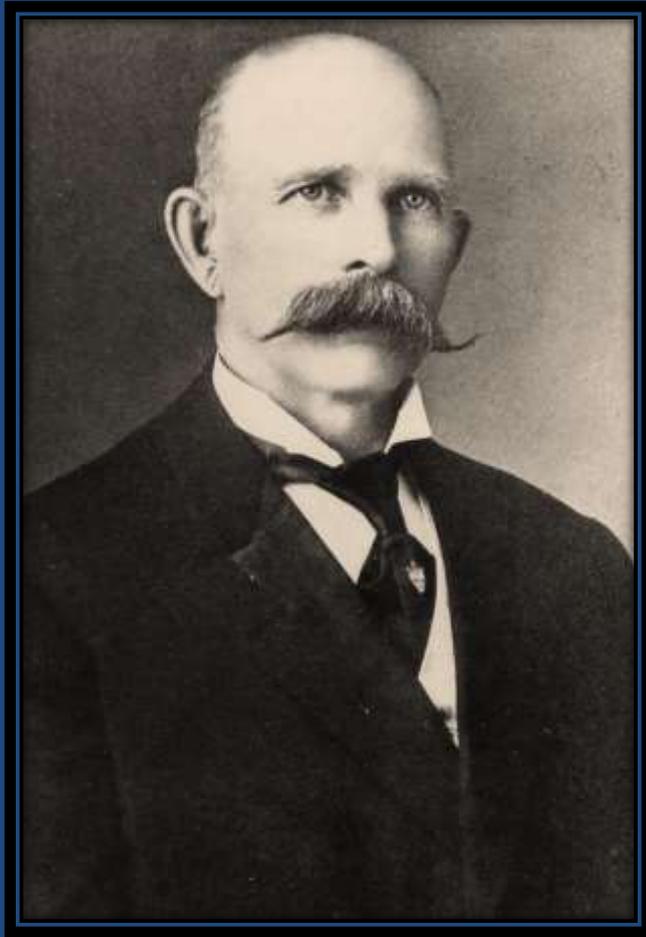
Iron Mountain's **Chapin Mine**, considered one of the world's great iron mines, could have long remained undiscovered without the determination of **Hagerman** and **Hulst**.

Hulst had been aware of the rock outcropping six miles west of **Quinnesec** at a place known as "iron mountain," located on Section 30, for some time. Although some said this outcropping was iron ore, **Hulst** maintained it was only a pointer to where the ore ought to be. **Hagerman**, trusting in **Hulst's** scientific expertise, first attempted to buy, and finally succeeded in leasing the land from **Henry Austin Chapin**, of **Niles, Michigan**, in the spring of 1879.

The ten-year lease allowed the **Menominee Mining Company** to make explorations on **Chapin's** land until October 1, and to test the ore found thereon to determine whether the quality and quantity of ore was such as to be profitably mined. If results proved negative, the company was not bound by the lease which actually went into effect August 1, 1880.

Under the leadership of **Captain John Wicks**, **Hulst** sent a crew of seven men, including **Wicks's** son-in-law, **Captain Elisha Morcom**, **John Fredricks** and **Charles J. Osterberg**, to the **Chapin** site from **Quinnesec**. The contingent set out through the wilderness July 5, 1879, with a wagon loaded with tools, tents, boards and provisions pulled by four mules.

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 2



About halfway to their destination, the party passed a log cabin occupied by other explorers at the site of the **Keel Ridge Mine**, and also encountered an empty cabin formerly used by loggers near the site of the **Milwaukee & Northern Railway Depot** on East B Street. These were the only structures between Quinnesec and Section 30.

The hardy band set up camp on what is now downtown Iron Mountain's East Chapin Lake, pitching their tents and, with the boards, putting up a shack to be used as a kitchen, building a roof over the table.

The crew began sinking shafts in the sandy slope of today's Millie Hill which ran down to the cedar swamp upon which much of Iron Mountain's business district was later built. Several unsuccessful shafts were sunk, and some Menominee Mining Company officials wanted to cease operations due to the expense involved. But Hagerman's faith in Hulst prevailed, and he bargained with these officials, agreeing to stop operations on Section 30 if, after one last shaft was sunk 200 feet west of the previous shaft, no ore was found. Ninety feet deep in sand, this last shaft took months to sink and was very costly, but it landed in the very heart of the great Chapin ore formation.

Charles J. Osterberg



Long thought to date from the fall of 1879, this photograph, the earliest known of the Chapin Mine in Iron Mountain, actually may have been taken the following spring due to the numerous frame buildings in the background. The camera is facing west and the buildings are situated on what is now the east side of the Chapin Pit. The tramway under construction apparently led to the proposed stockpile area from the primitive shaft, probably one of the seven shafts sunk on Section 30 during the late fall and winter of 1879-1880. [*Menominee Range Historical Museum*]



The cable passing over the sheave affixed to the simple framework over the shaft probably connected to a hoisting apparatus which raised earth, rock and ore in the bucket resting near the shaft opening in the foreground as the shaft was sunk. The top of a ladder protrudes through the opening directly in front of the bucket, and another ladder lies on the ground. In the early years, ladders provided miners with access to the mines. The shed with the smokestack may have housed the engine brought to the site in the early winter which was first operated by Charles J. Osterberg. *[Menominee Range Historical Museum]*

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 3

This discovery was made on the line between sections 30 and 31, about 400 feet west of the east line of the company's tract. An exploration pit was sunk on the foot wall and carried down through 50 feet of surface and 32 feet of ore, the vein appearing only about 4 feet wide. Explorations extended westward from this point, down the northwest slope of the hill, soon opening up 1,300 feet of the tremendous ore deposit which eventually measured over 6,100 feet from east to west, varying in width from 50 to 150 feet.

As winter approached, Captain Wicks' crew of pioneer miners often had to sweep the snow from the table before eating breakfast and continued to live in their tents, anxiously awaiting the construction of a house where they could secure board. Building operations commenced both at the mine location and the newly-platted townsite in early winter. Just before Christmas their hopes were realized. Benjamin Marchand opened a boarding house which was crowded to the limit until Jerome Rayome opened another house two weeks later.

The first winter most of the work on the first seven shafts was completed under the supervision of Wicks and Morcom. The mining company brought an engine to the site in the early winter which Osterberg operated, continuing as stationary engineer for the company until 1884. By the end of 1880, eight shafts, numbered respectively from east to west, had been sunk, and shafts 3, 5, 6, 7 and 8 were active. By 1882 two additional shafts had been sunk.

Initially ore was mined at the Chapin using the "room-and-pillar" method. Huge pillars, comprising about one-third of the ore in most mines using this system, were left as columns to support the entire roof surface. However, because the Chapin ore was extremely soft, friable and unstable, beginning to disintegrate when exposed to air, additional measures had to be taken to insure the men's safety. Thus rooms 20 feet across were separated by 18-foot pillars covered with lagging as fast as rooms were opened to discourage disintegration.

This, combined with unstable foot and hanging walls, added to the problems faced by the mine superintendent, Captain T.B. Rundle, in efficiently mining the Chapin's ore. Per Larsson served as mining engineer, and William Oliver was mining captain in these early years, although C.H. Cady assumed the mine superintendency by the mid-1880's.



This early view of Iron Mountain was probably taken in the spring or summer of 1880. The camera is facing west toward Pine Mountain. The Menominee Mining Company Store, a large two-story white building, is located in the upper left and more of the settlement can be seen in the background. Notice that with the exception of the company store all of the buildings seem to be painted the same color – traditionally rusty red. These buildings probably belonged to the mining company, as many mining companies erected houses and boarding houses for their employees. Rent or room and board was subtracted from the employees' wages at the end of each month.
[Gene Derwinski/Dick Ferris]



Building operations began at both the mine location and the newly-platted townsite in early winter 1879-1880. Just before Christmas Benjamin Marchand opened a boarding house which was crowded to the limit until Jerome Rayome opened another one two weeks later. Work on the first seven shafts was completed under the supervision of Captain John Wicks and Captain Elisha Morcom during the winter. The shafthouse appears much more substantial than the makeshift hoisting apparatus in use the previous fall. [*Gene Derwinski/Dick Ferris*]



This early view of Iron Mountain was probably taken in the spring or summer of 1880. The camera is facing west toward Pine Mountain. The photograph may have been taken near the Ludington Mine looking down to what is now the east side of the Chapin Pit, where the settlement known as the Chapin Location – also Section 30 – began to grow into Iron Mountain. Notice the large pine logs in the foreground where the men are sitting. [*Gene Derwinski/Dick Ferris*]



The large two-story white building at the right was the Menominee Mining Company Store for the Chapin Mine. The company also operated stores in Vulcan, Norway, Quinnesec and Florence, Wisconsin. Most of the larger mining companies operated stores at which their employees could trade on credit. At the end of the month their bills were subtracted from their monthly wages and they received the balance in cash – if there was one. *[Gene Derwinski/Dick Ferris]*

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 4

The timbering method adopted was a modification of the Nevada system, using “sets” or “bents” to help shore up the roof. A sawmill was erected in 1881 to saw and prepare timber and plank for the mine. In that same year, of the 900 men employed at the Chapin, only 500 were actually miners. By 1885, five million feet of lumber were used annually for timbering, and nearly one-half of the underground force was engaged in putting in timbers.

Originally the ore was allowed to fall to the bottom of each level and then shoveled into the tram cars. A change was made so ore dropped onto the floor of the work area and was then fed into chutes located against the pillars along the main drift. Ore from these chutes in turn supplied the tram cars. Once hoisted, the ore was run out on long, elevated tramways extending from the shafts to the ore docks.

Although the Chapin was one of the greatest strikes ever discovered in the Lake Superior region, most of the ore was under a swamp, making extraction very expensive. As the underground workings deepened, the original mining methods employed began to prove unsatisfactory.

The management’s decision to revamp these mining methods in the early 1880’s resulted in work so extensive and costly that realization of the project was basically equivalent to opening a new mine. It was determined that the only way to get the ore out at moderate cost per ton was to sink several deep shafts in the swamp which contained quicksand at one proposed site. Enormous pumps would be required to remove the water filtering into the mine from the surrounding soggy ground and the best hoisting machinery available would be necessary due to the greater depths involved. Since compressed air was the most economical power source for running the colossal machinery needed, the company purchased the Upper Quinnesec Falls, about three miles distant, as motive power for the compressor plant. Hiring the best engineers available, they soon found putting these plans into effect would cost about \$800,000.

With only a ten-year lease on the property, such a huge expenditure would be foolish, so Hagerman once again spoke to Chapin, finally convincing him to extend the lease for an additional ten years.



This view of Iron Mountain's Chapin Mine, facing east, was taken in 1882. Notice that the Chapin Location, located on what is now the east side of the Chapin Pit (to the left in this photograph), has grown significantly. Numerous tramways come from various shafts at the foot of Millie Hill where the iron ore was dumped into waiting ore cars. Just to the right of the small building in the center foreground is an early steam locomotive, coal tender and caboose. The darker building with white-trimmed windows directly above the locomotive may have been the Chapin sawmill. [*Menominee Range Historical Museum*]

HYDRAULIC POWER COMPANY SUPPLIED COMPRESSED AIR TO ECONOMICALLY OPERATE CHAPIN AND LUDINGTON MINING EQUIPMENT – 1

Fuel to run the heavy machinery necessary for underground mining was a major expense. Shortly after the Chapin Mine's discovery, the Menominee Mining Company decided compressed air would be the most economical power source to remove the vast ore deposits buried under Section 30's swampy surface.

Early in 1881, a preliminary survey was made between the mine and the Upper or Little Quinnesec Falls, a series of cascades falling sixty feet into a broad channel below, located about three miles southeast of Iron Mountain on the Menominee River. The Hydraulic Power Company was soon organized with the Menominee Mining Company taking four-fifths of the corporate stock, while the Lumbermen's Mining Company, owner of the Ludington Mine, subscribed to the remainder.

By October, Albert Conro, a Menominee Mining Company official who had been a railroad and governmental harbor contractor most of his life, had completed plans for the project which, upon completion, cost \$325,000. T.W. Orbison, a young civil engineer, executed the plans, while Conro supervised the actual work.

Construction began the following fall, when a cofferdam was built 300 feet above the falls to control the flow of water. The inlet from the stream just above the falls was then deepened to 20 feet, and a channel 270 feet long was excavated, narrowing from 75 feet in width at the mouth of the inlet to 53 feet at the bulkhead, with a depth of 12 feet at the low and 30 feet at the high water marks. Eight gates were placed in the bulkhead, each 5 feet wide and 8 feet high, working in slides by a rack and pinion movement fastened to the tongue.

The flume, 50 feet wide by 14 feet deep and 650 feet long, squarely abutted the bulkhead and allowed logs to be floated down the river to the mills in Menominee. Robert H. Flaherty, of Marquette, had the contract for framing the timbers for the flume's sides and bottom which were lined with 2-inch tongue-and-groove planks.

An opening 6 feet high and 12 feet wide was made 550 feet from the bulkhead in the flume, leading into the penstock which carried the water from the flume to the wheel box where the power was generated. This penstock was a wrought iron pipe 7 feet in diameter constructed of ¼-inch boiler plates securely riveted together.



With the purchase of the Menominee River's Upper Quinnesec Falls in 1881, the Menominee Mining Company and the Lumbermen's Mining Company formed the Hydraulic Power Company to provide compressed air for running their mining equipment. The cast iron pipeline, 24 inches in diameter, exited from the compressor house and extended 2 ½ miles to the Iron Mountain mines. Gust Tollen, an employee of the Chapin Mine for 44 years, served as superintendent of the Hydraulic Power Company for most of that time and is thought to be the man in the buggy. *[Menominee Range Historical Museum]*

HYDRAULIC POWER COMPANY SUPPLIED COMPRESSED AIR TO ECONOMICALLY OPERATE CHAPIN AND LUDINGTON MINING EQUIPMENT – 2

The compressor house, measuring 100 feet by 60 feet, was built on a foundation where two wheel pits 18 feet wide, 23 feet deep and 60 feet long were placed at 32-foot intervals. The wheel boxes, containing Victor turbines, or water wheels, built by the Stillwell & Bierce Manufacturing Company, of Dayton, Ohio, were placed near the bottom of the pits at the end nearest the flume. These turbines were controlled by a delicate compound speed and pressure regulator arranged to adjust the speed of the compressors from time to time so as to maintain a uniform pressure of air in the pipes. Power was transmitted from the turbines by beveled gearing and an 11-foot jack-shaft carrying a 14-foot in diameter gear wheel with a 24-inch face to a shaft upon which the crank-heads of a pair of compressors were keyed.

Originally only two pairs of Duplex Rand compressors were used, the cylinders measuring 32 inches in diameter with a 60-inch stroke. By running the turbines at 150 revolutions per minute, the compressors produced 40 strokes in the same time interval and had the capacity to compress 2,300,000 cubic feet of air in 24 hours, the equivalent in physical energy being 1,000 horse-power. An additional turbine and a third pair of compressors were installed shortly after the plant went into operation to meet the mining companies' needs.

By mid-summer, 1883, the right of way for the 24-inch wrought iron pipeline which spanned 16,665 feet (approximately 2 ⁷/₈ miles) was being cut. The pipe was supported by stands 58 feet apart, each carrying a roller upon which the pipe rested. Expansion joints inserted every 580 feet allowed a play of 13 inches, although no more than 7 inches were estimated as the variance in length in each 580-foot section under the influence of summer heat and winter cold. Laid on a line having very few angles on an upgrade from the falls to within a few hundred feet of the Chapin Mine, the pipe then descended rapidly to the Menominee River Railroad track, where a 12-inch pipe led to the Ludington Mine, supplying the Emmett exploration (Hamilton Mine) and the Ludington Mine with air to drive their hoisting and pumping machinery. Air pressure within the pipeline was maintained at between 60 and 65 pounds.

The Hydraulic Power Company was supplying compressed air for the Chapin Mine's drills by January, 1884, and a third turbine and pair of compressors were due to be installed by the end of the summer.

HYDRAULIC POWER COMPANY SUPPLIED COMPRESSED AIR TO ECONOMICALLY OPERATE CHAPIN AND LUDINGTON MINING EQUIPMENT – 2

Eventually the ownership of the Hydraulic Power Company and the use of the power supplied was shared by the Chapin Mining Company and the Ludington operation, the Chapin retaining two-thirds interest.

Modifications and improvements were steadily made at the power plant which eventually included generating electrical power. In early June, 1899, General Manager James MacNaughton, of the Chapin Mining Company, signed a contract with the General Electric Company of Chicago for a complete incandescent electric system for lighting the property both underground and on the surface. Power for operating the generator which would have the capacity to furnish between 2,000 and 2,400 sixteen-candlepower lights was to be furnished by an improved water wheel to be located at the Hydraulic Falls. The work of cutting the new race for this water wheel was well underway by mid-July, while the power house for the electric lighting plant, measuring 25 to 30 feet, sheeted with iron and lined with brick, was erected toward the end of the summer. By mid-January, 1900, the new lighting plant was working satisfactorily.

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 5

By 1885 the original methods extended to the fifth level workings. At that time, beginning with the sixth level, a system of stoping and filling was to be initiated, and the rooms were to be filled and the pillars mined out in the upper levels.

Three new shafts were planned – B, C and D – the first two to be sunk through hard limestone. Once sunk, cross-cuts and connecting tunnels had to be driven at each level. In November, the costs per foot were: drifting, \$3.50-\$7.50; sinking winzes, \$6; sinking shafts, \$25-\$70, including timbering. For B and C shafts, the cost was about \$30 per foot, and the abandoned A shaft had cost \$60 to \$70 per foot.

Although some pillars had been removed by 1886, the greater portion of them were still standing from the fifth level up. An estimated 871,200 tons of ore, exclusive of the caved-in areas, still remained. Buildings which stood over the mine were removed. The ore was stripped to a considerable extent over the widest part of the deposit, and the dirt run down into the mine to be used as filling. During the winter, while the ground remained frozen, the pillars down to the second and possibly the third level were to be mined in an open cut, hoisting with derricks and buckets.

Both Hagerman and Hulst became seriously ill in 1881. Hulst had worked himself to exhaustion, and on orders from his doctor took a year off work. At the end of the same year, the Menominee Mining Company sold all but the Chapin and Florence mines. Hagerman was finally forced to liquidate his holdings in the company near the close of 1886, due to continued ill health, and the Chapin and Florence mines were sold at that time. The newly-organized Chapin Mining Company, with John H. Van Dyke as vice-president, purchased the Chapin Mine on December 1, 1886.

Work toward the renovation of the mine continued under the new company. B and C shafts opened, and an extensive freezing process began at D shaft to enable the shaft to be sunk.



Identified on the back as “Cave-in – Chapin – 1899,” this photograph shows the ground which began caving in 1885 and gradually formed what became known as the Chapin Pit on either side of South Stephenson Avenue. Note the two early mine shafts at the left, and the mine workings at the center and at the far right. [*Keen S. Scott*]

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 6

An interesting account of the newly-installed rope-haulage system at C shaft appeared in *The Current*, Norway's weekly newspaper, on July 28, 1888:

The recently-completed rope-haulage system works finely. The system greatly facilitates the handling and hoisting of ore, and as an instance of the possibilities, by its use, we may say that we timed the cages at "C" shaft on Wednesday morning [July 25], and that 48 two-ton cars were hoisted in 90 minutes, from the sixth level, and we believe a third more could be done if necessary, as it does not take longer to handle the large than the small cars formerly in use, and "C" shaft has a record from last year, of nearly a car a minute for 10 hours work. It is a great sight to see the two lines of cars, the empties going into the mine and the loaded ones coming out, to see a car loaded, the grip lever pulled and see the car start slowly and surely for the shaft 900 ft. away, to see the men who fill from the cars atop an empty one going by, changing it from one track to another on a short of automatic switch, fill it and send it off with no doubt or question as to its reaching the shaft and returning to be refilled. Aside from the saving in time, not the least of the arguments in favor of the system is the relief of the employees from the incessant and wearisome tramping and tugging which accompanies the work of handling cars by man power.

Early in February, 1889, controlling interest in the Chapin Mining Company was acquired by the Schlesinger Syndicate, comprised of German capitalists represented by Cleveland and Milwaukee iron men. This syndicate purchased 74,000 of the company's 80,000 shares for an estimated \$2,000,000, making this the largest stock transfer to have occurred for years in the iron industry.

In October, the newspapers noted more than half a million tons of ore had been mined since the last man had been killed by a fall of ore at the Chapin, indicating the mine's superior safety record. The following week another article announced that on Thursday, October 24, 1,058 tons of ore were hoisted from C shaft in one 10-hour shift. This record was all the more remarkable because a shift actually consisted of only nine hours at this shaft since an hour was occupied hoisting and lowering men.

THE DISCOVERY AND DEVELOPMENT OF THE CHAPIN MINE – 7

Iron Mountain became known as the “payroll city of the North” by 1890, the Chapin Mine’s peak year, when the work force was estimated to be as high as 1,800 to 2,000 men employed in mining and construction. Not only were a record 742,843 tons of ore shipped, but nearly eight miles of sinking and driving were carried out, excluding the “slicing” work in removing crushed pillars and breaking down as follows: shafts, 1,054 feet; winzes, 7,612 feet; drifts and cross-cuts, 33,071 feet.

The Chapin management decided to strip the ore body at the extreme west of the property adjoining the Ludington, mining ore as an open pit. The drift covering the ore here ranged from 30 to 40 feet in depth. About 80 teams of horses working with scoops were on the job, working day and night shifts to remove approximately 60,000 yards of sand and gravel. By mid-May an additional ten teams of horses were employed at stripping this area. Arthur Stevens was in charge of the work, sending out fully 1,500 yards per day.

Four skip roads ran from the bottom of the pit to the Ludington ore pocket on the line between the two properties, and the ore was loaded through the pocket. The stripping operation was nearly completed toward the end of June, and by mid-July some ore was being shipped. By the end of August, the open pit was producing about 225 tons per day, and production appeared to be increasing by mid-September.

A year after the stripping process began at the open pit, a news item mentioned the ground near the pit’s west end, south of C shaft, had been gradually giving way for some time, and no further mention of this mining operation appears.

The work force had been halved by May of 1891, rising again in the fall. At about the same time, Superintendent Cady, long-standing supervisor of the mine, and Assistant Superintendent James H. MacNaughton surrendered their positions to T.F. Cole.

Ferdinand Schlesinger, who had lost control of the company, came again into control by purchase in May, 1892, and MacNaughton, who had been “acting” superintendent for six months, was appointed superintendent, a position he held for the next nine years. The work force rose to a high of 1,340 men toward the end of November, and then gradually declined.

THE DISCOVERY AND EARLY DEVELOPMENT OF THE LUDINGTON AND HAMILTON MINES – 1

While exploring a rise of ground on the opposite side of the valley where the Chapin Mine was located, George S. Stockbridge discovered the Ludington Mine in 1880. Located on the south half of Section 25, the mine adjoined the Chapin property on the west.

The property was leased from the Portage Lake and Lake Superior Ship Canal Company for a royalty fee of 40 cents per ton by the Lumbermen's Mining Company which had been formed in August, 1879, with a capital stock of \$100,000. Officers included Wisconsin's Governor Harrison Ludington, of Milwaukee, president; S.M. Stephenson, a Menominee lumberman, vice-president; Isaac Stephenson, a Marinette lumberman, treasurer; and Joseph Fleshier, another Menominee lumberman, secretary. The mine was named in honor of the company's president.

Mining was originally carried out in a small lens about half a mile west of the Chapin line, but this deposit was completely exhausted the second year after being opened, yielding a total of 12,190 tons. Stockbridge served as superintendent, assisted by William Bice, mining captain.

When the original deposit played out, extensive diamond drilling under the supervision of master mechanic Harry McDermott was performed throughout the property, resulting in the discovery of a continuation of the Chapin deposit on the northeast corner which yielded 52,519 tons in 1882, the first year of operation.

During the following summer, the Ludington Mine, already considered one of Iron Mountain's major producers, became the first mine on the Menominee Iron Range and the second in the Lake Superior region to install a system of electric bell signals to govern the movement of hoisting and other mining machinery. Other deep shaft mines soon followed suit, replacing the pull bells then in general use.

Within two months of the Chapin and Ludington miners' strike of 1883, Stockbridge resigned his position as superintendent, becoming the company's general manager. A.D. Moore, head clerk and an employee since the mine began producing, was named superintendent. Henry Davis assumed the position of mining captain prior to 1886.



These mining officials from Iron Mountain's Ludington Mine posed for H.S. Emory, an Appleton, Wisconsin, photographer, between 1883 and 1890. They are identified as follows: (back row) William B. Catlin, surface boss; Robert Bankes, cashier and later superintendent; A.D. Moore, superintendent; Harry McDermott, master mechanic; Francis A. Brown, chief chemist; Sam Spear, bookkeeper; (front row) Captain Grey; Captain Sam Langdon; Captain Henry Shields; Morris Danielson, blacksmith; Tom Hancock, carpenter. [*Menominee Range Historical Museum*]

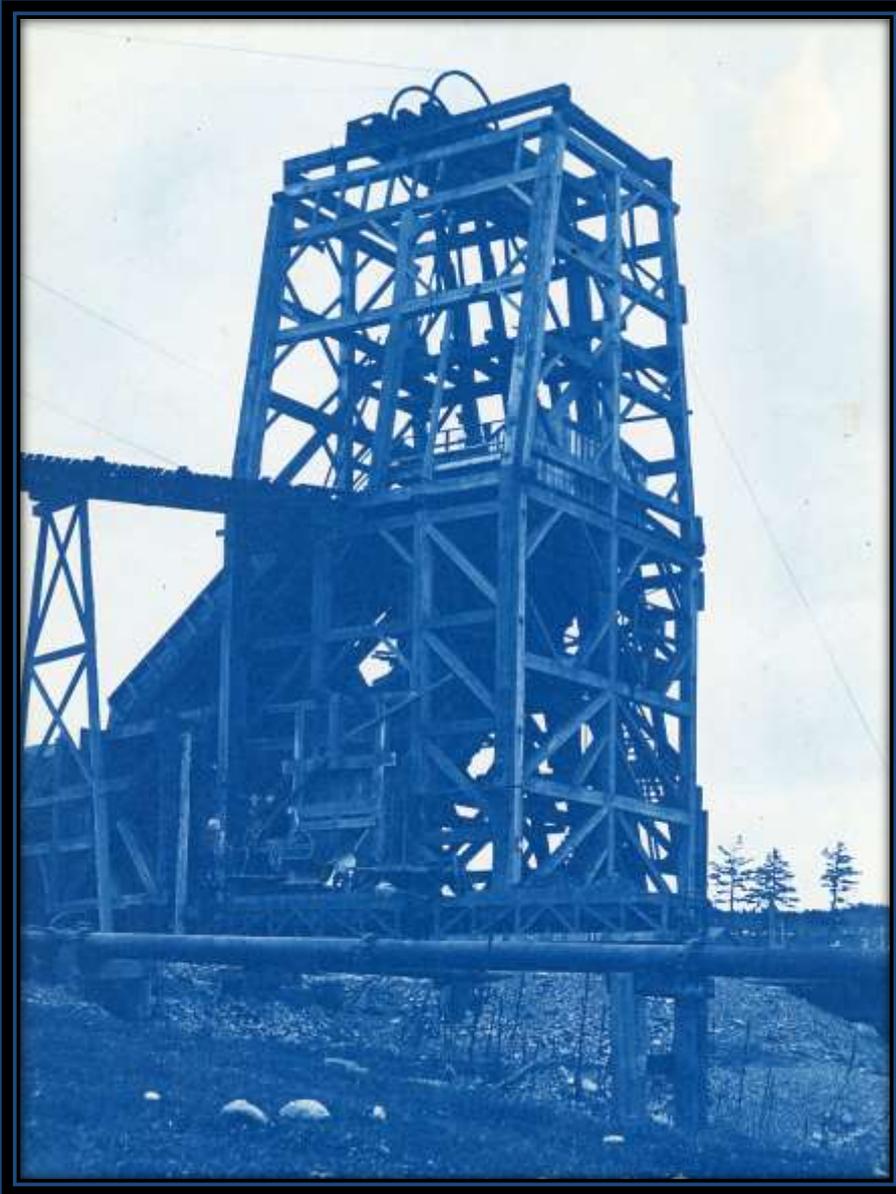


A group of Chapin and Ludington mining officials and surface workers posed informally around a Rand drill driven by compressed air at the Ludington Mine in 1886 or 1887. According to contemporary notations on the back of this dated photograph, the following men were among those pictured: Captain William Oliver, Chapin Mine; Per Larsson, mining engineer, Chapin Mine; Edward E. Brewster, chemist, Chapin Mine; Duff LaVictore, machinist; and Thomas Polkinghorn. [*Menominee Range Historical Museum*]



Harry McDermott, the master mechanic at the Ludington Mine, appears in the lower right, wearing a checked shirt, black hat and sporting a moustache and beard. Edmund Kent, the master mechanic at the Chapin Mine and Iron Mountain's second mayor, has his thumbs hooked in the front pockets of his pants to the left of the Rand drill. The man standing at the far right with a moustache and wearing a light-colored hat and dark vest was A.D. Moore, superintendent of the Ludington Mine. [*Menominee Range Historical Museum*]

LUDINGTON MINE
NO. 2 SHAFT HOUSE
Ca. 1890



Jorgen J. Eskil, pioneer Menominee Range Photographer, took this photograph of the No. 2 Shaft House of Iron Mountain's Ludington Mine in about 1890. Note the wooden timbering and the sheaves at the top for the cables used in hoisting ore and the skips in which the miners rode up and down the shaft. The blue color was a type of photograph known as a cyanotype. *[Menominee Range Historical Museum]*

THE DISCOVERY AND EARLY DEVELOPMENT OF THE LUDINGTON AND HAMILTON MINES – 2

During 1890, with **Robert Bankes** serving as **general manager**, extensive work was carried out at the Ludington, including sinking 1,569 feet of shafts, 3,530 feet of drifting, retimbering 500 feet of shafts and dividing 1,000 feet of shafts into compartments. At the year's end, about 650,000 tons of ore were in sight, and the company had shipped 97,355 tons. Daily output for the following year was estimated at 1,500 tons.

An electric lighting system was installed at the Ludington during the fall of 1891. The heavily-insulated wires were run down to the bottom of B shaft encased in two grooves cut into the face of 2 x 6 inch planks which had been dipped in a solution known as “rubber paint” as further precaution against shocks and fire. When Bankes visited Ironwood's Aurora Mine to inspect their lighting system in late March, officials told him miners worked with 10 to 15 per cent more efficiency when working by electric light instead of candlelight, while trammers' productivity jumped 25 per cent.

Early in 1883, the ore supply of the **Emmett Mining Company's Keel Ridge Mine**, located two miles west of **Quinnesec**, appeared to be exhausted. Since the ground had been cracking and settling in the area, **Superintendent John Tyler Jones** and **Agent E.T. Foster** ordered all mining and hoisting to cease. By noon on April 10, the pumps had been taken out and all machinery removed. Preparations for abandonment of the property were almost completed when suddenly, shortly after one o'clock, there was a loud rumble from the shaft and the ground under thirteen men gave way. Four scrambled to safety and one of the remaining miners buried alive was rescued in one of the area's worst mining disasters.

Hoping to intercept the Chapin and Ludington deposits, the ill-fated Emmett Mining Company had obtained a lease on 80 acres in Section 30 owned by the Hamilton and Merryman Company. Within three months following the Keel Ridge tragedy, Superintendent Jones was supervising the diamond drilling operations at this exploration, where the deposit which was to become the Hamilton Mine was discovered just 40 feet from the Ludington property line. The company also began platting an addition to the village of Iron Mountain on this tract and moved 29 buildings from the abandoned Keel Ridge location to this site.

EARLY DISCOVERIES ON THE MENOMINEE IRON RANGE



John Tyler Jones

John Tyler Jones, pictured in the conservatory of his gracious Lake Antoine home, came to the Menominee Iron Range from Pennsylvania in June, 1881, to supervise the mines of the P.L. Kimberly Company which included the Emmett Mine at Waucedah and the Keel Ridge Mine, just east of Iron Mountain. He was instrumental in the discovery and development of the Hamilton Mine, serving as its superintendent, a position he also held later with the Antoine Ore Company.

Prominent in mining circles, Jones was also an inventor, holding numerous patents which included a railroad spike and a ball-bearing railroad car wheel.

Recognizing the economic potential of the Upper Peninsula's low grade iron ore, he built an experimental furnace near his home in 1908, named for his daughter Ardis, to test his theory. This furnace consisted of an 85-foot long steel tube eight feet in diameter lined with firebrick which was placed on an incline and charged with ore. The whole device was rotated by electric motors, and iron suitable for mill use was discharged from the lower end.

The experiment was plagued with financial and mechanical problems, and the furnace was dismantled in the spring of 1916. Elements of Jones' method were later incorporated into successful processing operations for low-grade iron ore.

THE DISCOVERY AND EARLY DEVELOPMENT OF THE LUDINGTON AND HAMILTON MINES – 3

By August plans for sinking a shaft had been completed with full knowledge that the ore body was located at least 600 feet below the surface. A shaft house was under construction in late October, and boilers and an engine from the Keel Ridge were used to facilitate the work, then down 110 feet. The 215-foot level had been reached by late January, 1884, and the completed shaft house was acclaimed as the finest on the range.

As the shaft continued following the drill hole, Agent Foster announced the drill had been deflected, cutting a modified letter “S” through the strata, a fact which amazed the mining world because the stiff-jointed drill bit, several hundred feet long and rapidly revolving, had not broken while twisting through such a hole.

By mid-December the shaft was down 530 feet; six months later the 650-foot mark was reached. Having announced they would strike clean ore within 30 days, the company was very disappointed when a jasper deposit was encountered at 680 feet, but a diamond drill core indicated clean ore 70 feet below. This 9 x 12 foot shaft reached a depth of 960 feet from the collar and was on the list of producers in 1886, shipping 872 tons. By then the corporate name assumed by the company was the Hamilton Ore Company, of Sharon, Pennsylvania, with P.L. Kimberly, an iron manufacturer, the principal stockholder.

Although a force of only 30 men was originally employed at the Hamilton exploration, by 1891 over 300 miners comprised the work force.

During the fall of 1891, No. 2 shaft was being sunk at the Hamilton. Noting unusual commotion at the shaft’s collar on October 22, Superintendent Jones investigated, arriving just in time to witness miner James Biddick being brought to the surface, blinded and nearly dead. Biddick had just about finished the last hole in a series prior to blasting when he struck a water-filled cavity, and the released pressure tossed him like a ball. At least a portion of the water came from the Ludington’s A shaft sump, and continued rising in the Hamilton’s No. 2 shaft to within 90 feet of the collar.



With the buildings surrounding the Chapin Mine in the background at the foot of Iron Mountain's Millie Hill serving as a reference point, this view, looking east, shows the Hamilton Mine shaft under construction, probably taken in late October, 1883. Notice how sparse the crest of Millie Hill appears. [*Menominee Range Historical Museum*]



This photograph documents early mining construction techniques before steel replaced timber. A shaft house was under construction in late October, and boilers and an engine from the Keel Ridge Mine were used to facilitate the work, then down 110 feet. The 215-foot level had been reached by late January, 1884, and the completed shaft house was acclaimed as the finest on the range. *[Menominee Range Historical Museum]*



The Hamilton Mine was owned by the Hamilton Ore Company, of Sharon, Pennsylvania, and was located on the N $\frac{1}{2}$ of the SW $\frac{1}{4}$ of Section 30, Township 40, Range 30, a tract which contained 80 acres leased from the Hamilton & Merryman Company. John Tyler Jones prospected in the area in 1883 and discovered the mine that year by using a diamond drill. [*Menominee Range Historical Museum*]



This early photograph, probably dating between 1886 and 1890, shows the shaft housing at the right and the trestles and tramways where the ore cars dumped the iron ore onto the stockpiles on the left. [*Menominee Range Historical Museum*]



2,560-Gallon Bailer Used to Dewater No. 2 Shaft
of the Hamilton Mine in June, 1892

During the fall of 1891, No. 2 shaft was being sunk at the Hamilton Mine in Iron Mountain. On October 22, Superintendent John Tyler Jones, noting an unusual commotion at the shaft's collar, arrived just in time to see James Biddick being brought to the surface, blinded and nearly dead. Biddick had just about finished the last hole in a series prior to blasting when he struck a water-filled cavity, and the released pressure tossed him like a ball. At least a portion of the water came from the Ludington Mine's A shaft sump and continued rising in the Hamilton's No. 2 shaft to within 90 feet of the collar. Since a 10-ton hoisting plant was then being installed, plans were modified to incorporate bailers to dewater the mine.

Installation was still in progress on December 31, when the Ludington Mine's hanging wall moved and water began entering that mine at the 11th level of A shaft at a rate of 6,000 gallons per minute. The Ludington was soon filled to the 9th level, and the Hamilton's No. 1 shaft, connected to the Ludington's A shaft by drifts, was also filling. The water level at the Hamilton's No. 2 shaft was lowered 182 feet by this second flooding. [*Menominee Range Historical Museum*]



2,650-Gallon Bailer Used to Dewater No. 2 Shaft
of the Hamilton Mine in June, 1892

The Ludington immediately reduced its labor force from 500 to 150 men, while the Hamilton, with both shafts flooded, laid off all its miners and most of the surface men.

A month after the flooding, the Ludington's bailing operations had succeeded in lowering the water level only 10 feet. The management, losing tremendous sums daily, abandoned the mine February 6, 1892, discharging the remaining 150 employees. Once the bailing operations ceased, the water in the Ludington rose at the rate of a foot an hour, reaching the 6th level by February 11.

The owner of the Hamilton Mine bought the Ludington Mine and, after considerable work driving a drift to connect the two Hamilton shafts during the winter and early spring of 1893, bailing began June 19. By June 14, the bailers had raised 87,017,954 gallons of water, lowering the water level by 896 feet in the Ludington and 1,325 feet in the Hamilton. The flow was then normal, and in six weeks the water was out of both mines. [*Menominee Range Historical Museum*]

HAMILTON MINE
POSSIBLY NO. 2 SHAFT
HOUSE
Ca. 1890



This early view of the wooden shaft house of the Hamilton Mine came belonged to Arthur Jones, son of John Tyler Jones, who was largely responsible for locating the mine and served as the mine's superintendent. The rafters for the building in the background may be for the sandstone building which still stands at _____. Note the size of the men standing in the foreground in relation to the structure giving an idea of the scale of the structure. A trestle to the right would have brought iron ore to the stockpiles. *[Menominee Range Historical Museum]*

THE DISCOVERY AND EARLY DEVELOPMENT OF THE LUDINGTON AND HAMILTON MINES – 4

Since a 10-ton hoisting plant was then being installed at this shaft, plans were modified to incorporate bailers to dewater the mine. Installation was still in progress on December 31, when the Ludington's hanging wall moved and water began entering that mine at the 11th level of A shaft at a rate of 6,000 gallons per minute. The Ludington was soon filled to the 9th level, and the Hamilton's No. 1 shaft, connected to the Ludington's A shaft by drifts, was also filling. The water level at the Hamilton's No. 2 shaft was lowered by 182 feet by this second flooding!

The Ludington immediately reduced its labor force from 500 to 150 men, while the Hamilton, with both shafts flooded, laid off all its miners and most of the surface men.

A month after the flooding, the Ludington's bailing operation had succeeded in lowering the water level only 10 feet. The management, losing tremendous sums daily, abandoned the mine February 6, 1892. Superintendent Bankes tendered his resignation, and the remaining 150 employees were discharged. Once the bailing operations ceased, the water in the Ludington rose at the rate of a foot an hour, reaching the 6th level by February 11.

Shortly thereafter negotiations were unsuccessfully initiated to have the two companies handle the dewatering jointly. Eventually Kimberly bought controlling interest in the Ludington Mine, and an agreement with the stockholders was reached.

Before bailing operations could begin, the 1,325-foot level of No. 1 Hamilton had to be connected with No. 2 Hamilton because No. 2 had a bailing capacity of 2,560 gallons in each of its two large bailers, while the two bailers in No. 1 only had the capacity of 500 gallons each. The dangerous work of driving the 313-foot drift which would connect these two shafts began in the winter of 1893 under the supervision of Captain Frank Carbis. The drift, averaging 18 feet in width and 12 feet in height for its entire length, was made this size to facilitate handling the long drills with which exploratory holes were bored.

THE DISCOVERY AND EARLY DEVELOPMENT OF THE LUDINGTON AND HAMILTON MINES – 6

These long drills were used as a precautionary measure to keep the men well away from the work area, since they anticipated encountering more water which, at that level, is under 600 pounds of pressure to the square inch, or 43 tons per square foot. The remaining 140 feet were driven in May, and when the connection was finally completed on June 1, compressed air was encountered instead of water. However, No. 2 Hamilton filled rapidly with water once the hole was made, while the water in the Ludington shafts receded 75 feet at the rate of 15 feet per hour.

By then the Ludington's three shafts and the two Hamilton shafts were all equipped with bailers, and negotiations to begin the joint dewatering operation were completed. Captain Robert Flaherty supervised the bailing operation which began June 19. By July 14, the bailers had raised 87,017,954 gallons of water, lowering the water level by 896 feet in the Ludington and 1,325 feet in the Hamilton. The flow was then normal, and in six weeks the water was out of both mines.



Taken by Iron Mountain photographer George S. Van Stone between 1893 and 1895, this view of the Ludington Mine shows a shaft house at the far left and another shaft house at the right, as well as a brick building, probably an engine house, to the left of center, and another brick or sandstone engine house to the right of the shaft house at the left. The building where steam is being emitted appears to have been a sawmill. [Keen S. Scott]



Robert Bankes, general manager of the Ludington Mining Company, originally lived in this house, located at the north end of Carpenter Avenue in the Ludington Location. This photograph, probably taken by Iron Mountain photographer George S. Van Stone, was dated 1894 by Emma S. Keen (later Mrs. Solomon S. Scott). On the reverse, Emma identified her fellow teachers, seated on the porch of the house where they roomed which then belonged to Thomas Flaherty, as follows: Minnie Daub, Emma Keen, Bird Scolland, Minnie McDonald and Anna Campbell Irish.
[Keen Scott]



Another view of the Flaherty house, also probably taken by George S. Van Stone, Iron Mountain photographer in about 1894, shows a group of ladies, probably the same teachers, seated in a hammock and under a shade tree. When James MacNaughton became superintendent of the Chapin Mining Company in 1898, the house was sold to Thomas Penglase and moved to its present location at 401 East A Street. MacNaughton's new residence, today the Chippewa Club, was constructed for him on the site and later occupied by the Otto C. Davidson family. [*Keen Scott*]

THE SINKING OF D SHAFT AT THE CHAPIN MINE – 1

Attempts at sinking a shaft in the swampy area of the Chapin property bordering the Ludington Mine had been attempted and abandoned as early as 1882, due to the excessive amount of water and the quicksand found there. However, the ore formation clearly indicated the rich Chapin deposit continued under the site, eventually developed as D shaft, the first location of the Cornish pumping engine.

A stand pipe was sunk in November, 1885, on the proposed shaft site to ascertain the depth of the ledge and the nature of the ground above it. Per Larsson, the Chapin's mining engineer, had been sent to Europe the previous year to inspect mining methods in view of their application to the Chapin Mine, and while there probably learned of the freezing process successfully used to sink shafts through "soft" ground.

By the fall of 1887, preparations were under way for the freezing of D shaft. First a series of 26 stand pipes had to be sunk in a circle around the shaft site. A temporary set back occurred in late October when it was found that the pipes being used were not heavy enough, the fifth pipe having broken three times within a few feet of the ledge. New, heavier pipes arrived by mid-December, and the pipes were all driven by mid-April, 1888. Within three weeks, work was temporarily suspended due to the depressed ore market.

Plans to commence the freezing process resumed early in the fall. Two large coils of pipe, about 10 feet in diameter and forming part of the machinery for the process, arrived in mid-October, and the freezing plant was rapidly being erected by the beginning of November.

George Thomas, an engineer sent to Iron Mountain by the Poetsch SooySmith Company, of New York, to supervise the operation, explained the process involved in an article which appeared in the December, 1888, edition of Iron Mountain's school newspaper, *Young America*, as follows:

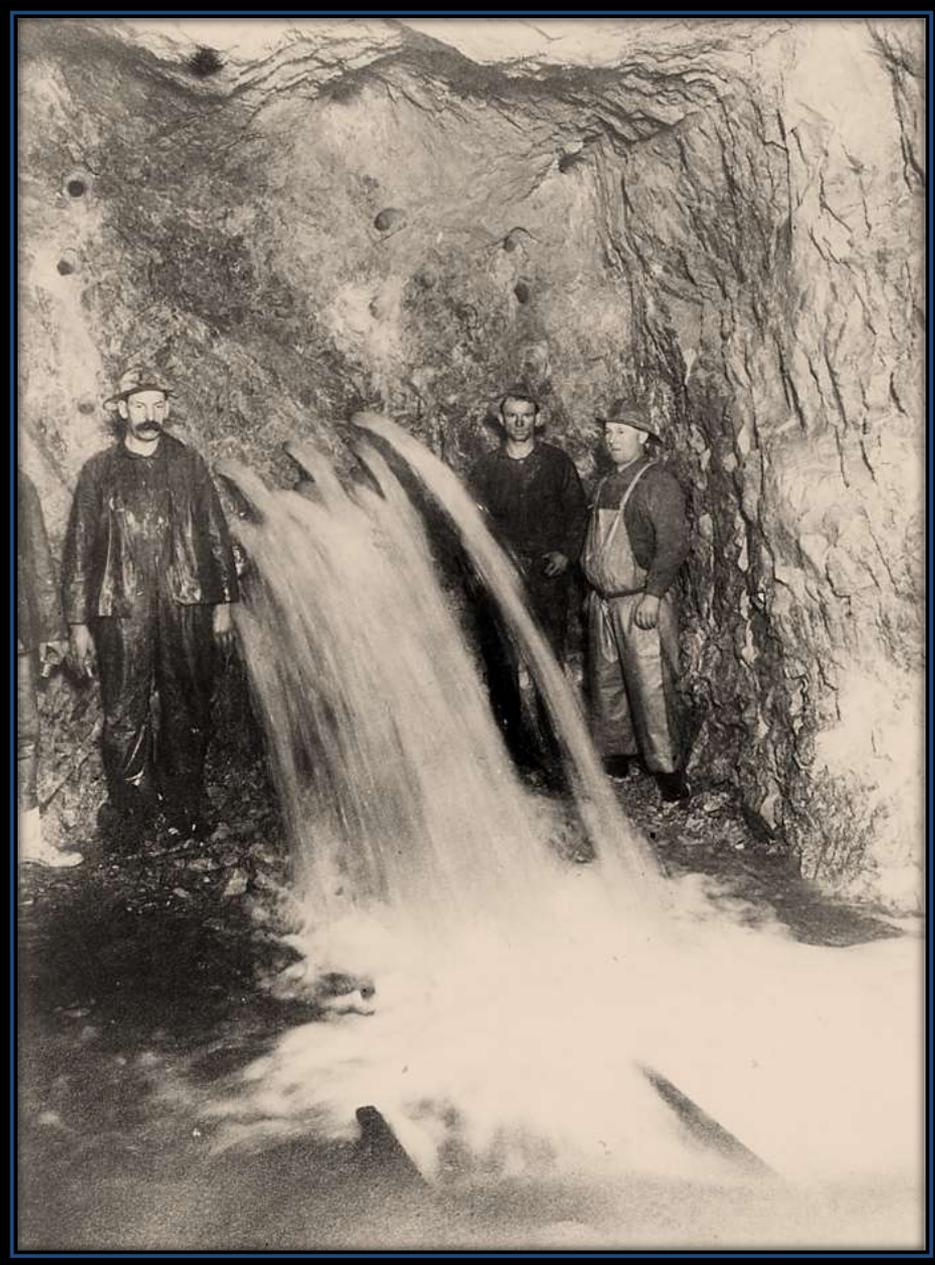
The ground through which this excavation is being made of a peculiar nature, as it has been proved to be impractical to get through it by ordinary means, the Chapin Company has contracted with the Poetsch SooySmith Company, of New York, to freeze the ground from surface to ledge rock below 100 feet.

The system of freezing is a very interesting one, and is as follows:

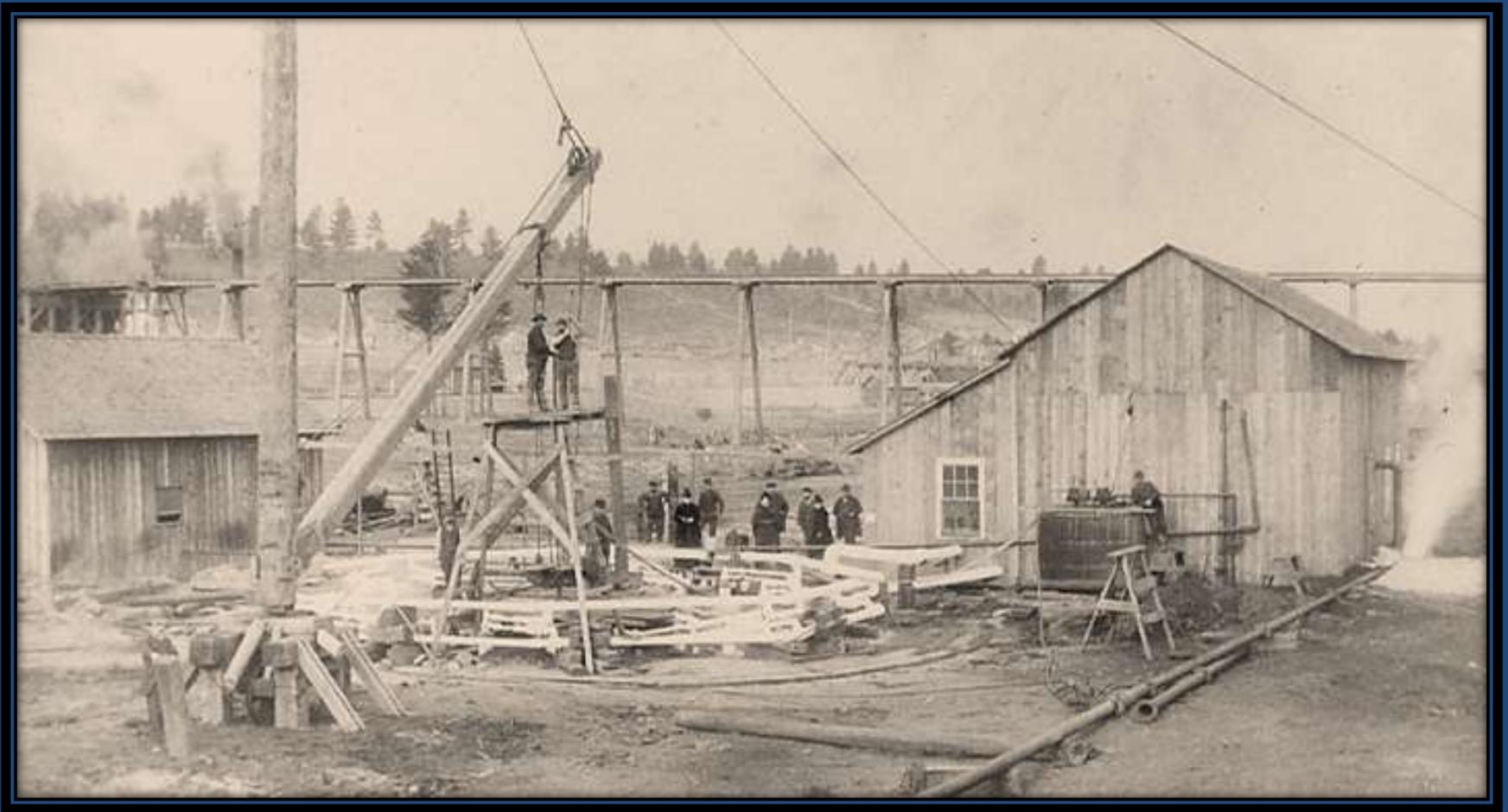
There are 26 stand pipes, 8 in. in diameter, drive to the rock, in a circle of 29 degs., in the center of which circle the proposed shaft is to be sunk. These pipes are all water-tight, having a shoe on the bottom and a cap on the top, and through the cap a small pipe is passed to nearly the end of the stand-pipe. These are all connected with a circle of pipes on the surface of the ground, and this circle is a connecting link between the pump, tank and stand-pipes.

CHAPIN MINE WATER FLOW

Ca. 1900-1910



Iron Mountain's Chapin Mine was not only the most famous and most productive on the Menominee Iron Range, but also among the wettest, due in part to the fact that its immense deposits were situated under a cedar swamp. This photograph, taken in the early 1900's, attests to the Chapin Mine's wet working conditions, one of the many hazards of underground mining. Water had to be pumped from the mine around the clock to allow miners to extract the ore. The miner in the center was Frank Larson. [*Menominee Range Historical Museum*]



Engineer George Thomas, of the Poetsch SooySmith Company, of New York, supervised the freezing process used to sink D shaft of the Chapin Mine through over 90 feet of rock and loose sand. The process began in the late fall of 1888, and, after 15 days of freezing, the excavation of the shaft began, reaching the ledge 135 days later. This historic photograph of the freezing process records what may have been the first such attempt in the United States. The shaft was sunk inside the circle of pipes in a cylinder of frozen ground measuring 50 feet in diameter. In the background, the air pipe carrying compressed air from the Hydraulic Power Company at the Upper Quinnesec Falls to the Chapin and Ludington mines towered over the buildings. *[Menominee Range Historical Museum]*

THE SINKING OF D SHAFT AT THE CHAPIN MINE – 2

The heat absorbent used is calcium chloride in solution. The tank and stand-pipes are filled with this solution, which is forced through all the pipes in volume equal to their area. We do not require quick but must have uniform movement, which alone will enable us to regulate the temperature. The solution of calcium chloride has in turn to receive its cold bath, to take from it the latest heat which it has taken from mother earth in its course through the pipes, & c. This is done by returning it to the tank or starting point by a second set of pipes immediately under the upper circle, which conveys the fluid in over the top of the tank, or bath tub, in which there are 4,000 feet of pipe in coil, around which the fluid passes. Immediately to the left is another tank of equal size, also containing 4,000 feet of pipe in coil, submerged in water. With this coil there is connected an ice machine or cold producer, which is charged with anhydrous ammonia. This ammonia is compressed to a high pressure, 300 lbs. to the square inch and by compressing it to this degree it is made very hot. It is now allowed to pass through the coils in the tank containing the water until it reaches the valve between the two tanks, at which point it is allowed to expand suddenly, changing the temperature from 70 degs. above, Fahr. to 50 zero Fahr., in which condition it is allowed to pass through 4,000 feet of coil in the tank containing calcium chloride solution, which is again pumped through the whole circuit of pipe, returning again charged with more heat from the ground. The entire chain is made every 33 minutes. The volume used equals 15,000 gallons.

By mid-December the shaft, measuring 15½ x 16½ feet inside the timbers, was down about 20 feet. By the end of January, 1889, forty men, working two shifts, had sunk the shaft 70 feet, with approximately 25 feet remaining before reaching the ledge. Two weeks later the ledge had been reached on one side of the shaft, but complications arose when it was found that one of the stand pipes had not reached the ledge in the southwest corner, but rested on a boulder, causing the freezing process to be incomplete.

A pump removed the incoming water until the afternoon of February 21, when, as reported in *The Current*, “the water and quicksand came in so rapidly as to drive the men out of the shaft. Measures were immediately taken to partially fill the shaft with water and we are informed that this will be frozen, and if necessary a new pipe will be drive and an attempt made to break up the boulder.” Auxiliary pipes were sunk to freeze the area, and within a week the influx of sand and water had been arrested. Shortly thereafter the water level was lowered and work resumed.

THE SINKING OF D SHAFT AT THE CHAPIN MINE – 3

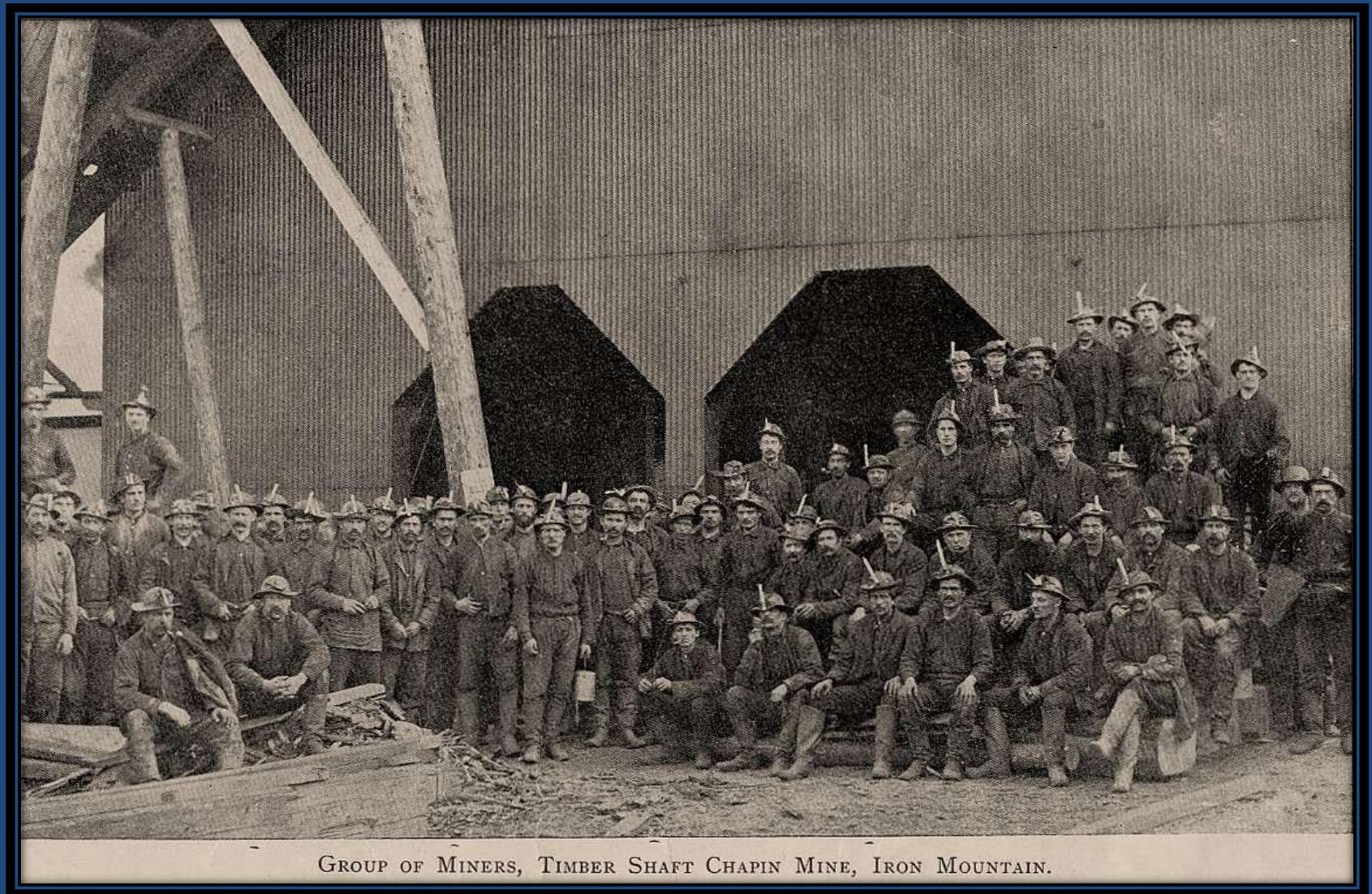
However, at the beginning of April sinking operations were again suspended because the shaft had filled with water. Within two weeks the water was again pumped out of D shaft, but Thomas concluded it would be safer to pump it full again and do a little more freezing before he trusted it. This was done, and the freezing process continued until the shaft was emptied in mid-May. Excavation continued, and the shaft was basically completed during the first week in June. The shaft was securely timbered, the sides being covered with planks, and battens and pitch were then applied to seal the cracks between the planks to prevent the sand from entering.

Now the shaft was again filled with water, and the freezing plant was removed to allow the surrounding ground to return to its normal temperature. Excavation had begun after 15 days of freezing, and the shaft had reached the ledge in 135 days. The cylinder of frozen ground was 50 feet in diameter.

Since thawing the ground naturally would take a considerable amount of time, steam was forced into the eight-inch pipes still encircling the shaft and penetrating to the ledge. Although the water in these pipes was frozen to within 15 feet of the surface, they soon thawed, and steam passed through them until the middle of August, when the pipes began to be withdrawn – with considerable difficulty. Pipes were still being withdrawn at the end of the month when auger holes were bored in the shaft's casing to admit water more freely. The water from the swampy area surrounding D shaft was being drained, and two pumps had lowered the water level in the shaft by 60 feet by early September. Two weeks later the shaft was easily being kept dry, and was considered the finest shaft on the Menominee Range.

A temporary hoisting plant was erected at D shaft early in November, as preparations were being made to continue sinking operations there. By the end of August, 1890, the four-compartment shaft had been sunk 190 feet to the ledge at the fifth level. Three months later the sixth level was reached, and by August, 1891, the eighth level was achieved.

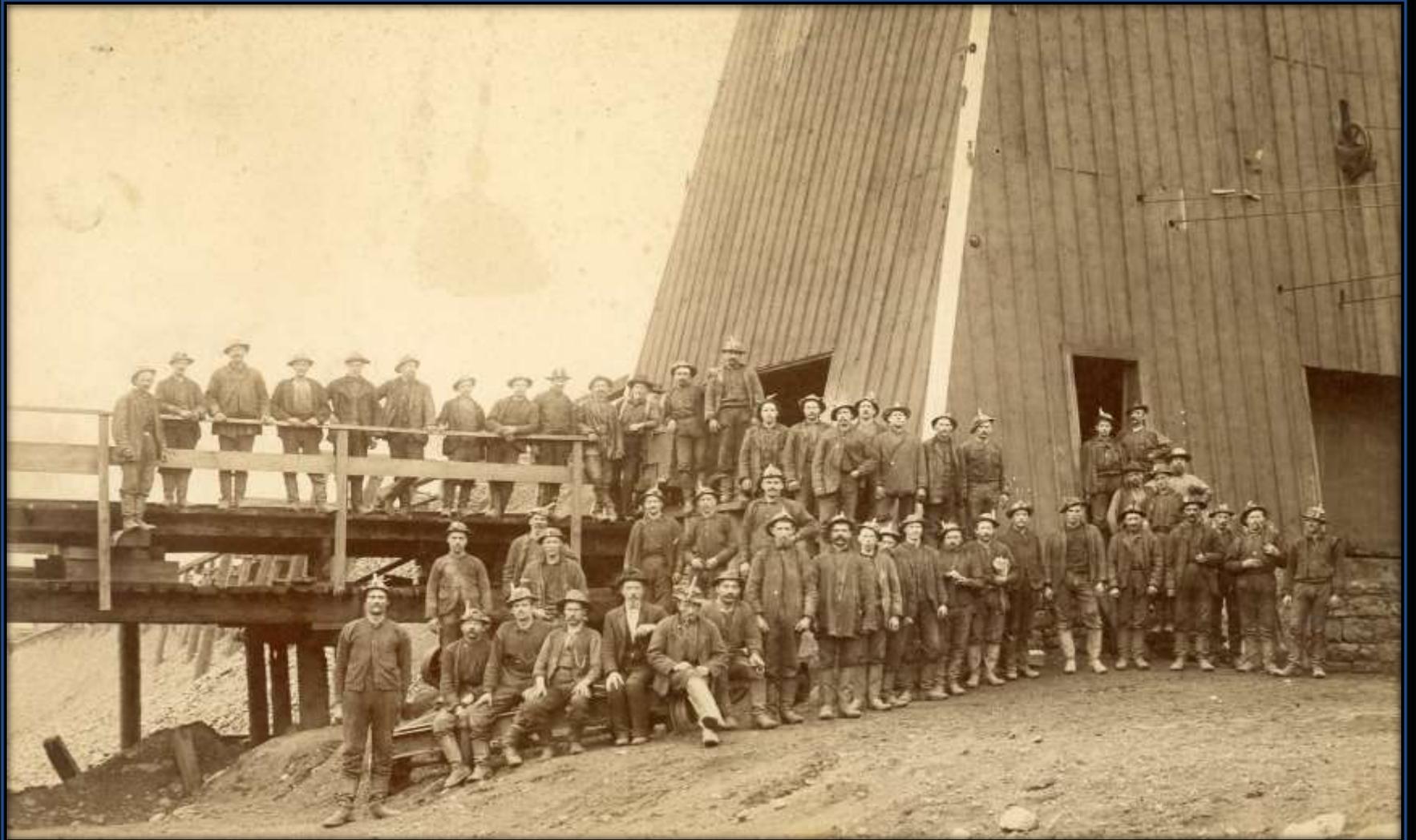
Cage runners were installed during the early fall, and the first ore, two tons, was hoisted November 18. In a 24-hour period in mid-March a record 1,898 tons of ore were hoisted and sent to stock, although the daily average at that time was from 1,700 to 1,800 tons.



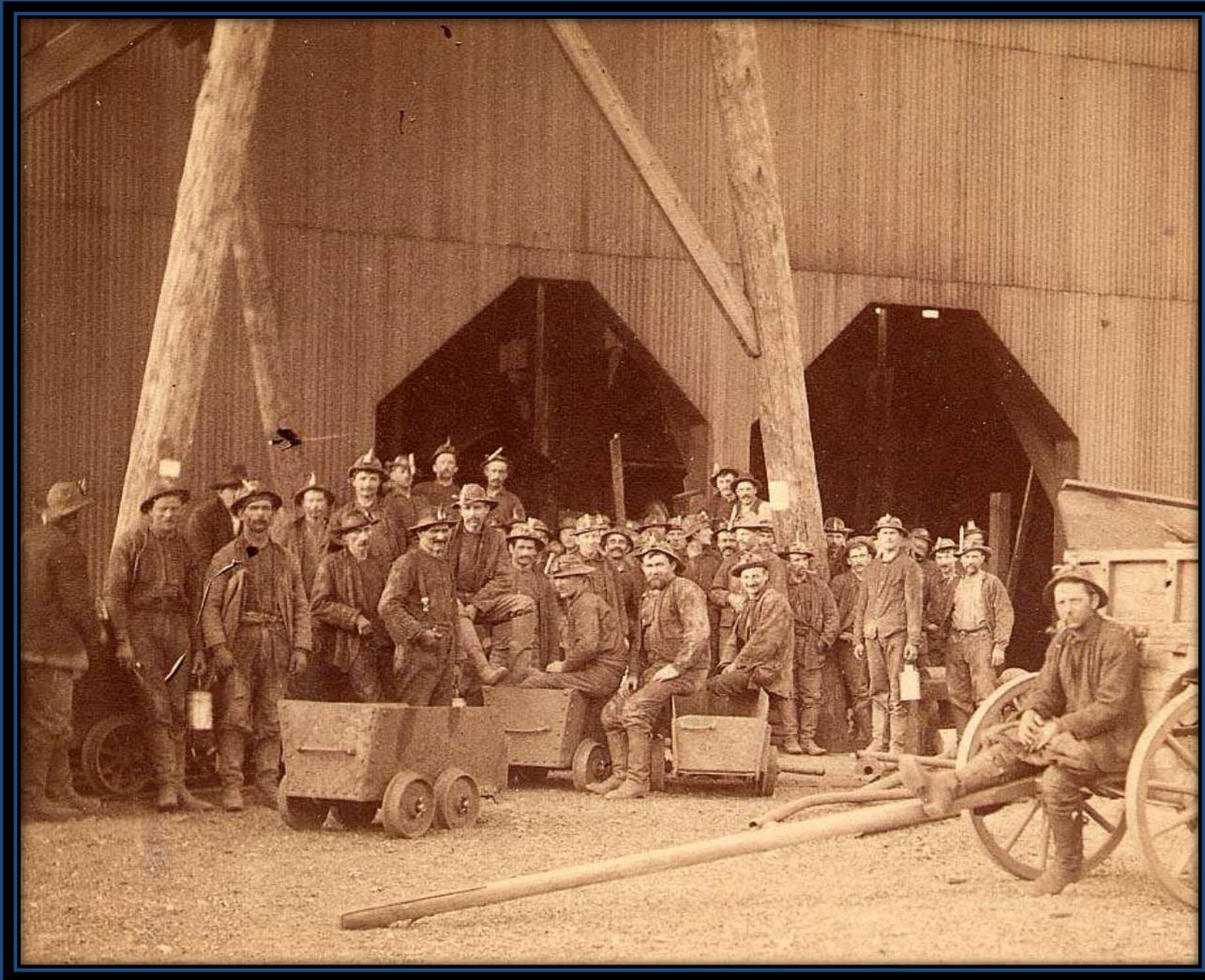
This photograph appeared on page 42 in Walter R. Nursey's book *The Menominee Iron Range*, published in 1891. The timber shaft was then "D" Shaft of the Chapin Mine, located near the northwest corner of Kent Street and South Stephenson Avenue. Note the miners are all wearing candlesticks and sunshine lamps to light their work area. [William J. Cummings]



This early view of Chapin “D” shaft, probably dating to the early 1890’s, shows the wooden shaft housing. Many miners gathered for the photographer and were wearing miner’s candlesticks on their oilcloth hats to illuminate their work area underground. The sandstone water tank with its iron dome can be seen on the horizon to the left of the shaft housing, indicating the camera is facing north. *[Menominee Range Historical Museum]*



Another early view of Chapin "D" shaft, again probably dating to the early 1890's, shows the wooden shaft housing. Many miners gathered for the photographer and were wearing miner's candlesticks on their oilcloth hats to illuminate their work area underground. The stockpiles appear to be located behind the miners, as the trestle can be seen. *[Menominee Range Historical Museum]*



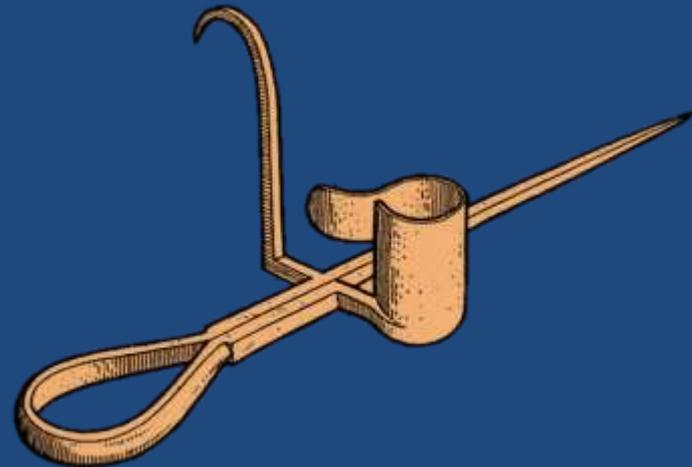
Identified on the back as “Miners from the Chapin Mine,” this photograph, probably taken by Iron Mountain photographer George S. Van Stone between 1893 and 1895, shows the shaft entrances at “D” Shaft of the Chapin Mine. Note the small ore cars which were used by trammers in the mine to push the ore to the skips to be lifted to the surface. The miners were wearing miner’s candlesticks which were used to light their work area during their shift underground. A few were carrying their tin lunch buckets. *[Keen S. Scott]*

Miners' Work Equipment – Miner's Candlesticks, Oilers and Boots

Miners worked by the light of **stearine candles** during the early years of iron mining on the Menominee Iron Range. Paraffin, patented in 1850, was used to make inexpensive candles of high quality. When stearic acid, a very hard and durable material, was discovered, the melting point of paraffin was elevated, producing a superior, long-burning candle.

Miner's candlesticks, sometimes called “**sticking tommies**,” held these candles. Worn on the miner's hat, they also had a spike and a hook which allowed them to hang from or be driven into the timbers in the shaft.

The **oilers** were the “**waterproof**” **oilcloth jackets and pants** worn to help the miner from getting excessively wet in the mines. Boots were also necessary, due to wet working conditions.



William Joseph Trestrail (left) and his Italian mining partner worked in the **Pewabic Mine**, circa 1910. [*Menominee Range Historical Museum*]



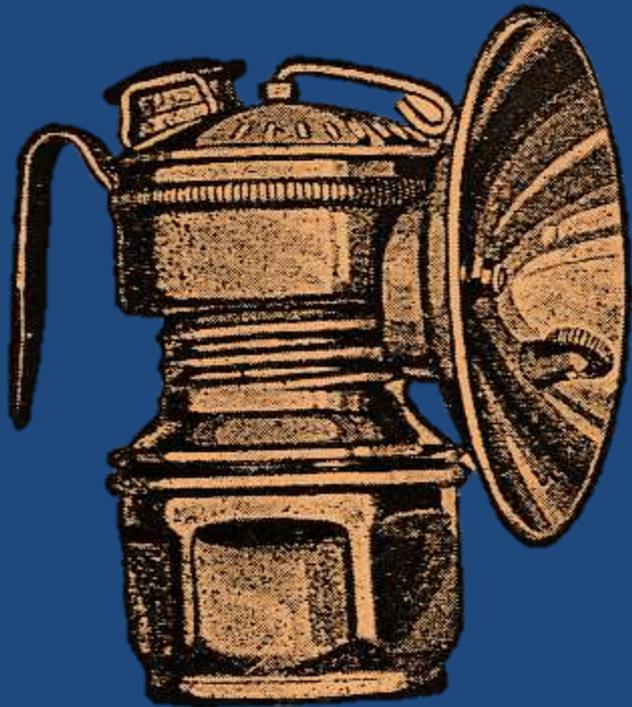
Stearine candles and miner's candlesticks, as well as "sunshine" lamps affixed to the hats of these Chapin miners help date this early photograph, taken around 1900. Possibly the three barefooted boys in the foreground just delivered lunch pails to their fathers, and unexpectedly had their picture taken as well. Note the sandstone mining building. [*Menominee Range Historical Museum*]

Miners' Work Equipment – Carbide Lamps

In 1892, Thomas Willson discovered an economically efficient process for creating calcium carbide, which is used in the production of acetylene gas. In 1895, he sold his patent to Union Carbide. Domestic lighting with acetylene gas was introduced circa 1894 and bicycle lamps from 1896.

The first carbide mining lamp developed in the United States was patented in New York on August 28, 1900 by Frederick Baldwin. After carbide lamps were implicated in an Illinois coal-seam methane gas explosion that killed 54 miners, the 1932 Moweaqua Coal Mine disaster, carbide lamps were less used in United States coal mines.

An unidentified miner with a carbide lamp attached to his hat posed underground on a tram car used for hauling ore to the shaft. Note the cogs on the bottom of his boots. [William J. Cummings]



THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 1

By the time plans were formulated for sinking D shaft by the freezing process, the Chapin management had also decided to make this the new pump shaft, replacing the existing pumping system at the east end of the mine.

A substantial pumping engine and boiler house of native red sandstone was erected there in 1882. The duplex pumping engine then in use had cylinders measuring 24 x 48 inches, and a balance wheel 20 feet in diameter, exactly half the size of the Cornish pumping engine's flywheel. This engine worked a 12-inch suction pump, extracting water from shafts 1, 2, 3 and 5, and had the capability to dewater the entire mine when another level opened.

In his report for 1886, Charles D. Lawton, Michigan's commissioner of mineral statistics, noted the Chapin management had erred in locating their new stone pumping engine house at the east end of the mine, 128 feet above the surface level of the mine's west end. By locating the pump shaft at the west end of the mine, where D shaft was proposed, water wouldn't have to be raised the additional 128 feet. The pumps used at the east end consisted of two 12-inch and two 17-inch plungers, each lifting the water 200 feet. These plungers alternated, so in the second 200-foot lift a 12-inch plunger worked opposite a 17-inch plunger, while the positions were reversed in the first 200-foot lift from surface. Making seven 10-foot strokes per minute, the pumps raised 1,300 gallons in that time, taking nearly all the mine's water via the fifth level through the shaft located just north of the pumping engine house.

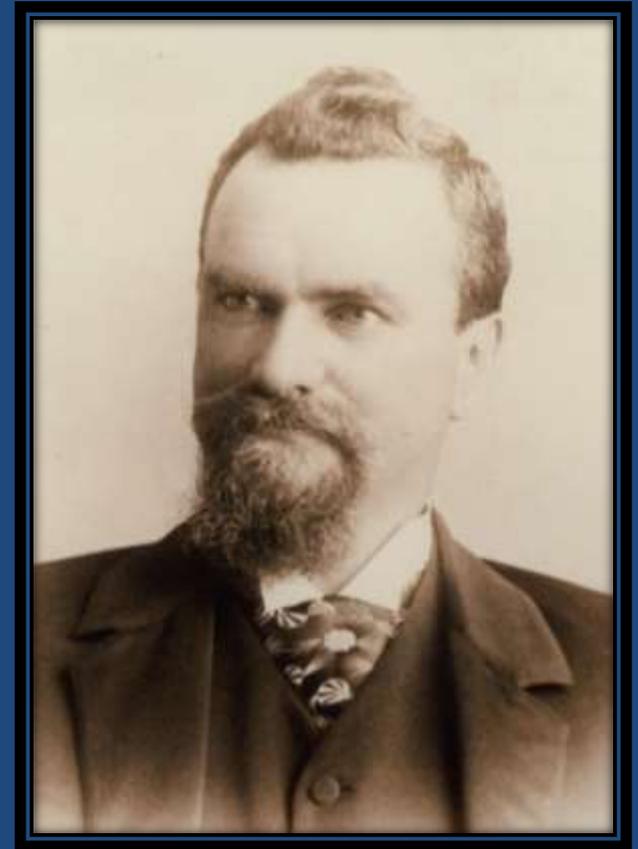
The earliest recorded local public mention of the Cornish pumping engine appeared in the December 7, 1889, issue of *The Current*. **Master Mechanic Edmund Kent** provided the following information:

The plant now in course of construction at the works of E.P. Allis & Co., is a pumping plant which is estimated to weigh 750 tons, and which will be the largest in the country excepting the one at Bethlehem, Pa. It will consist of a "compound condensing direct acting pumping engine" the upper cylinder being 50 inches and the lower one 100 inches in diameter and 10 ft. stroke. The engine will be connected directly with the pump bob, which will weigh 50 tons. There will be a fly wheel 40 ft. in diameter and weighing about 150 tons, and the crank shaft will be 27 inches in diameter. The connecting rods will be 15 inches at the center and 11 inches at the neck.

CHAPIN MINE MASTER MECHANIC EDMOND KENT

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*Edmond Kent
Master Mechanic, Chapin Mine
Iron Mountain's Second Mayor*

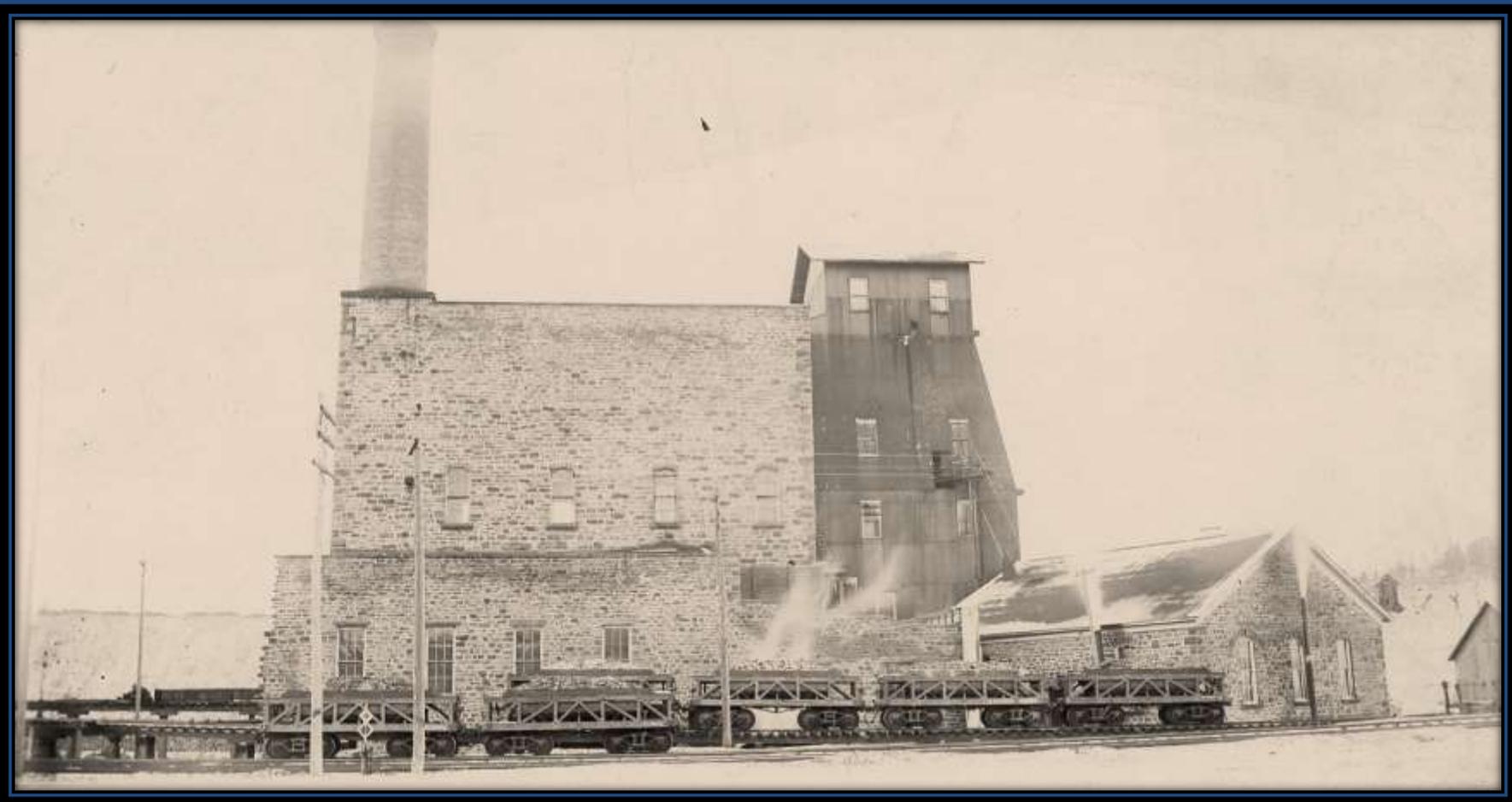
THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 2

The pump rods will be of iron about seven inches in diameter calculated for a depth of 1,500 ft. The plunger will be 28 inches in diameter and ten feet stroke and the water column will be 28 inches in diameter. The capacity of the pump at regular speed will be a fraction more than 319 gallons of water per stroke and ten strokes per minute. There will be 8 upright steam boilers 8 ft. in diameter and 18 ft. high of Reynolds' patent. The estimate given of the weight of the machinery includes only that on surface.

Excavation for the engine house to house the mammoth pumping plant was nearly completed in early September, 1889. Contractor Button had put down a two-foot layer of concrete on which the heavy granite blocks which would form the foundation for the machinery would rest by mid-October. The concrete was covered, and work resumed in the spring to complete the 23-foot thick foundation of stone and concrete. The extreme thickness of this foundation was necessary to accommodate the “slot” for the flywheel which extended about 20 feet below the bed of the engine.

The massive engine house measured 36 x 42 feet, and had risen to 73 feet by early October, 1890, with only the roof remaining for completion. The building dominated Iron Mountain's skyline for almost a decade. A 30-ton traveling crane was placed inside to handle the machinery, while a 10-ton steam winch was put in place for the pump installation in the shaft itself.

Meanwhile, another stone engine house, measuring 56 feet square with a 9-foot thick concrete foundation, was under construction by mid-September for the hoisting plant. By the end of November the iron roof was being secured, while the boiler house for the battery of Reynolds' boilers was nearly completed and 80 feet of the shaft house was up, with the remaining 20 feet ready to place in position. Within a week the derricks, temporary railroad tracks and litter generated by the construction of the pump, engine and boiler houses had been removed, and bolt holes were being drilled in the foundations for the new engines.



Excavation for the foundation of the original building housing the Cornish pumping engine, located on North Stephenson Avenue on the south side of today's West Chapin Lake, began in the fall of 1889. Measuring 36x42 feet and constructed of native red sandstone, the building, towering four stories high, dominated the landscape a year later. The smokestack was contained at the engine house's south end, while the shaft housing, approximately 100 feet in height, was located to the north. The hoisting plant, powering the half-inch thick by four-inch wide flat cables, was situated in a sandstone building just northeast of the shaft house (at the right in the photograph) and began operation in November, 1891. The sandstone boiler house was an eastern extension of the engine house, and contained the battery of Reynolds' patented boilers. *[Menominee Range Historical Museum]*

EDWIN REYNOLDS, DESIGNER OF THE CORNISH PUMP – 1

Edwin Reynolds, who designed the Cornish pumping engine with the assistance of his nephew, Irving H. Reynolds, was born March 23, 1831, at Mansfield, Connecticut, to Christopher and Charissa (Huntington) Reynolds. Following the usual public school education, he was apprenticed to a small local machinist for three years, living as one of the family in the master's house. Reynolds always maintained his success was largely due to this early training at a time when the skill of the mechanic, not the refinement of the tools, produced accuracy.

After learning his trade, he worked in machine shops in Connecticut, Massachusetts and Ohio before becoming shop superintendent of Steadman & Company, in Aurora, Indiana. There Reynolds built engines, sawmills and drainage pumps for Mississippi plantations. During the Civil War he obtained employment in Connecticut, Boston and New York, at one time working on the machinery for Ericsson's famed iron-clad warship *The Monitor*. Following the war he entered the shops of the Corliss Steam Engine Company in Providence, Rhode Island, where he assumed the post of general superintendent.

The Corliss company's "Centennial Engine" stood in the center of the Machinery Hall at the Centennial Exhibition in Philadelphia in 1876, driving all the exhibits in that building. Enormous for its day, the 1400 horsepower condensing steam engine had a pair of 40-inch cylinders, a 10-foot stroke and a flywheel 30 feet in diameter.



Edwin Reynolds

EDWIN REYNOLDS, DESIGNER OF THE CORNISH PUMP – 2

Among those impressed with this and other mechanical marvels, some of which were designed by Reynolds, was Milwaukee's Edward P. Allis.

Hired with the promise of freedom and financial support to allow his mechanical genius to develop for the benefit of the company, Reynolds assumed the position of superintendent of the Edward P. Allis & Company's Reliance Works July 1, 1877, at a salary of \$3,500 – \$1,500 less per year than he earned at the Corliss works.

Since the patent on the Corliss engine expired in 1870, Reynolds was free to make adaptations, and within a year the Allis company was advertising Reynolds' improved Corliss engine. In 1880 he designed two large blowing engines to produce large volumes of air for blast furnaces in the steel mills, and also designed his first pumping engine. Three years later Reynolds built two large pumping engines, mounted on a base area of 36x29 feet which were remarkably simple in design and permitted a reasonably uniform flow of water. Marking the first departure from the conventional type of large pumping engines, they became the forerunners of the great triple-expansion engine.

Reynolds' 22-year-old nephew, Irving H. Reynolds, began working for the Allis company in 1884. Although without formal engineering training, he worked from his experience with marine engines and the pumps Reliance produced from 1874 to 1884 to design an engine which would reduce pulsation in the water main, effect fuel saving and have greater durability, yet be more easily serviced. By working almost every night and every Sunday for two years, Irving Reynolds finally developed his own engine which he called the triple-expansion pumping engine.



Edwin Reynolds

EDWIN REYNOLDS, DESIGNER OF THE CORNISH PUMP – 3

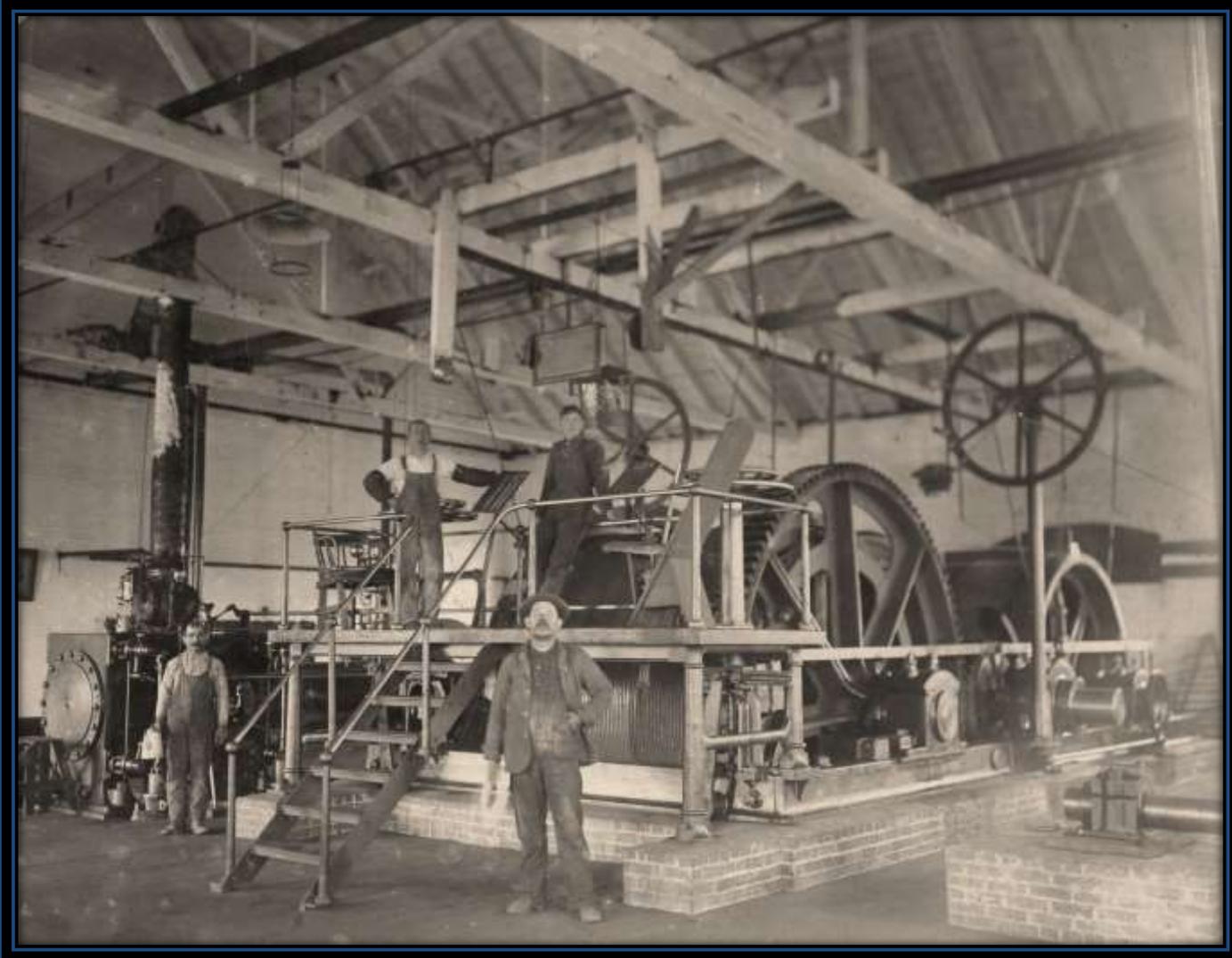
Shortly after the Cornish pumping engine began dewatering Iron Mountain's Chapin Mine, President Grover Cleveland pressed the button which started the 3,000 horsepower horizontal quadruple-expansion Reynolds-Corliss engine on exhibit at the 1893 World's Columbian Exposition in Chicago. Weighing 325 tons and boasting a flywheel 30 feet in diameter – 10 feet less than that of the Cornish pumping engine – the "Pride of Machinery Hall" drove two Westinghouse 750 kilowatt alternators which supplied the current for 20,000 16-candlepower incandescent lamps throughout the fairgrounds. The lavish use of electricity and the engine that produced the power were among the most memorable of the attractions fairgoers retained. Reynolds received national and worldwide recognition for his outstanding achievements in engine design and construction. The Reynolds-Corliss engines were soon powering electric railways and other plants around the globe, including London's "underground railway."

Reynolds was a catalyst in developing the merger between the Edward P. Allis Company, the Fraser & Chalmers Company and the Gates Iron Works of Chicago and the Dickson Manufacturing Company of Scranton and Wilkes-Barre, Pennsylvania, in 1901. He also was involved in planning the newly-formed Allis-Chalmers Company's \$3,000,000 plant erected in West Allis, Wisconsin.

In 1903, the aging Reynolds was made a consulting engineer. He died February 19, 1909, at his residence in Milwaukee, following an illness of three years.



Edwin Reynolds



Probably dating to about 1900, this photograph shows hoisting equipment at the Chapin Mine. Note the workman at the far left with an oil can near the boiler, the two workmen on the platform of the hoisting engine and the other workman standing near the stairway, wearing a hat and coat. *[Menominee Range Historical Museum]*

THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 3

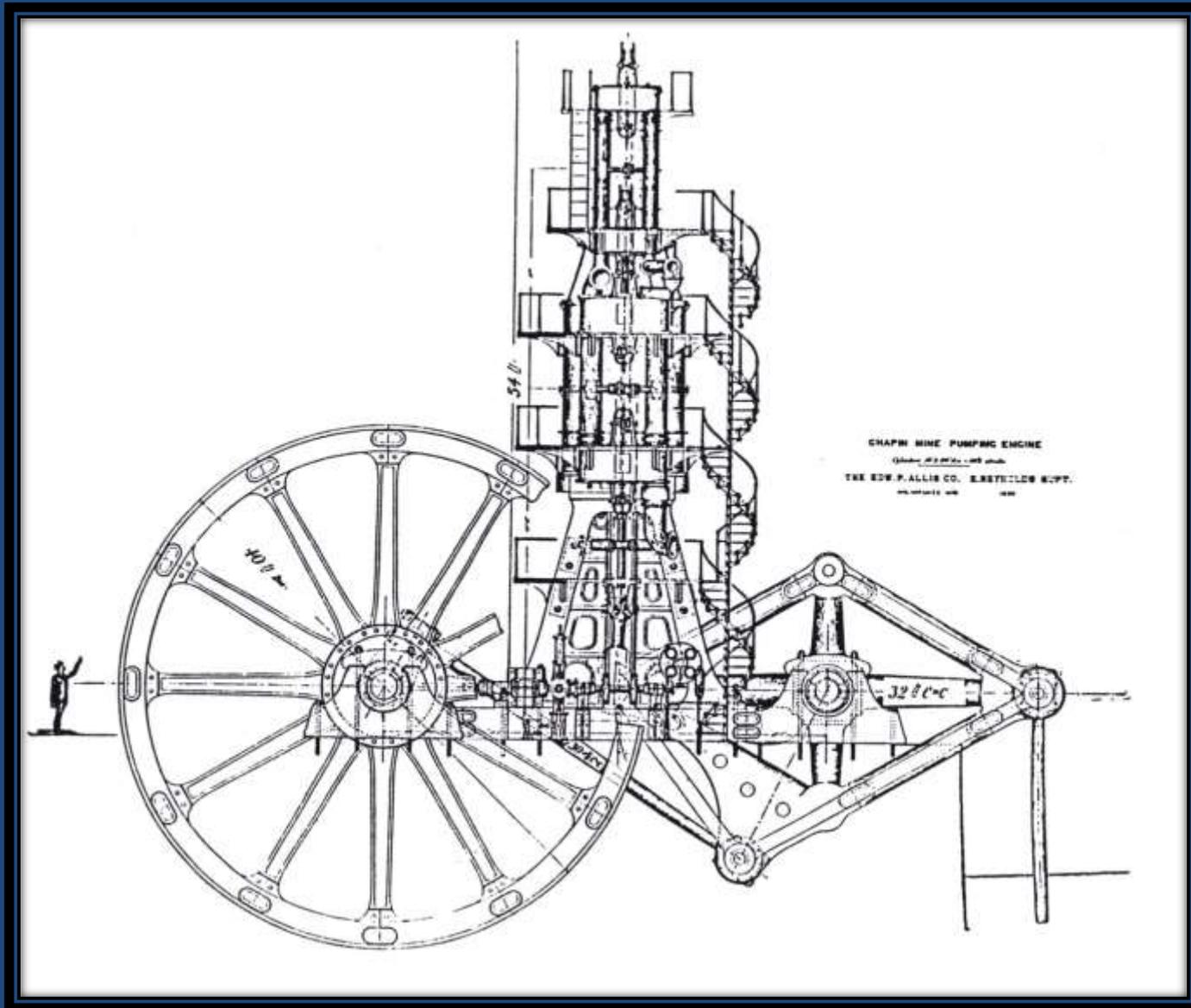
Beginning in mid-February, 1891, D. Heggarty, erecting engineer for the E.P. Allis Company, supervised placing the new hoisting plant machinery, completing the job about two months later due to delays in delivery of some pieces of equipment. The hoisting plant finally went into operation in November, using flat ropes half an inch thick and four inches wide.

Although some castings for the Cornish pumping engine arrived in Iron Mountain as early as February, 1891, more than a year elapsed before any additional machinery for this project arrived, causing much local speculation. Superintendent Charles Tyler, of the E.P. Allis Company, was in charge of erecting the huge engine, and by April, 1892, machinery was arriving regularly from Milwaukee and being set in place. On May 11, the big cylinder, weighing 33 tons, was swung into position. The lower cylinder head, weighing 17 tons, and the upper head, weighing 10 tons, when combined with the cylinder aggregated 60 tons. Captain Traverse assisted Tyler, managing the tackle work on moving and placing the heavy castings.

The Iron Range, an early Iron Mountain newspaper, ran a front-page feature article on the Cornish pumping engine in the May 19, 1892, edition which contained the accompanying line diagram and read as follows:

We present to our readers this week an illustration of the mammoth pumping engine now being erected at D shaft, Chapin mine, under the supervision of Mr. Chas. Taylor, erecting engineer, and through the courtesy of the builders, The E.P. Allis Company, of Milwaukee, we are able to give the following description of this wonderful machine: This engine is what is known as a steeple compound condensing engine, and was designed by E. and I.H. Reynolds, and the contract calls for ninety million foot pounds duty. It will be capable of lifting 200 tons of water per minute, 1500 feet, 100 feet flow, which will be equivalent to 4,000,000 gallons on 24 hours. So it will be seen that the Chapin Mining Company, in putting in this machine, is providing for any contingency that is likely to arise as the mine is deepened to 1500 feet from the surface.

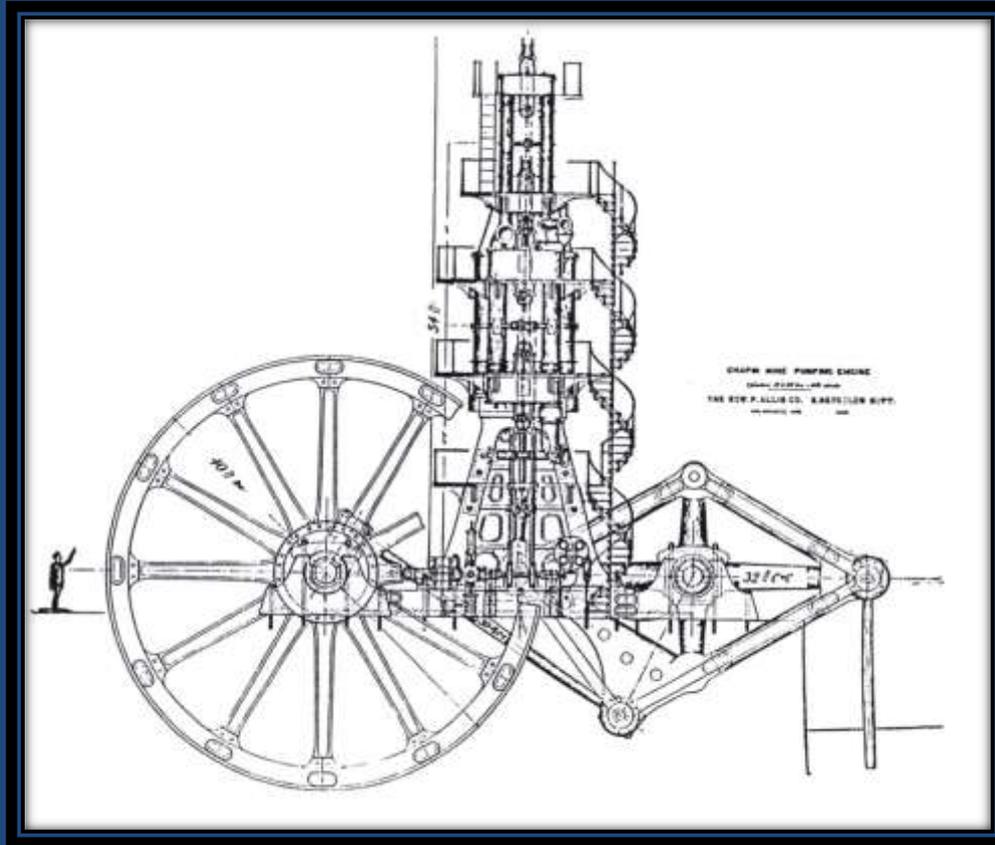
CHAPIN MINE'S CORNISH PUMPING ENGINE



THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 4

*The length from the end of the bob to the back of the fly wheel is about 75 feet and the height above foundation is 54 feet. The high pressure cylinder is 50 inches in diameter and the low pressure cylinder is 100 inches in diameter, and the pumps, to be located about 200 feet apart in the shaft, are 28 inches in diameter, with 120 inches stroke. The bob weighs about 120 tons, and the fly wheel about 160 tons. The fly wheel, as indicated in the illustration, is 40 feet in diameter. The rim of the wheel is 24 inches thick and 24 inches wide. **The immensity of this machine is illustrated in the engraving in a most striking manner by the representation of a six foot man standing near the fly wheel.** The shaft on which the fly wheel revolves is 27 inches in diameter. The bob is made in seven pieces and firmly held together by 21 wrought iron links shrunk on to the lugs as shown by dotted lines in the engraving. It is further strengthened by eight wrought iron tension rods, 8 x 16 inches, shrunk on to the sides and held in place by pins. The engine is fitted with a surface condenser with 1049 one inch tubes, and a Reynolds patent air pump. The mine water will be used in the condenser for cooling purposes. The boilers being once charged with water, as it is evaporated and the steam performs its office of driving the pumping engine, it exhausts into the condenser and is there cooled to a liquid state and pumped back into the boilers by a pump attached to the air pump, thereby affecting the greatest economy possible in the use of water and the making of steam. But to supply any deficiency arising from possible leakage or waste of any kind a small pipe is connected with the city water works. The boiler plant at present consists of four Reynolds patent boilers, but as the mine increases in depth four more will be added as needed. **This engine is the largest and most powerful of its kind ever constructed, and the long established reputation of the builders is sufficient guarantee that it will perform the duty for which it is designed in a perfectly satisfactory manner.** The E.P. Allis Company has contracts for and is building nine triple expansion engines of 165,000,000 gallons daily capacity, and among those of this type already built is one with steam cylinders of 40, 70 and 104 inches by 60 inches for the American Water Works Company, of Omaha, Neb.*

CHAPIN MINE'S CORNISH PUMPING ENGINE



PUMPING MECHANISM STATISTICS

- Pump Bob – 120 tons
- Pump Rods – 7 inches in diameter
- Connecting Rods – 15 inches at center and 11 inches at neck
- Plunger – 28 inches in diameter; 10-foot stroke
- Water Column – 28 inches in diameter

ENGINE STATISTICS

- Engine Height – 54 feet above engine room floor
- Engine Length – 75 feet from back of flywheel to end of pump bob
- Engine Weight – 725 tons (designer's estimate)
- High Pressure Cylinder – 50 inches in diameter
- High Pressure Cylinder Head – 10 tons
- Low Pressure Cylinder – 100 inches in diameter
- Low Pressure Cylinder Head – 17 tons
- Stroke of Pistons – 10 feet
- Flywheel – 40 feet in diameter; 160 tons; normal speed 10 R.P.M.; rim 24 inches thick and 24 inches wide
- Flywheel Drive Shaft – 24 inches in diameter
- Flywheel "Slot" – 20 feet below engine room floor
- Cost of Engine Alone – \$82,500
- Cost of Engine and Pumps – \$250,000 (estimate)

THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 5

Toward the latter part of June, 1892, the 40-foot flywheel was being put together as the erection of the engine neared completion. By the end of the month the engine was basically ready for operation, but a great deal of work remained to be done on the actual pumping mechanism in the shaft.

Little more was done to the engine until the end of September, when Bond & Gill, a local painting and decorating firm, was contracted to paint the huge machine with four to six coats. The firm's work force finished painting and varnishing the engine by mid-November, at about the same time the work in the shaft was nearing completion.

The first work done inside the Chapin Mine in preparation for the new pumping plant was driving a water level 2,000 feet through solid rock from the eighth level at the mine's east end to D shaft, the water level having an incline of 30 feet in this distance. The water level was completed by early December, 1891, with the exception of about 40 feet which was to be driven when the pumps were in place and ready to remove the water from the entire mine.

Near D shaft dams fitted with valves were installed so water could be held in the water level in the event repairs needed to be made at the bottom of the shaft. A full day's worth of water could be retained.

By mid-May, 1892, the "hitches" for the steel girders which would support the water column had been completed. About five weeks later the first of eleven steel girders manufactured by the King Bridge Company, of Cleveland, was lowered to the fifth level and cemented in place. The new steam winch, with a capacity of 10 tons and 1,300 feet of 4 x ½-inch steel rope, lowered the 5-ton girder. Each steel girder had a tensile strength of 60,000 pounds per square inch, and was manufactured on a safety factor of ten, meaning that a girder required to carry one ton was capable of carrying ten tons. Once three girders had been placed, the installation of the pump's water column began. Steel tanks with a capacity of 3,000 gallons, equal to about ten strokes of the pump, were placed at intervals in the shaft.

THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 6

By the end of June, the piston rods still had to be installed and the shafts connected, and considerable piping remained to be done. The bottom set of pumps were in place by August 20, and the balance-bob was scheduled to be put in shortly thereafter.

The new pumping plant was rapidly nearing completion by mid-November, more than three years after the foundation for the pumping engine house had been laid. The first published estimate as to when the giant steam engine would begin pumping was for early December. However, the engine didn't start up until Tuesday afternoon, January 3, 1893, at twenty minutes past two o'clock. Irving H. Reynolds, who assisted his uncle in designing the ponderous machine, witnessed the event.

The Current gave a detailed account of this historic event in Menominee Range mining history in its January 7 edition, as follows:

The new pump at shaft D of the Chapin is at last doing duty. Tuesday it was started up and the column partially filled with water, but owing to a slight trouble with one of the pump valves no water was brought to surface. Wednesday, the trouble having been found and remedied, the ponderous machinery was again started, but owing to the slowness of the start and the weight of water in the partially filled column, the engine centered. The hydraulic crane was brought into use, the fly wheel pulled over and at 1:30 o'clock another start was made and the water soon made its appearance, coming up with such force and in such quantity that the "collar-launders" provided and thought amply large enough, were found scant in size. The pump was worked at varying speed from 4½ to 10 strokes per minute for a short time when it was found necessary to stop for want of water, as the quantity let into the sump had been exhausted and the five feet barrier in the water level toward the east had not been blasted out. The blasting out of this will give the full flow of all the water in the mine into the sump by valves in the dam. Messrs. Reynolds and Lewis of the Allis works and master mechanic Kent were conspicuous during the trial of Wednesday, loosening a nut here, tightening one there, opening one valve a little and closing another until at last everything seemed to their liking and they and Supt. MacNaughton settled down to a condition of extreme satisfaction. The big pump is a success as far as appearances and its ability to do the work assigned it, goes, but one of the bystanders remarked that though it brought up lots of water, it was the driest affair he had ever seen. He even asserted that the whisky jacks used in some part of the construction work were dry.

THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 7

The new pump is built to raise if needed 3,000 gallons of water per minute from a depth of 1,500 ft., but at present less than half that duty will be required. Of the stability of the work but a glance is required to convince one who looks around on surface, while in the shaft nothing has been left undone and the steel girders which carry the weight have a load of 3000 tons with a breaking strain of 30,000 tons. This pump has cost a good round sum of money and has many opponents on the questions of duty and economy, and we trust that at no very distant day comparisons may be made which will interest the mining public.

The estimated “good round sum” the Chapin Mining Company paid for the steam engine alone has been placed at \$82,500, but when the portion of the pumping system located within the shaft and installation costs were added, the total expenditure is thought to have approached \$250,000.

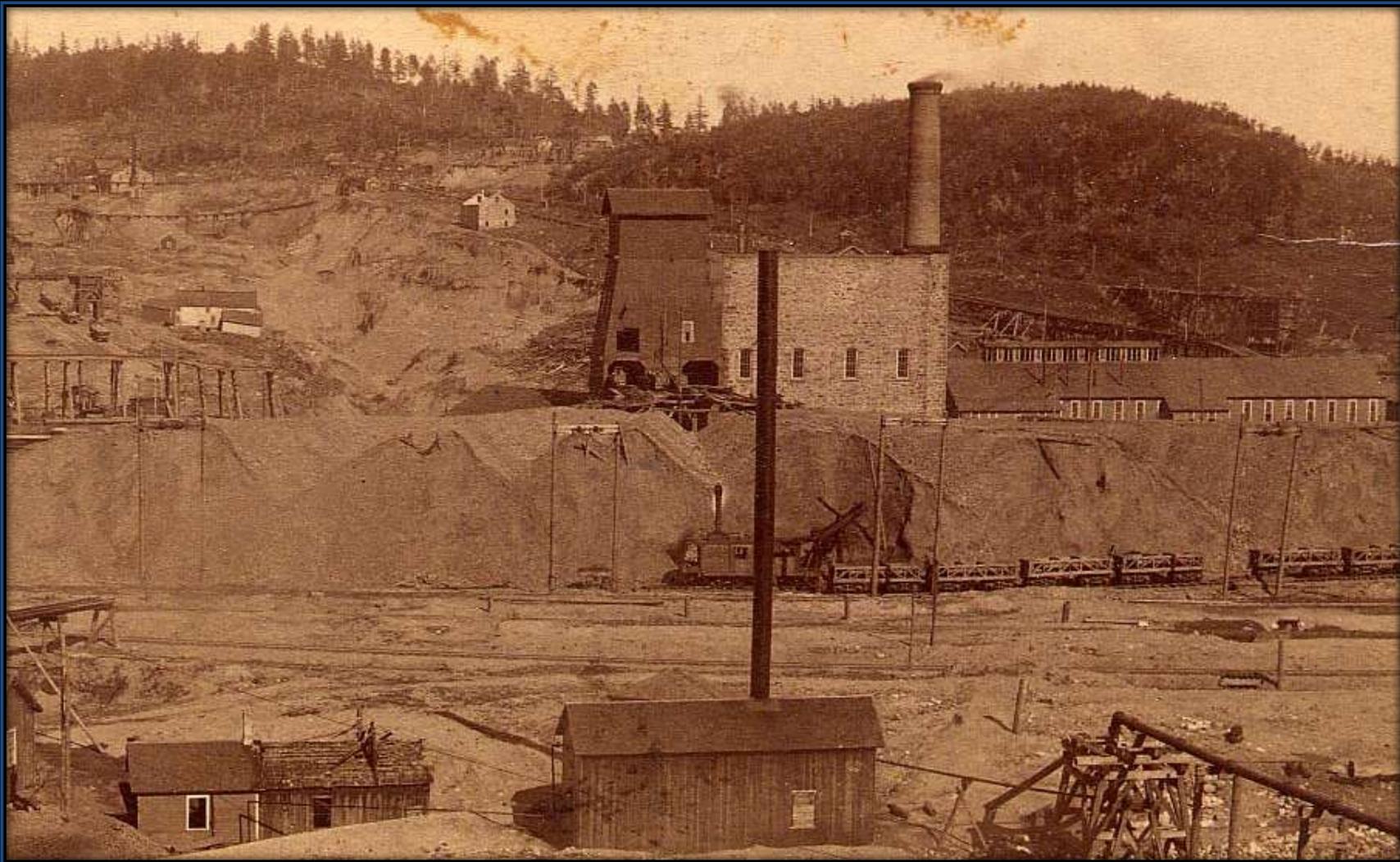
For the next three and a half months, the pumping engine worked sporadically, as minor adjustments of one kind or another were being made.



Iron Mountain's new Chicago & North-Western Railway Depot, located on the west side of the 300 block of South Stephenson Avenue, was opened to the public Sunday, December 22, 1889. A flagman's house at the Hughitt Street crossing is in the foreground and a similar building toward the center of the photograph served as a shelter for policemen. Further down the street on the same side is the original sandstone building which housed the Cornish pumping engine. *[Gene Derwinsk/Dick Ferris]*



Construction of the four-story structure originally housing the Cornish Pumping Engine with a smokestack to the north began in the fall of 1890, and portions of “D” Shaft of the Chapin Mine were razed in June, 1899. However, the sandstone building was allowed to tumble down naturally. The sandstone water tank with its iron dome can be seen on the horizon and at the extreme left is a corner of the Fisher Block which originally housed the Commercial Bank, built in 1891. [Gene Derwinsk/Dick Ferris]



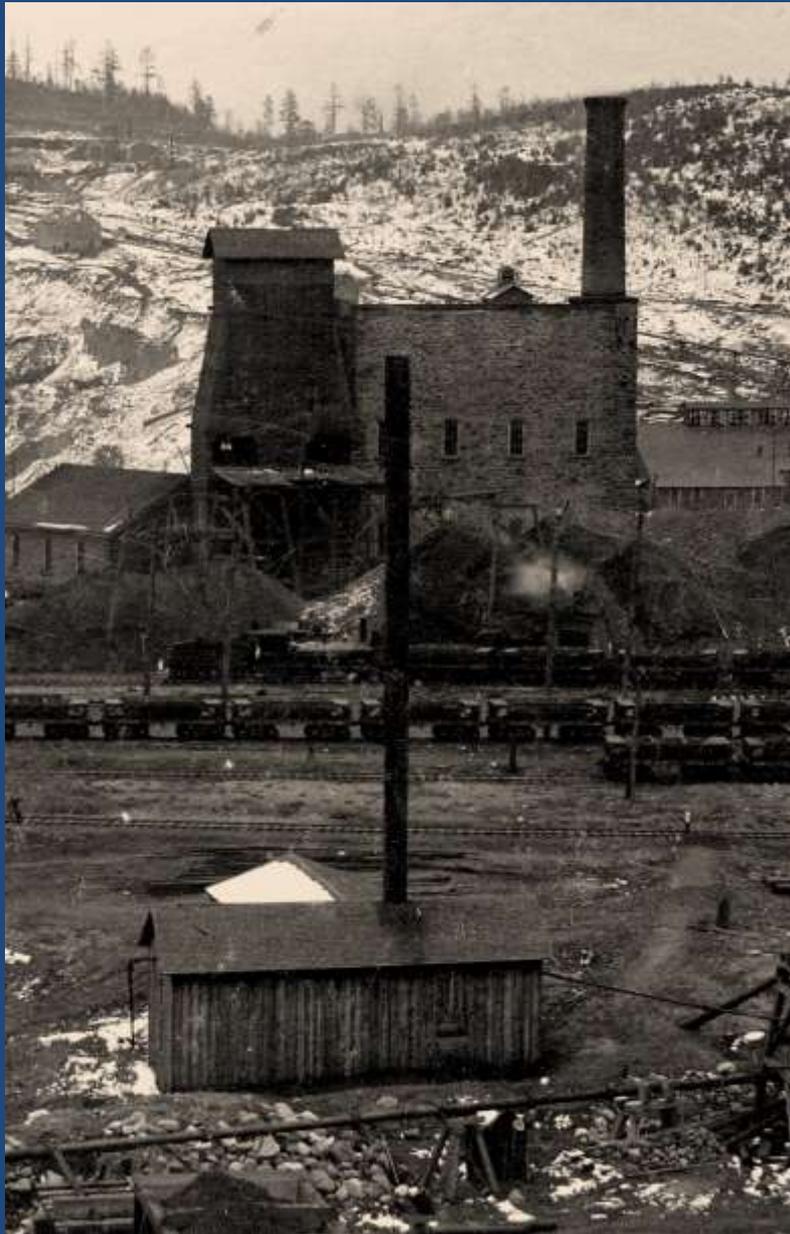
Probably taken by Iron Mountain photographer George S. Van Stone between 1893 and 1895, this view shows “D” Shaft of the Chapin Mine with the sandstone building housing the Cornish pumping engine, taken from Ludington Mine area looking east with Millie Hill visible in the background. Note the air pipe from the Hydraulic Power Company in the lower right corner, the size of the stockpiles, the steam shovel and the ore cars. *[Keen S. Scott]*



This view of the Chapin Mine's "D" shaft complex in Iron Mountain, looking east, was taken in about 1894. Two tramways exist at the shaft housing's mid-point. A steam locomotive appears to be pushing four cars directly below, in front of the vast stockpiles. To the right of the sandstone building which originally housed the Cornish pumping engine and across the street on Stephenson Avenue some of the Chapin Mining Company's shops are visible. *[William J. Cummings]*



The Millie Mine, originally the Hewitt Mine, can faintly be seen directly above and slightly to the left of the Chapin "D" shaft housing near the crest of Millie Hill. Pewabic Hill rises in the background. The Hydraulic Power Company's air pipe appears in the lower right, extending west to the Ludington shaft and northwest to the Hamilton shaft. Earlier Chapin Mine shafts are visible at the left and the depression is the area which began sinking in 1885 and now forms East Chapin Lake. [William J. Cummings]



Excavation for the foundation of the original building housing the Cornish pumping engine, located on North Stephenson Avenue on the south side of today's West Chapin Lake, began in the fall of 1889.

Measuring 36x42 feet and constructed on native red sandstone, the building, towering four stories high, dominated the landscape a year later.

The smokestack was contained at the engine house's south end, while the shaft housing, approximately 100 feet in height, was located to its north. The hoisting plant, powering the half-inch thick by four-inch wide flat cables, was situated in a sandstone building just northeast of the shaft house (at the left in the photograph) and began operation in November, 1891. The sandstone boiler house was an eastern extension of the engine house, and contained the battery of Reynolds' patented boilers.



The mines employed skilled workers as well as miners and common laborers. The Chapin Mine shops, located just south of today's East Chapin Lake on South Stephenson Avenue, included a carpenter shop, a machine shop and a blacksmith shop. *[Menominee Range Historical Museum] [Menominee Range Historical Museum]*



Taken near the Chapin Mine shops on the east side of South Stephenson Avenue just south of today's East Chapin Lake, these men posed with a team of white horses pulling a wagon in front of a pile of lumber in about 1900-1910. The man at the far right wore a mining hat, possibly with a miner's candlestick, used for lighting his work area in the mine. *[Menominee Range Historical Museum]*



The interior of the Chapin Mine blacksmith shop, pictured here sometime between 1910 and 1920, includes Joseph Sandercock, holding a metal bar at the far right. George Bennett is the fourth man from the right. Sandercock was Iron Mountain's first blacksmith, setting up his anvil on a stump and hanging his bellow between two trees on September 15, 1879. [*Menominee Range Historical Museum*]



Another interior view of the Chapin Mine blacksmith shop, taken sometime between 1910 and 1920, again includes Joseph Sandercock, foreman of the blacksmith shop, second from left. Hired to work at the Chapin Mine in 1879, he was continuously employed there for 44 years. In September, 1899, the blacksmith shop was remodeled in accordance with Sandercock's plans, and the old stone forges were replaced with the iron ones pictured. [*Menominee Range Historical Museum*]

THE CHAPIN MINING COMPANY ANNEXES THE HAMILTON AND LUDINGTON MINES – 1

When the successful dewatering of the Hamilton and Ludington shafts was accomplished in the summer of 1893, the full impact of the financial panic was just beginning to spread across the nation. With the depressed iron market, these mines remained closed, and General Manager John Tyler Jones had to allow them to again fill with water.

Following its sale in 1894, the Chapin continued to mine and ship ore, and began increasing its work force in the spring of 1895. In early June, *The Range-Tribune* exclaimed:

It seems like old times now with the Chicago & North-Western hauling between six and seven hundred cars to Escanaba daily from this range, and the cry being heard all along the line for more cars...Thirty-two trains are operated, sixteen each way, and the daily movement of ore is over 10,000 tons.

Beating all the Chapin's previous records, the steam shovel loaded 113 cars in 13 hours one day in August.

The newspapers noted a verbal agreement had been made by which the Hamilton and Ludington mines would both come under the Chapin management in their late November editions. The merger became official after a meeting in Cleveland on January 6, 1896, and plans were rapidly made to dewater the two new properties. Hampered by a series of accidents to the equipment, bailing finally began May 4, and a month later the task was completed with 122,464,787 gallons of water raised.

At a special meeting of the Chapin Mining Company stockholders held in Cleveland June 8, a new lease was signed between Henry A. Chapin and his wife and the company, the Keweenaw Association and the Hamilton and Merryman Company in which the royalty fees were reduced.

The management soon placed an order for a Reidler pumping plant for these two mines which was installed at the 12th level of the Hamilton No. 2 shaft in a room cut into the limestone measuring 53 x 35 feet with an 18-foot ceiling. Work soon began to connect the Chapin's D shaft with the Hamilton No. 2 shaft, and was completed in late fall, 1897. A new trestle, an ore pocket and a haulage house were also constructed, since ore from the west end of the Chapin property was to be hoisted through this shaft.

THE CHAPIN MINING COMPANY ANNEXES THE HAMILTON AND LUDINGTON MINES – 2

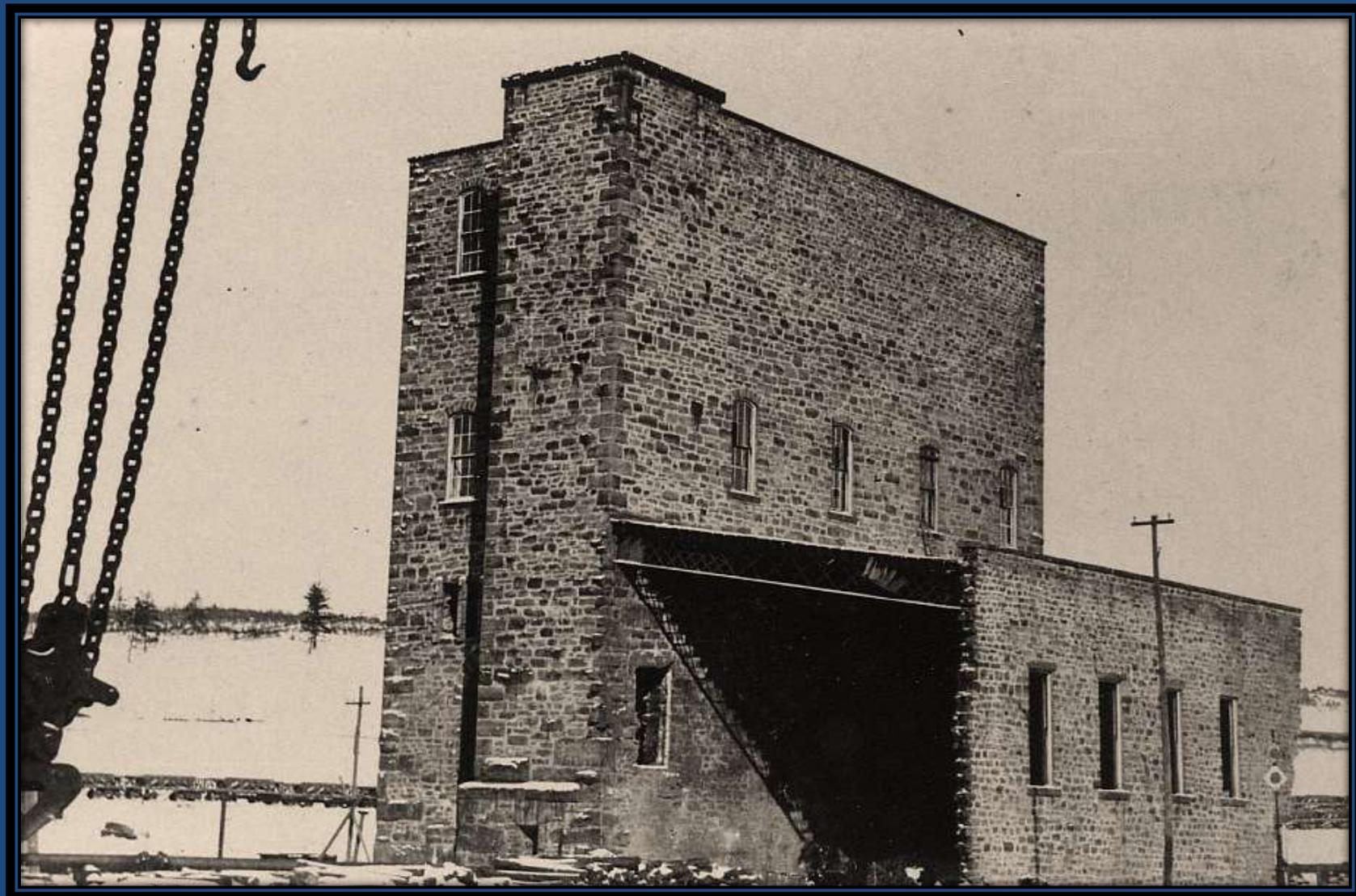
All of the old buildings at both the Hamilton and Ludington properties were torn down as these improvements were being made, and the connection between the Chapin and Ludington mines was completed early in May, 1898.

THE DISMANTLING OF THE CORNISH PUMPING ENGINE AT D SHAFT OF THE CHAPIN MINE – 1

As early as February, 1896, scarcely three years after the Cornish pumping engine began operation at D shaft, an article in *The Current* predicted the huge plant would probably be removed so the pillar supporting it, containing more than a million tons of the best grade Chapin ore, could be mined.

Master Mechanic Frederick Richards headed the small force of men which began dismantling the engine in mid-July, 1898. By that time ominous cracks had appeared in the pumping engine house due to the settling of the ground in the surrounding area, where circular sink holes appeared with increasing frequency. As soon as parts were removed from the engine, they were thoroughly “larded” and stored away for possible future use. The dismantling was completed toward the end of August, and a storage shed was built to house the machinery near the old coal dock. By the beginning of December, when the underground and surface haulage systems and the Allis pump’s water column were being removed from the shaft, predictions were that D shaft would soon collapse.

However, in June of 1899 a crew of Chapin Mining Company men was assigned to tear down the stone engine house and the large brick smokestack, salvaging as much of the smokestack as possible. But the four-story sandstone pumping engine house was not razed, the management having decided to allow it to tumble down with the settling ground.



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THE CHAPIN SOLD TO NATIONAL STEEL CO. IN 1899; BECOMES PROPERTY OF U.S. STEEL IN 1901 – 1

Marcus A. Hanna, an astute businessman, quickly realized that as the nation's industries developed, they became more and more closely allied with local, state and national politics. Thus, early in his career, he became actively involved in politics, soon being recognized as a leader of the Ohio Republican Party. He successfully supported Congressman William McKinley's bid for the Ohio governorship in 1891, and then succeeded in placing him in the White House in 1896. When McKinley appointed Ohio's Senator John Sherman secretary of state, Hanna was named as his replacement, and retained his senate seat, a life-long ambition, until his death in 1904.

Perhaps Hanna's outspoken support of the prevailing tendency toward railroad and industrial combinations as the nineteenth century drew to a close influenced his company's sale of the Chapin Mining Company to the newly-formed National Steel Company. The deal was closed in Cleveland on July 28, 1898, although the final transfer of M.A. Hanna & Company's interest in the Hydraulic Power Company was not completed until June 16, 1900.

The National Steel Company had been organized by brothers William Henry and James Hobart Moore, Chicago capitalists and promoters. The Moores were among the first to recognize the possibilities of industrial mergers in America, and, next to John Pierpont Morgan, perhaps the most important in developing them. Prior to turning to the steel industry, they had first reorganized the Diamond Match Company, and then, somewhat later, formed the National Biscuit Company (Nabisco) in February, 1898.

Between December, 1898, and April, 1899, the Moores organized the American Tin Plate Company, the National Steel Company and the American Steel Hoop Company.

The Chapin Mining Company continued to be operated as before under the National Steel Company, with General Manager MacNaughton still in charge. The year 1900 proved to be the Chapin's banner year, when a record 1,012,000 tons of ore were produced. Between 1880 and 1900, the total output was 9,451,963 tons.

Mergers and consolidations continued multiplying at an accelerated rate in the American business world, especially in the steel industry. During the summer of 1898, the Federal Steel Company was formed from the Illinois Steel Company, an ore company and several other concerns by Chicago Judge Elbert H. Gary with considerable assistance from America's foremost leader of finance, New Yorker John Pierpont Morgan.

THE CHAPIN SOLD TO NATIONAL STEEL CO. IN 1899; BECOMES PROPERTY OF U.S. STEEL IN 1901 – 2

Soon thereafter, Morgan organized the National Tube Company and the American Bridge Company. By then the Moores had also formed the American Sheet Steel Company and the American Steel Hoop Company. Barbed wire manufacturer John Warne Gates had put together the American Steel & Wire Company earlier, having unsuccessfully solicited Morgan's support.

Each of these companies constituted a merger of a number of former competitors. As these companies had acquired a partial monopoly of the operations in their special fields of steel manufacture, each was able to raise prices for its finished steel products.

In many minds the ideal merger now evolved – a combination of these steel manufacturing companies into a mammoth supercorporation. But one thing stood squarely in the way of such a dream – the Carnegie Steel Company, then the biggest, most efficient and fabulously successful company in the industry. While the newly-formed companies concentrated on making finished steel articles, the Carnegie company dominated the production of crude steel from which they fashioned their products.

In the summer of 1900, a ferocious struggle began within the steel industry. The various new combinations which made finished steel products realized they also needed to produce their own crude steel, even to the point of acquiring their own sources of iron ore, if they wanted to avoid being dependent on the Carnegie Steel Company for their raw material. As these companies prepared to manufacture crude steel, they began cancelling their contracts with the Carnegie company.

Feisty Andrew Carnegie, who tightly controlled his steel empire, considered this a declaration of war, and soon announced the Carnegie Steel Company would begin manufacturing finished steel products. This announcement placed the new steel combinations in deadly peril, for Carnegie could produce more steel more economically than anyone else in the world. He also had immense capital, and did not mind stopping dividends entirely to invest his company's earnings in new construction.

Arrangements were made for Morgan to attend a dinner at New York's University Club in December, 1900, where Charles M. Schwab, Carnegie's chief assistant, was to speak about the future of the American steel industry. Schwab noted the growing demand for steel, adding that America could dominate the world's steel trade only if the industry could be fully integrated for complete efficiency. If a single corporation could carry the manufacture of steel through every stage from mining the ore to completing the finished product, operations would be so economical that such a company could cut prices, instead of raising them, and still make millions.

THE CHAPIN SOLD TO NATIONAL STEEL CO. IN 1899; BECOMES PROPERTY OF U.S. STEEL IN 1901 – 3

Intrigued, Morgan spoke with Schwab privately following the dinner, and another meeting was arranged shortly thereafter at Morgan's mansion, where Schwab was asked if he thought Carnegie would be willing to sell his company.

Carnegie was then in his middle sixties, and had given some thought to retirement. At first dismayed when Schwab asked the question, Carnegie soon realized the moment to sell had arrived, and jotted some figures on a slip of paper for Morgan's approval. Morgan accepted, agreeing to pay Carnegie's asking price which totaled \$492,556,766.

Morgan now called the head of one big company after another into conference, working out terms for its acquisition. Among the properties he succeeded in acquiring was the Lake Superior Consolidated Iron Mines which controlled the largest deposits of ore on the Mesabi Range and was owned by John D. Rockefeller. Carnegie had leased these properties from Rockefeller, and had controlling interest in the Oliver Iron Mining Company which worked the mines.

Within three months of the University Club dinner, Morgan had organized the United States Steel Corporation which then controlled three-fifths of the country's steel business and was the first American corporation with a capitalization of over a billion dollars (\$1,402,846,817).

Thus, the Chapin Mining Company became a part of the United States Steel Corporation when the National Steel Company was acquired. The Chapin Mine was worked by the new corporation's subsidiary, the Oliver Iron Mining Company, and MacNaughton was appointed general manager of its Menominee Iron Range mines. When MacNaughton left to become general superintendent of the Calumet & Hecla Mining Company in Calumet in mid-June, 1901, he was succeeded by Otto C. Davidson, who had been general superintendent of the Commonwealth Iron Company in Florence County, Wisconsin, for many years.

Men formerly connected with the Chapin Mine who became officials in the new corporation included **Dr. Nelson Powell Hulst**, named mining engineer, and **Thomas F. Cole**, former Chapin Mine superintendent, named general manager of mines.

OTTO C. DAVIDSON, SUPERINTENDENT OF THE OLIVER IRON MINING COMPANY



Otto Conrad Davidson, son of Thomas Davidson, a native of Norway, was born in Green Bay, Wisconsin, June 22, 1857. After being educated in the public schools in that city, Davidson began clerking in a bank at sixteen years of age. In 1882 he was hired as bookkeeper at the Briar Hill Mine in Norway, Dickinson County, Michigan, and at the end of one year was made superintendent of the mine.

After serving as the mine's superintendent for one year, Davidson became a teller in a Green Bay bank. In 1886 he returned to mining, serving as superintendent of the Florence Mining Company's properties for two years. From January, 1889, to 1901, he was superintendent of the Commonwealth Mine near Florence, Florence County, Wisconsin.

In 1901 Davidson became superintendent of the Oliver Mining Company's properties on the Menominee Range, and subsequently was promoted to general superintendent of the properties on both the Menominee Range and the Gogebic Range, with headquarters in Iron Mountain, Dickinson County, Michigan.

Beginning in 1902, Davidson was president of the Commercial Bank of Iron Mountain.

In April, 1889, Davidson married Charlotte S. Dickinson, daughter of William Edmund Dickinson, a pioneer in mining development in the Upper Peninsula. In 1881 Dickinson was employed by the Tuttle Brothers as superintendent of the Commonwealth Mine, Florence County, Wisconsin, a position he held for eight years.

Otto Conrad Davidson



In August, 1898, D. Fred Charlton, a Marquette architect, was preparing plans for the new residence that James MacNaughton, general manager of the Chapin Mining Company, planned to erect at 106 North Carpenter Avenue on the site of the former Robert Bankes residence which had been sold to Thomas Penglase and moved to 401 East A Street. The new residence was colonial in style and was to contain about twelve rooms. The foundation walls were completed by the beginning of October, 1898. *[William J. Cummings]*



In 1901 the Chapin Mine was worked by the Oliver Iron Mining Company, a subsidiary of the newly-formed United States Steel Corporation. MacNaughton was appointed general manager of the subsidiary's Menominee Iron Range mines. When MacNaughton left to become general superintendent of the Calumet & Hecla Mining Company in Calumet in mid-June, 1901, he was succeeded by Otto C. Davidson, who had been general superintendent of the Commonwealth Iron Company in Florence County, Wisconsin, for many years. *[William J. Cummings]*



The Davidson family occupied the residence for many years. After her husband's death, Mrs. Otto C. (Charlotte Dickinson) Davidson sold the residence to friends Martin D. Thomas and F. Albee Flodin, who helped to organize the Chippewa Club in 1945 as a "suitable place where executives could meet for private business." The Chippewa Club, considered a private social club, was named for The Chippewa, a popular engine (numbered 21 and 14) of the Milwaukee Road which ran between Chicago and Iron Mountain beginning May 28, 1937 until December 9, 1950. This postcard dates to about the time the Chippewa Club was established. [William J. Cummings]



Postmarked in Iron Mountain, December 26, 1915, this black-and-white halftone postcard view shows two miners working underground in the Chapin Mine, wearing candlesticks to light their work area and operating a Rand drill with various drill bits leaning against the mine wall. [*William J. Cummings*]

THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT C LUDINGTON SHAFT OF THE CHAPIN MINE – 1

The Oliver Iron Mining Company begin sinking C Ludington shaft, where the Cornish pumping engine now stands, on May 6, 1903. Sinking was completed early in December, 1907.

The shaft was lined with steel frames from the surface to the bottom and lathed outside with heavy planks “broken” at various points in order to avoid a continuous sheet of combustible material. The inside measurements at the collar of the four-compartment shaft were 10 feet 4 inches by 23 feet 1 inch, making it among the largest and best shafts in the Lake Superior iron mining region at the time. Two hoisting compartments were each 5 x 8 feet, the cageway was 5 feet by 10 feet 4 inches, and the pump compartment was 10 feet 4 inches by 11 feet 1 inch.

Erection of the Cornish pumping engine and plant began in 1907 and was completed early the following year, after almost a decade in storage. Long known to be one of North America’s wettest mines, the Chapin was steadily producing from 2,800 to 3,000 gallons per minute at this time.

At D shaft only four sets of pumps had been used, as water only had to be lifted 600 feet. However, eight sets of pumps were installed at C Ludington shaft at intervals of 170 to 192 feet, since the total depth of the shaft was 1,522 feet. The pumping equipment utilized a reciprocating motion with a line of steel rods extending the depth of the shaft. Each of the pumps forced the water to the next higher holding tank, each holding tank having a capacity of approximately 3,000 gallons, until the water finally was pumped out at the surface, eventually making its way through natural and man-made waterways to the Menominee River.

The engine’s boilers required 11,000 tons of coal annually to produce an adequate head of steam. The tile smokestack, having an inside diameter of 78 inches, towered 135 feet above the ground west of the boiler house. A crew of 60 men divided into three shifts was employed to operate the plant, including the men in the boiler house, engine house and the shaft house.

THE INSTALLATION OF THE CORNISH PUMPING ENGINE AT C LUDINGTON SHAFT OF THE CHAPIN MINE – 2

A steel shaft house capped the shaft, and four ore pockets were built. Ample room for extensive stock docks was available and the ground had been thoroughly tested to insure against caving before sinking commenced.

The largest hoisting plant in the Lake Superior iron mining region at this time was also then being erected at C Ludington shaft. Built by Milwaukee's Allis-Chalmers Company, the duplex reversing Corliss engine with heavy duty frames was 34 x 72 inches and worked at 50 r.p.m. Equipped with an automatic device for closing the throttle, the engine was capable of hoisting 22,000 pounds, excluding the weight of the steel rope, from a maximum depth of 3,000 feet. Stephenson link was the reverse motion employed by the engine.

The hoisting drum, keyed to the shaft's depth and boasting turned grooves for its 1 3/8-inch steel rope, was 12 feet in diameter, with a 10-foot face. Two 4,000-pound skips were each capable of carrying a 14,000 pound load.

Hoisting operations began July 26, 1908, and C Ludington shaft served as the main hoisting shaft of the Chapin Mine.



An oversized postcard view by Nels M. Nelson, Iron Mountain photographer, early in the second decade of the twentieth century shows the Chapin cave-in or pit looking northeast from the Ludington Shaft area. The Hamilton Shaft complex appears near the center where the smokestack belches black smoke. Ground around the Chapin Mine began settling as early as 1885. A book entitled *Michigan and Its Resources* published in 1893 by the Secretary of State noted over 4,000,000 tons of iron ore had been extracted from the Chapin, and illustrated this immense volume as follows: “to convey the total product of this one mine in railroad cars, such as are used for carrying ore from the mines to the docks, would require a train of 218,327 20-ton cars, which at twenty-three feet in length would cover a distance of 5,022,441 feet, or 951 miles. About the distance between New York City and Chicago.” No wonder the Chapin cave-in was so immense! [*Menominee Range Historical Museum*]

SINK HOLE, CHAPIN MINE, IRON MOUNTAIN, MICH.



E. C. KROPP CO. MILWAUKEE

Postmarked July 13, 1908, this view of the “Sink Hole” of the Chapin Mine shows the west side of the Chapin Pit with the Hamilton Mine Shaft buildings of the Chapin Mine at the left and the Chapin Company Store and other buildings on the east side of Stephenson Avenue. [William J. Cummings]



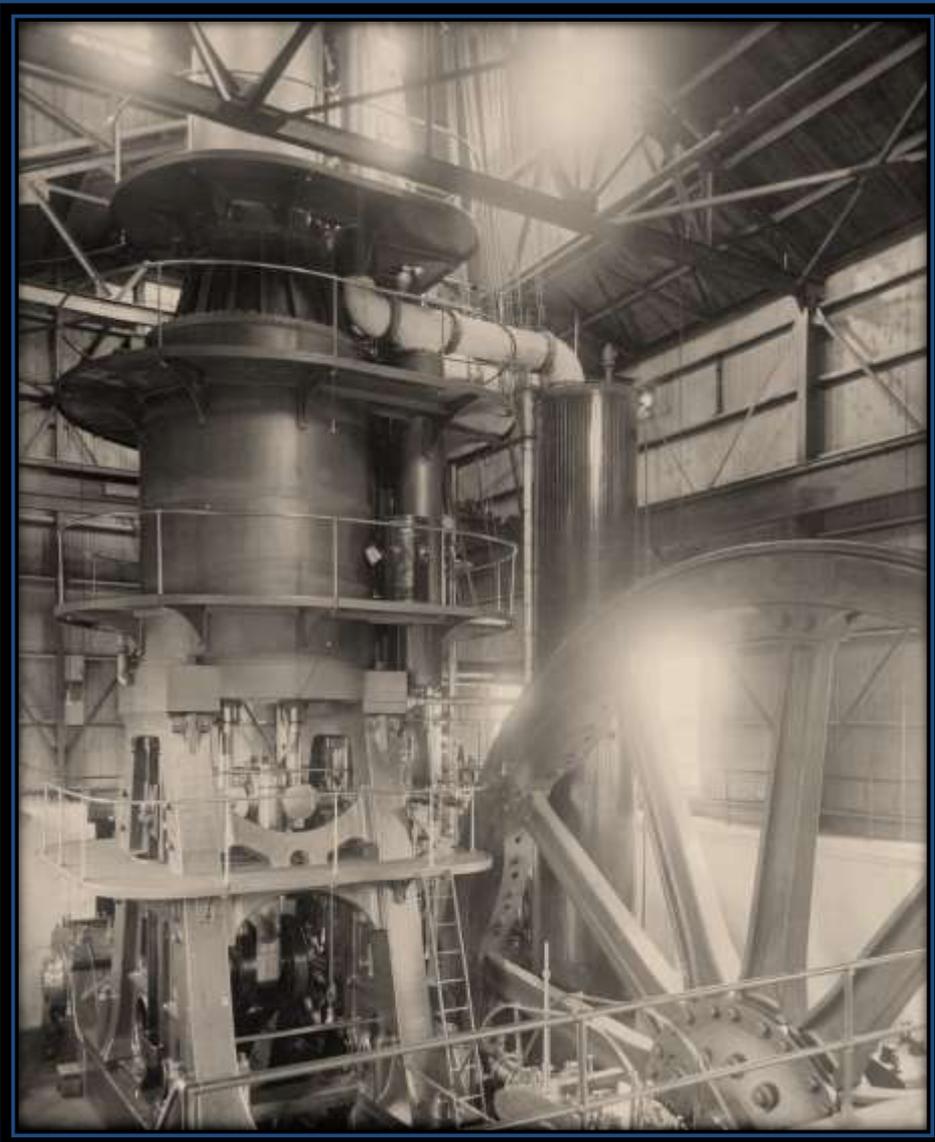
Dated October 19, 1912, this view of the C Ludington Shaft, facing east, shows the shaft housing which rose 114 feet above the collar of Iron Mountain's Chapin Mine. The chutes to the left allowed ore cars, like those pictured, to be loaded directly, as the ore came up in the tram cars on the hoist. The cage in which the men descended and ascended can be seen at the lower left of the shaft housing. *[Menominee Range Historical Museum]*



The pump house, covering the Cornish pumping engine where it still stands today, was sheathed in corrugated metal and rested on a red sandstone foundation. A pipe can be seen leading from the boiler house to the pump house, feeding steam to the gigantic engine. Another railroad track passed between these two buildings. Note the team of horses and the men standing near the shaft. *[Menominee Range Historical Museum]*

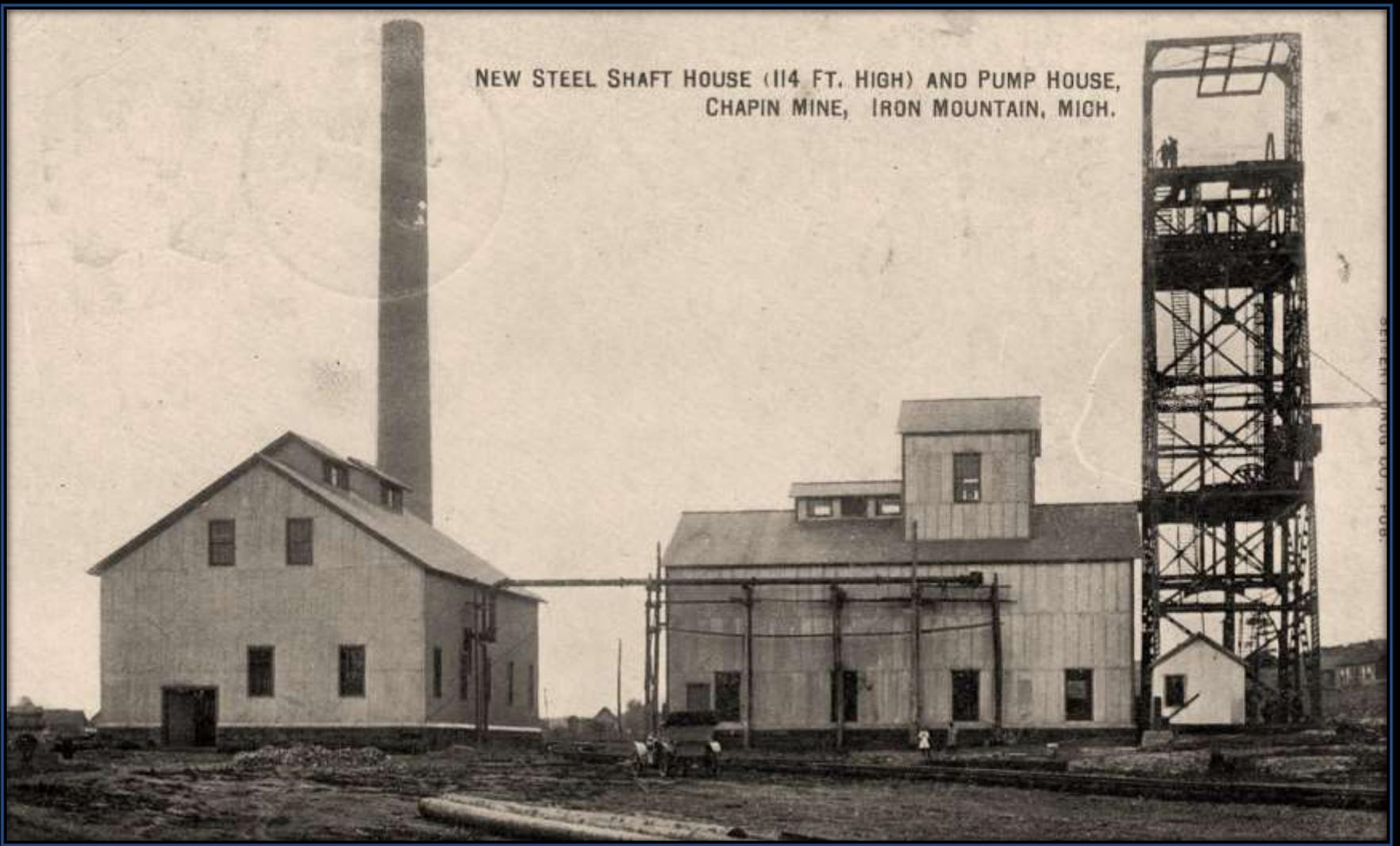


The Chapin Mine's Cornish pumping engine in Iron Mountain began operation at 2:20 p.m. on Tuesday, January 3, 1893. The Chapin Mining Company spent about \$82,500 on the engine alone, but when the portion of the pumping system located within the shaft and installation costs were added, the total expenditure is thought to have approached \$250,000. The following statistics regarding the huge steam engine are of interest: height, 54 feet above the engine room floor; length, 75 feet from back of flywheel to end of pump bob; weight, 725 tons (designer's estimate); high pressure cylinder, 50 inches in diameter; high pressure cylinder head, 10 tons; low pressure cylinder, 100 inches in diameter; low pressure cylinder head, 17 tons; stroke of pistons, 10 feet; flywheel, 40 feet in diameter weighing 160 tons with a rim 24 inches thick and 24 inches wide with a normal speed of 10 revolutions per minute; flywheel drive shaft, 24 inches in diameter; flywheel "slot," 20 feet below engine room floor. **This photograph is dated October 19, 1912, and was taken when the Cornish pumping engine was located at "C" Ludington Shaft, its present location.** *[Menominee Range Historical Museum]*



Pumping mechanism statistics include the following: pump bob, 120 tons; pump rods, 7 inches in diameter; connecting rods, 15 inches at center and 11 inches at neck; plunger, 28 inches in diameter with a 10-foot stroke; water column, 28 inches in diameter; pumps at D shaft, four pumps approximately 150 feet apart with 3,000-gallon holding tanks and a maximum depth of 600 feet; pumps at C Ludington shaft, eight pumps approximately 170 to 190 feet apart with 3,000-gallon holding tanks and a maximum depth of 1,522 feet; pumping capacity at 1,500 feet, 319 gallons per stroke of 3,190 gallons per minute at 10 r.p.m., or 191,400 gallons per hour, or 4,593,600 gallons per 24 hours. **This photograph is dated October 19, 1912, and was taken when the Cornish pumping engine was located at “C” Ludington Shaft, its present location.** *[Menominee Range Historical Museum]*

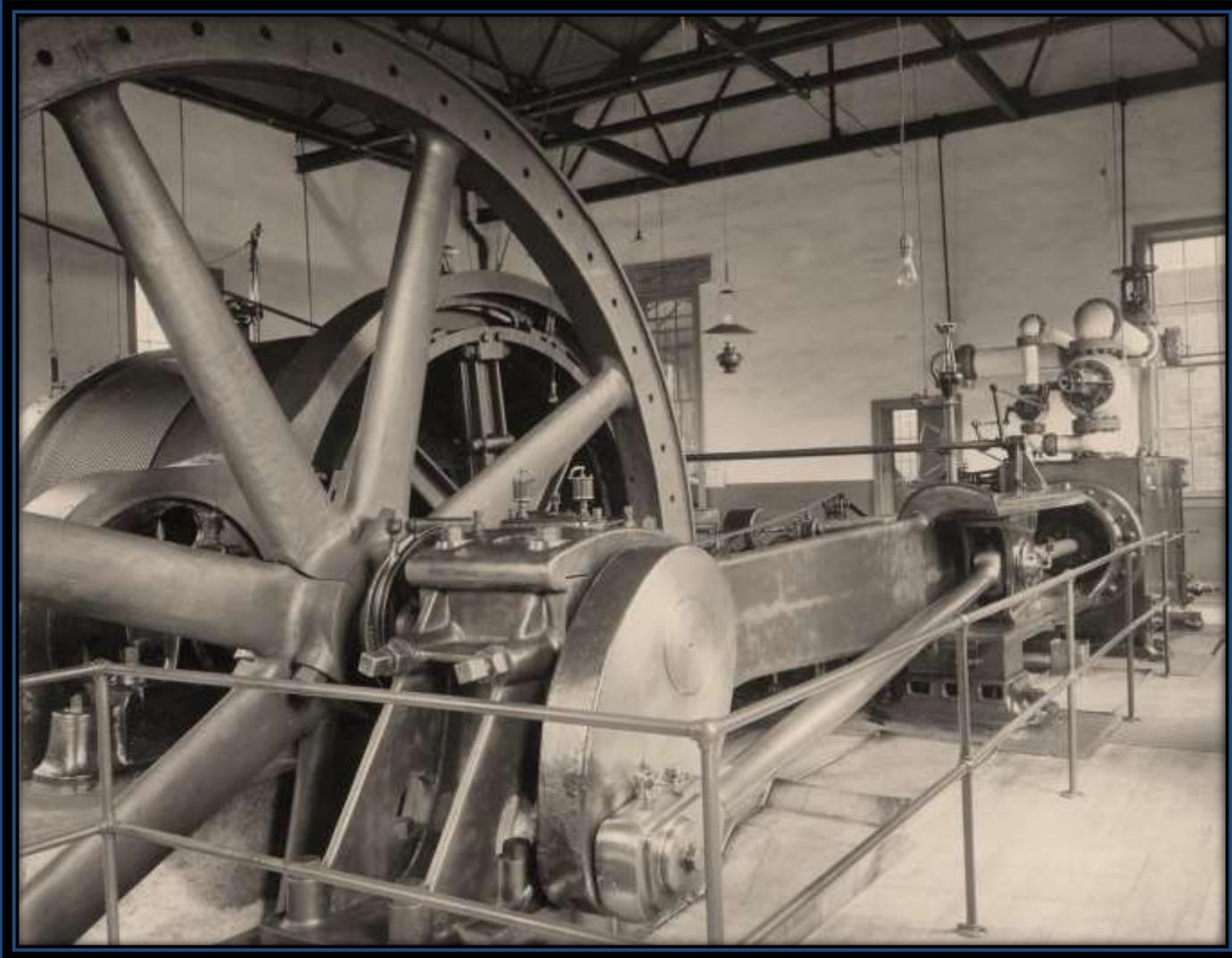
NEW STEEL SHAFT HOUSE (114 FT. HIGH) AND PUMP HOUSE,
CHAPIN MINE, IRON MOUNTAIN, MICH.



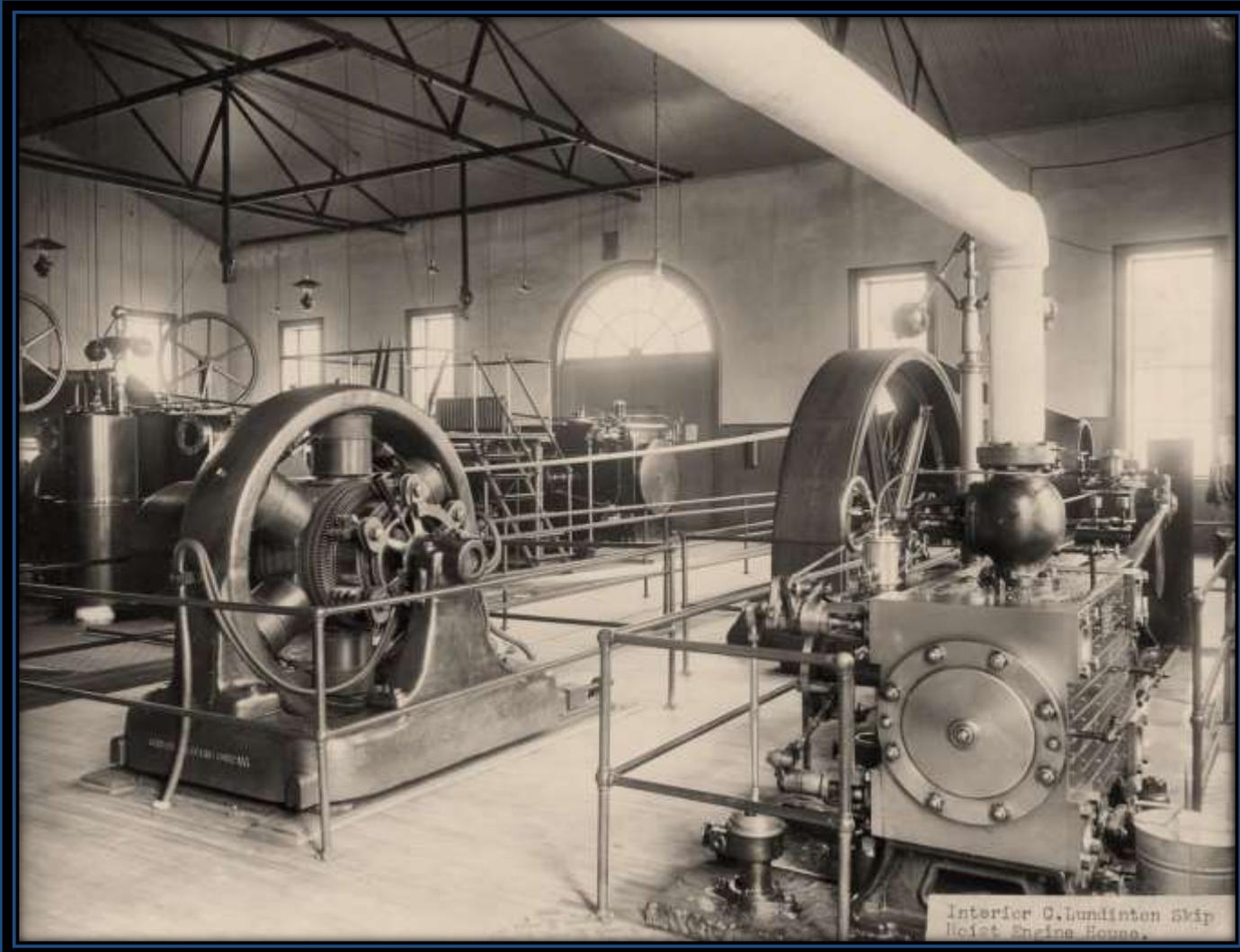
Postmarked in Iron Mountain, March 3, 1908, this black-and-white halftone postcard, looking west, shows the New Steel Shaft House and Pump House at the Chapin Mine. The building housing the Cornish pumping engine is at the right with the shaft, apparently still under construction, at the far right. The boilers were located in the building at the left with the tall smokestack. The postcard view was sold by the Seibert Drug Co. Note the early automobile in the middle of the photo. *[William J. Cummings]*



This postcard view, looking southeast, also dates from about 1908, when the new steel C Ludington Shaft of the Chapin Mine was completed. Published by the E.C. Kropf Company of Milwaukee, the postcard shows the shaft housing shaft housing which rose 114 feet above the collar and the building containing the Cornish Pumping Engine to the right of the headframe. *[William J. Cummings]*



Dated October 19, 1912, this photograph shows the hoisting engine and drum which began operation July 26, 1908. The hoisting drum, keyed to the shaft's depth of 1,522 feet, contained grooves for the 1 3/8-inch steel rope and was 12 feet in diameter. Powered by an engine built by the Allis-Chalmers Company capable of hoisting 22,000 pounds, excluding the weight of the steel rope, the drum raised and lowered two 4,000-pound skips. *[Menominee Range Historical Museum]*



This interior view of the Chapin Mine's "C" Ludington Shaft hoist engine house, probably dating from October 19, 1912, shows several engines. Note the immaculate condition of the engine house and the fan window above a set of double doors. *[Menominee Range Historical Museum]*



These miners, many carrying their tin lunch pails, posed for the photographer at the Chapin Mine's "C" Ludington Shaft in about 1908. They were wearing carbide lamps on their hats to light their work area in the mine. *[Menominee Range Historical Museum]*



Posing at the Chapin Mine's "C" Ludington Shaft in about 1908, these miners are identified as follows: front row, left to right: Charles "Tito" Gianunzio, Peter Salina, Vincent Oradai, William Oliver (foreman), unknown, Joe Badini, Martin Carollo, Emanuel Rossi and unknown; second row, left to right: Vincent Spigarelli, Tony DeMuri, ___ Pucci, William Beard, unknown, Pitchy Nelson, ___ Larson, Louis Palluconi, Nicola Eutizi, ___ Anderson and Ferdinand Badini; third row, left to right: Raphael Corsi, Isadore Fontecchio, Louis Garavaglia, Anton Petroni, Peter Fiorani, ___ Milano, Art Hooper, unknown, Carlo Moroni and John Sleik; back row, left to right: Charles Regettes, John Strelig, Jack Eckholm, Louis Palesoti, unknown, Najerino Mancini, unknown, unknown, ___ Olson and August Nardi. *[Menominee Range Historical Museum]*



Another group of miners, many carrying their tin lunch pails, posed for the photographer at the Chapin Mine's "C" Ludington Shaft in about 1908. They were wearing carbide lamps on their hats to light their work area in the mine. [*Menominee Range Historical Museum*]



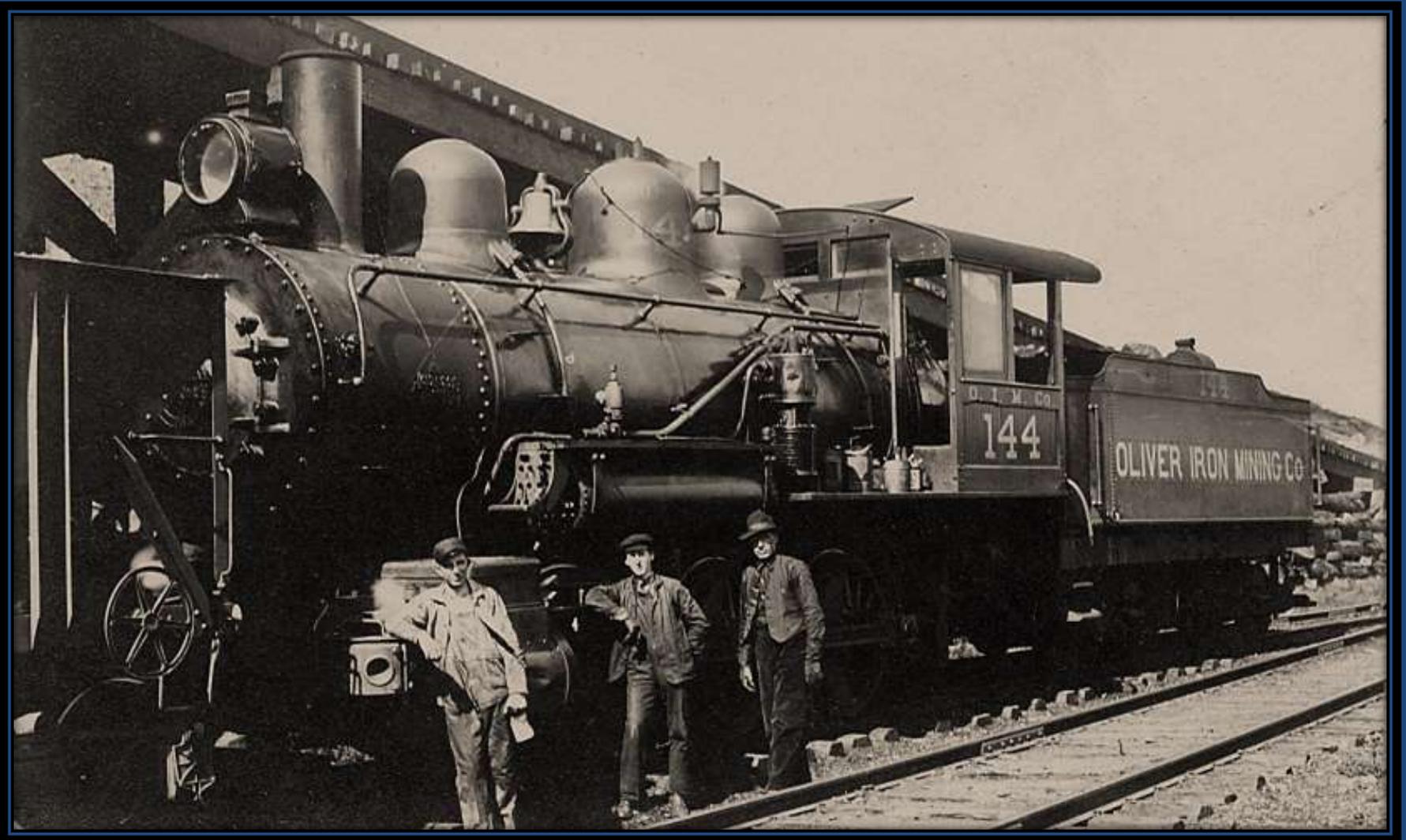
A large group of miners wearing carbide lamps posed at “C” Ludington Shaft of the Chapin Mine, some carrying their lunch pails, probably in about 1915-1920. The steel shaft housing and the building housing the Cornish pumping engine can be seen in the center of the photograph. [*Menominee Range Historical Museum*]



The steam shovel was an expensive and vital piece of machinery, particularly for the larger mining companies, and was used to load stockpiled iron ore into the railroad cars. The steam shovel and crew of the Hamilton Shaft of the Chapin Mine are pictured here near the turn of the century. [*Menominee Range Historical Museum*]



This postcard view, dating between 1910 and 1920, shows the Oliver Iron Mining Company Steam Engine No. 57 pulling a string of ore cars being loaded by a steam shovel. This scene was probably photographed at the Chapin Mine or the East Chapin Mine in Iron Mountain. Note the light in front of the engine and the whistle above the center cylinder. [William J. Cummings]



This postcard view, dating between 1910 and 1920, shows the Oliver Iron Mining Company Steam Engine No. 144 with its coal tender near a trestle, probably taken at the Chapin Mine or the East Chapin Mine in Iron Mountain. Three men posed near the front of the engine which appears to be pushing an ore car. Note the steam whistle, bell and light on the front. The name "Jack Miller" appears on the reverse in pencil. [William J. Cummings]



This postcard view, dating between 1910 and 1920, shows the Oliver Iron Mining Company Steam Engine No. 300 with its coal tender, probably taken at the Chapin Mine or the East Chapin Mine in Iron Mountain. The steam whistle can be seen on the third cylinder, and a brass bell is mounted on front of it. Note the light in front of the engine. The following information appears on the reverse in pencil: “Pesavento, for A.F. Pesavento, Order 1114 Kinfe 273 C.F. Jaeger best efforts.” [William J. Cummings]

ELECTRICAL PUMPS AT HAMILTON SHAFT MORE ECONOMICAL THAN STEAM POWER

When the Oliver Mining Company decided to rebuild the Hamilton shaft and install electrical pumps, the era of the Cornish pumping engine, a marvel of the steam age, came to a close.

The shaft's inside dimensions, originally 7 x 21½ feet, were increased to 9 x 21 1/3 feet to accommodate the water column pipes and transmission cables for the electrical pumps. The shaft was also converted from six to eight compartments, relined with reinforced concrete dividers, end plates and poured concrete walls. To facilitate work, a concrete mixing plant was built near the shaft, consisting of a crusher bucket elevator, a revolving screen, two concrete mixers and a pocket divided into three compartments for sand and gravel.

Relining began May 3, 1912, about 83 feet below the shaft's collar and was completed to the surface June 29. Work was carried on in three 8-hour shifts by a force of about 40 men supervised by the company's chief construction engineer S.W. Tarr, of Duluth.

The work was done in sections, each section started on permanent bearers and worked upward. The average amount of material used to reline one 6-foot vertical section was one cord of stone for back filling, 10 cubic yards of concrete and 550 pounds of steel for reinforcing. The average time required to concrete 6 vertical feet was 24 hours, pouring concrete and removing an equal amount of forms. After the forms were removed, they were taken to the surface, thoroughly cleaned and given a coat of crude oil.

Work progressed at the rate of 60 to 70 feet per month, and by mid-February, 1914, the shaft had been relined to the 12th level, a depth of 1,000 feet.

There the first of two pumping stations was cut out, measuring 30 x 100 feet and containing one set of electrical centrifugal pumps. A second plant was located at the 16th level, about 430 feet below the 12th level, and the shaft was relined the entire distance.



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Work progressed at the rate of 60 to 70 feet per month, and by mid-February, 1914, the shaft had been relined to the twelfth level, a depth of 1,000 feet.

There the first of two pumping stations was cut out, measuring 30 x 100 feet and containing one set of electrical centrifugal pumps. A second plant was located at the sixteenth level, about 430 feet below the twelfth level, and the shaft was relined the entire distance.

The smokestack pictured here still stands (2012) on Iron Mountain's North Side, but the headframe was dismantled long ago. *[Menominee Range Historical Museum]*



This photograph, probably dating from about 1912, shows the Hamilton Shaft of the Chapin Mine, including the sandstone engine house at the left, which used flat cables to pull up the cage and the skips filled with iron ore. Note the wooden shaft housing and the smokestack rising from another mine building. [*Menominee Range Historical Museum*]

DEPRESSED ORE MARKET CLOSES CHAPIN MINE FOR ALMOST EIGHT MONTHS DURING 1921-1922

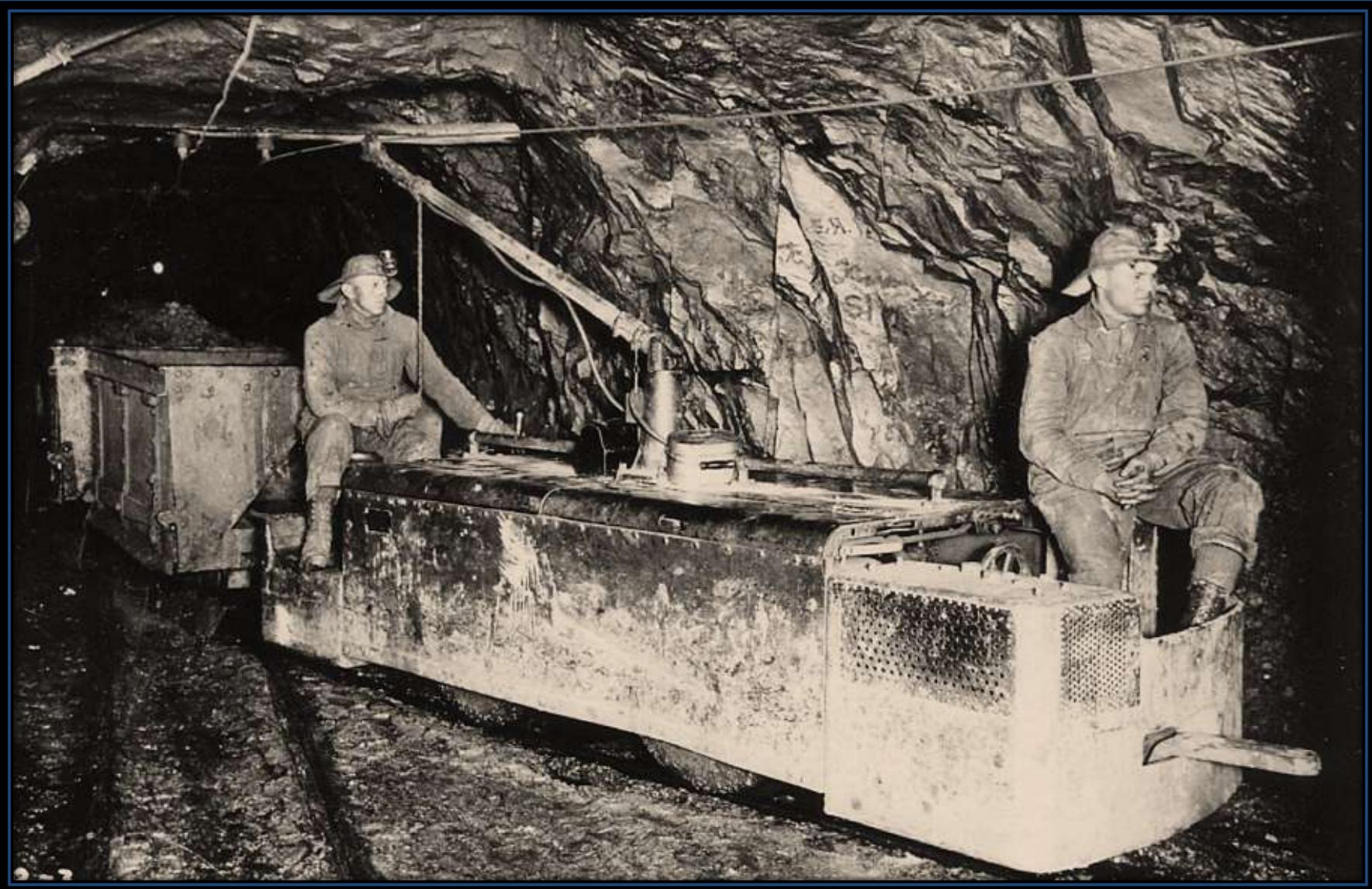
Following World War I, the demand for steel was greatly reduced, and by 1921 the steel industry was operating at only a quarter of its capacity. This resulted in a depressed iron ore market, causing the Oliver Iron Mining Company and other ore producers around the country to close most mines. Thus, 700 men were discharged indefinitely when work at the Chapin Mine was suspended June 21.

Earlier in the spring, in an attempt to keep the mine open, the working force had been reduced, and some weeks later those still employed began working a four-day per week schedule. In addition, wages were reduced shortly thereafter by 20 per cent.

The Ford Motor Company was then engaged in the construction of their new plant south of Iron Mountain in an area later chartered as the Village of Kingsford. In an attempt to provide employment for some of the married men with dependents who had been discharged from the Chapin Mine, the company released all single men who were unskilled laborers, hiring the miners as their replacements.

By the time Superintendent O.C. Davidson was able to make the announcement February 9, 1922, that mining operations at the Chapin would resume as soon as the trestles were made ready, only 450 of the 700 discharged miners were awaiting recall. The remaining men had either secured other employment in the area or moved away. Some had left for the Pennsylvania and West Virginia coal fields, while a number of Italians had returned to their homeland.

Hearing the mine whistles for the first time in almost eight months brought smiles to many faces in the community. Before hoisting could be resumed, the electric locomotives which had been brought to the surface and stored in the building housing the Cornish pumping engine had to be put into condition and lowered to the proper levels within the mine.



Electric locomotives replaced tram cars moved by trammers, mules and rope haulage systems. This photograph was taken in the Chapin Mine January 2, 1921. [*Menominee Range Historical Museum*]



This aerial view, probably dating from around 1930, shows the Chapin Mine's C Ludington Shaft with the building housing the Cornish Pumping Engine and the tramway extending east at the lower left and the Hamilton Shaft workings at the upper right. [*Menominee Range Historical Museum*]

THE FATE OF THE CORNISH PUMPING ENGINE AFTER THE CHAPIN MINE CLOSED ON AUGUST 1, 1932 – 1

As the first quarter of the twentieth century drew to a close, the Chapin, like most area iron mines, began to decline in production and employment. Although the mine still employed about 750 men in 1923, manpower was further reduced following the fateful stock market crash six years later.

Finally, with the nation engulfed in the Great Depression, George J. Eisele, superintendent of the Oliver Iron Mining Company on the Menominee and Marquette ranges, announced that the Chapin would permanently close August 1, 1932. The mine had been operating on a curtailed schedule for some time. On July 28 the last skip of ore was hoisted at the end of the night shift, leaving more than 400 men jobless. A crew of 30 employees remained on the payroll until the end of the year, when the pumps were scheduled to be pulled and the lease surrendered to the fee holders.

Iron Mountain residents were not only concerned about the mine closing, for when the pumps were pulled, the city's water supply was affected. Part of the approximately 3,000,000 gallons of water pumped from the mine daily was piped to Lake Antoine to replenish the water supply, the remainder being emptied into sewer creek and flowing into the Menominee River.

When the huge pumps ceased, the mine's water level steadily rose, eventually filling the two pits flanking Stephenson Avenue (U.S. 2) which began sinking in 1885. Long known to area residents as the Chapin Pit, these two bodies of water have been officially christened East and West Chapin Lakes.

Even when Iron Mountain's last underground mining operation closed, reports indicated huge reserves of rich iron ore still remained, but the cost of mining and hoisting a ton of ore from the Chapin's tremendous depths made the product unmarketable. Between 1880 and 1932, the Chapin shipped 27,506,868 tons of iron ore, accounting for fully one-third of Dickinson County's entire iron ore production. While the Chapin maintained its title as the Menominee Range's leading producer, only Ironwood's Norrie-Aurora-Pabst Mine on the Gogebic Range, shipping over 53,802,000 tons from 1885 to 1935, surpassed the Chapin's production in the Upper Peninsula.

THE FATE OF THE CORNISH PUMPING ENGINE AFTER THE CHAPIN MINE CLOSED ON AUGUST 1, 1932 – 2

In mid-November, 1934, *The Iron Mountain News* announced that the Oliver Iron Mining Company had offered the Cornish pumping engine at C Ludington shaft of the Chapin Mine to Dickinson County as a “relic for sightseers to visit.” The Keweenaw Land Association, fee holder of the Chapin Mine, agreed to lease the land around the pumping engine to the county for one dollar with the provision that the area be fenced and tax free.

By late September the following year, county highway department workers had razed the building housing the pumping engine, removed some unsightly framework, cleaned up the site and erected a steel wire fence around the sandstone foundation surrounding it. All that remained at that time was painting the pump with aluminum paint to better attract the attention of the tourists.

And thus the Cornish pumping engine remained, exposed to the elements for almost half a century, until the present building was erected during the fall and winter of 1982-1983 by the Menominee Historical Foundation.



This postcard view, dated September 5, 1937 on the reverse, was probably one of the earliest postcards issued to promote the Cornish Pump. The building housing the Cornish Pumping Engine was removed by workers from the Dickinson County Highway Department in September, 1935, just a year after the county acquired the landmark. At the same time chain-link fencing was placed around the original sandstone foundation. [William J. Cummings]



This postcard view of the Cornish pumping engine with the steel shaft housing still standing dates to about 1940. Exactly when the steel head frame and ore chutes were removed has not yet been determined.

In late July, 1942, the Dickinson County Board of Supervisors tabled a request from Edward Chandler, commander of the Dickinson County Council of American Legion Posts that asked that the relic be dismantled as scrap metal for the war effort.

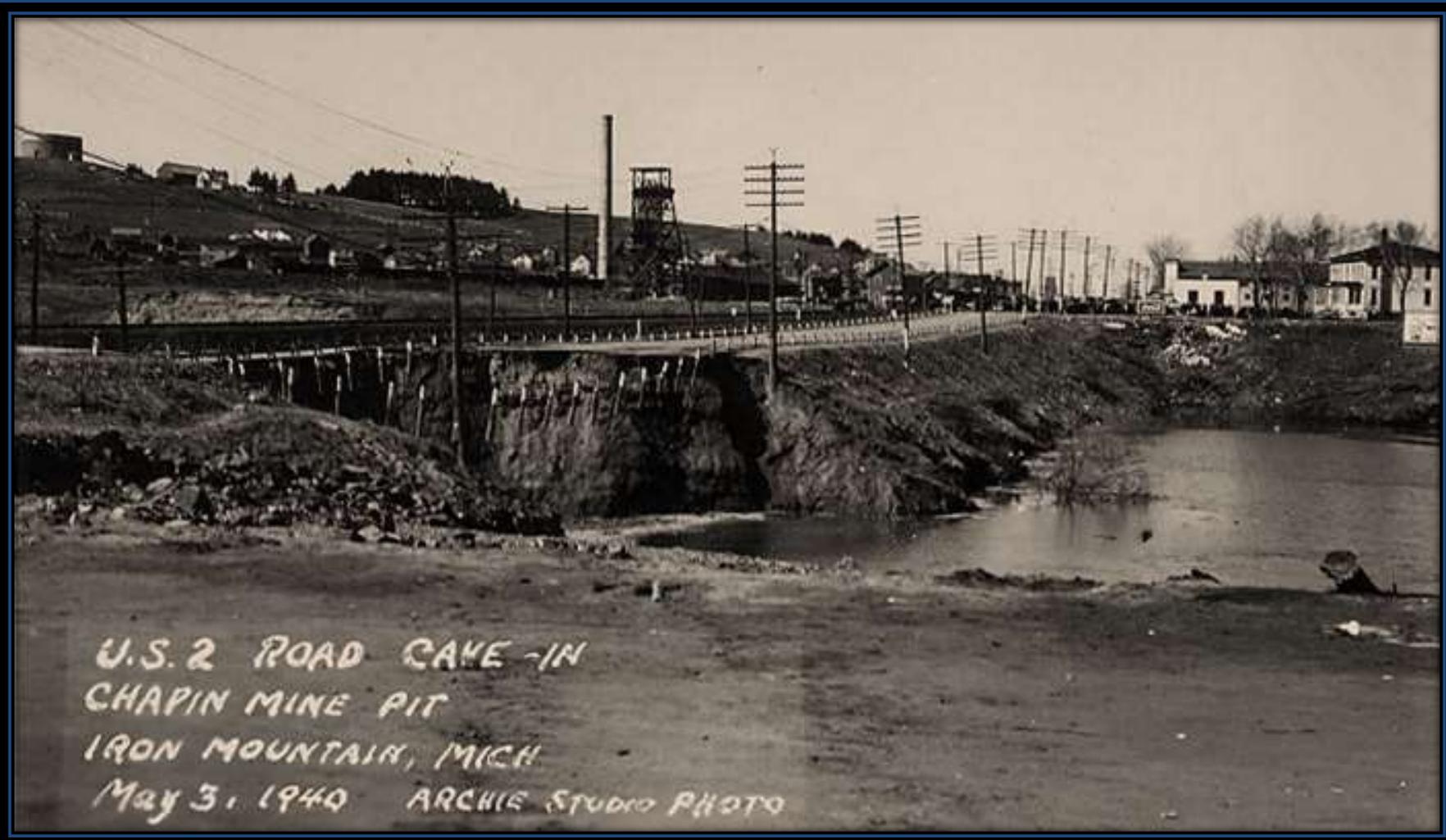
Don Smith, secretary of the Dickinson County Chamber of Commerce and chairman of the Iron Mountain Salvage-for-Victory Drive, urged the Cornish Pumping Engine be retained as a tourist attraction, viewed by many visitors to the area.

A week later saving the county-owned pump became a civic issue with the county board of supervisors and chamber of commerce wishing to preserve the historic landmark and the Kingsford Board of Commissioners supporting the American Legion drive to convert the huge machine to scrap for the war effort.

Kingsford Defense Coordinator George Sanford had urged the Kingsford Board of Commissioners to dismantle the pump for salvage. [William J. Cummings]

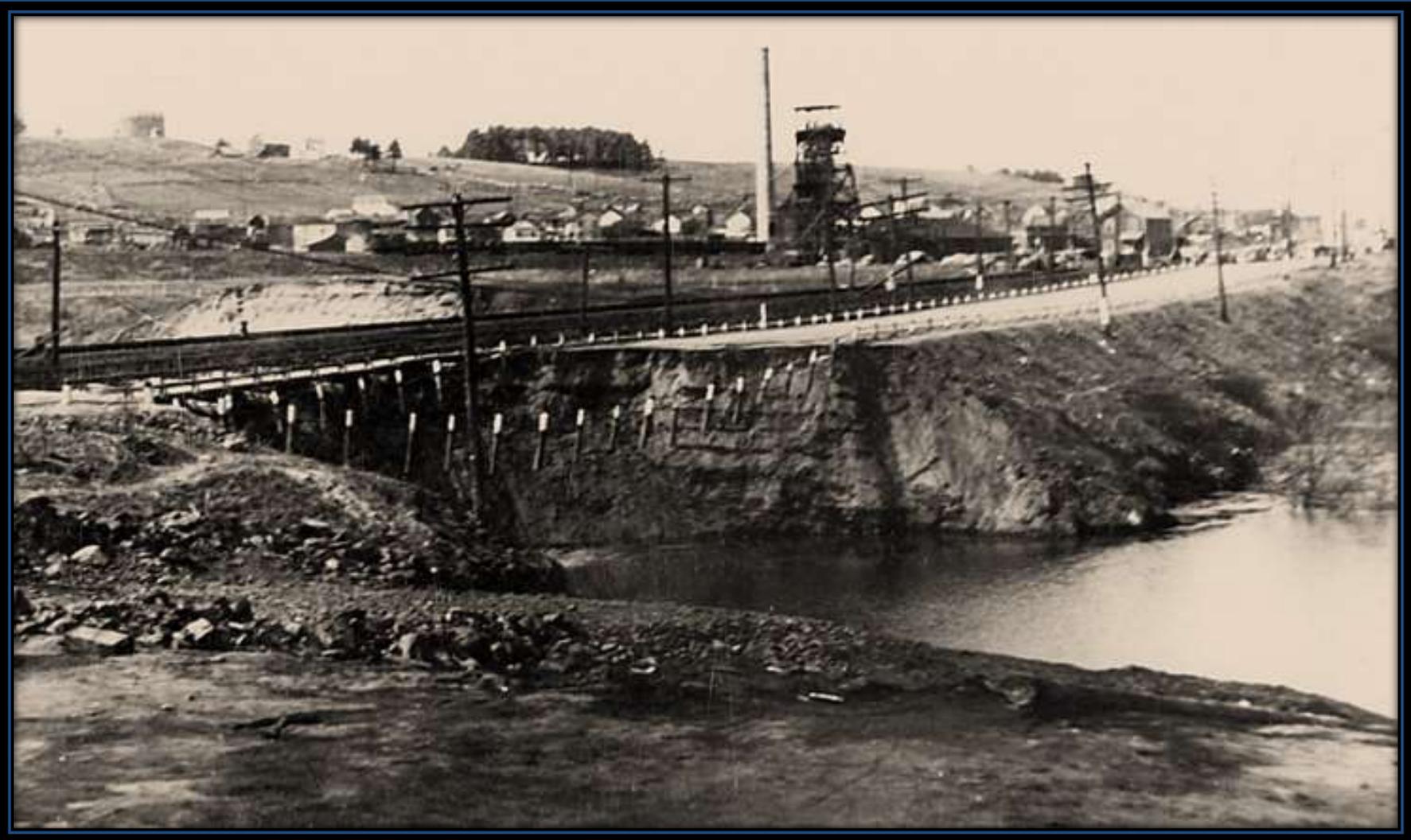


Another postcard view, unused, but dating to about 1940, shows the West Chapin Pit with no water. Exactly when the East and West Chapin Pits began filling with water has not yet been determined. However, when Stephenson Avenue collapsed into the East Chapin Pit on May 3, 1940, water was present. The steel head frame and ore chutes, together with the Cornish Pumping Engine, are visible left of center, and the metal roof of the sandstone dry building at C Ludington Shaft can be seen. [William J. Cummings]



U.S. 2 ROAD CAVE-IN
CHAPIN MINE PIT
IRON MOUNTAIN, MICH.
May 3, 1940 ARCHIE STUDIO PHOTO

As long as the pumps were active at the Chapin Mine, the pits on either side of Stephenson Avenue were dry. However, when the mine closed and the pumps ceased, the pits gradually filled with water. On May 3, 1940, at 2 p.m., an 80-foot section of roadway unexpectedly caved into the East Chapin Pit, leaving guardrail and telephone poles suspended. The Hamilton shaft housing and smokestack are visible in the background near the center of this postcard view. [William J. Cummings]



Although nobody was injured, four cars and a truck were buried in the rubble. While many felt the cave-in was due to the old mine workings settling, mining men familiar with the Chapin believed it was caused by the roadway fill collapsing. The Hamilton shaft housing and smokestack are visible in the background. [William J. Cummings]



Another postcard view shows a close-up of the cave-in with debris floating in the water. [William J. Cummings]

THE FATE OF THE CORNISH PUMPING ENGINE AFTER THE CHAPIN MINE CLOSED ON AUGUST 1, 1932 – 3

Iron Mountain News, Iron Mountain, Dickinson County, Michigan, _____ Year, Number _____ [Friday, July 31, 1942], page 3, column 1

Cornish Pump To Remain As Landmark

The old Cornish pump, Iron Mountain landmark and tourist attraction, was saved, at least temporarily[,/ yesterday afternoon when the board of supervisors tabled a request by Edward Chandler, commander of the Dickinson county council of American Legion posts, asking that the relic be dismantled as scrap metal for the war effort.

The American Legion, Chandler wrote[,/ has entered a campaign to see “that every piece of scrap metal is made available for producing the sinews of war.”

“We therefore urge you,” his letter continued, “as one group of patriotic Americans to another, to dispose of the old Cornish pump. We realize that the pump is an old landmark; that it has a sentimental value and has been a source of pride to a great many of our people. However, we believe that there may be reason for far greater pride when the steel in the pump...confronts the enemy and gives a good account of itself.”

Urging retention of the pump as a tourist attraction, which has been viewed by thousands of visitors, Don Smith, secretary of the chamber of commerce and chairman of the Iron Mountain salvage-for-victory drive, told the supervisors that he did not believe the landmark should be destroyed.

Outstanding Attraction

“I’m in an embarrassing situation,” Smith told the supervisors. “I am chairman of the salvage drive, but feel I must protest the proposed destruction of the pump. It is one of the two outstanding landmarks in Iron Mountain. Thousands of tourists, if they see nothing else here, visit the ski slide and the Cornish pump.

“In time of war we may be moved by hysteria to do things we would not otherwise do. I do not think the metal situation is so desperate as to require dismantling the pump. In the correspondence I receive from the state salvage chairman, we are urged not to destroy landmarks which will be missed,” he concluded.

The board tabled the Legion’s request by a unanimous vote.

THE FATE OF THE CORNISH PUMPING ENGINE AFTER THE CHAPIN MINE CLOSED ON AUGUST 1, 1932 – 4

Iron Mountain News, Iron Mountain, Dickinson County, Michigan, _____ Year, Number _____ [Tuesday, August 4, 1942], page 3, column 1

Cornish Pump Becomes Civic Issue

Dismantling of the Cornish pump for scrap metal to feed the nation's steel mills last night became a point at issue between the Kingsford commission and the county on one hand, Legion posts, and the county board of supervisors and the chamber of commerce on the other.

Commissioners voted unanimously to recommend conversion of the pump to scrap, in support of a Legion request which was tabled last Thursday by the county board. Don Smith, secretary of the chamber, protested destruction of the landmark and tourist attraction. The pump is owned by the county.

Commission action in support of salvaging the pump was urged by George Sanford, Kingsford defense coordinator, who appeared before the commission.

Eastern communities are melting down cannon which were mementoes of the Revolutionary war, Sanford told the commission, and continued: "We in this country should stand ready to do as much in the interest of the country's welfare."

Challenges Smith

"As defense coordinator in the village, I wish to enter a protest with this body concerning a recent statement by Don Smith, that the Cornish pump is needed as a tourist attraction and that it should not be salvaged for war purposes – a queer statement for one who is head of the city salvage committee," Sanford said. "Need Mr. Smith be reminded that we are at war? Doesn't he realize that nothing matters except winning the war, because if we don't win it, nothing matters."

THE FATE OF THE CORNISH PUMPING ENGINE AFTER THE CHAPIN MINE CLOSED ON AUGUST 1, 1932 – 5

Iron Mountain News, Iron Mountain, Dickinson County, Michigan, _____ Year, Number _____ [Tuesday, August 4, 1942], page 3, column 1

The steel industry operates on a “half and half” basis – 50 per cent pig iron and 50 per cent scrap, Sanford went on, quoting a recent statement by Donald M. Nelson, WPB chairman. Many furnaces have been allowed to cool because of a lack of scrap metal.

“We must fill this scrap iron shortage,” he continued. “A few years ago we were selling this scrap to Japan and now they are giving it back to us free – at least portions of it have landed in California and British Vancouver.

“It seems to me that if communities in the east are melting down cannon and the like – which are mementoes of the Revolutionary war days, and no doubt had considerable chamber of commerce value from a tourist standpoint – we in this county should stand ready to do as much in the interest of the nation’s welfare.

“Dickinson county boasts[,]” he concluded, “of five wonders of the word [*sic – world*] – but the biggest wonder of all will be the Cornish pump when people ask, ‘I wonder why that hasn’t gone into scrap metal.’”

THE FATE OF THE CORNISH PUMPING ENGINE AFTER THE CHAPIN MINE CLOSED ON AUGUST 1, 1932 – 6

Iron Mountain News, Iron Mountain, Dickinson County, Michigan, _____ Year, Number _____ [Tuesday, September 29, 1942], page 3, columns 1-2

Cornish Pump Not Forgotten In Scrap Drive

To all you people who are still fretting about the old Cornish pump, in the current scrap drive:

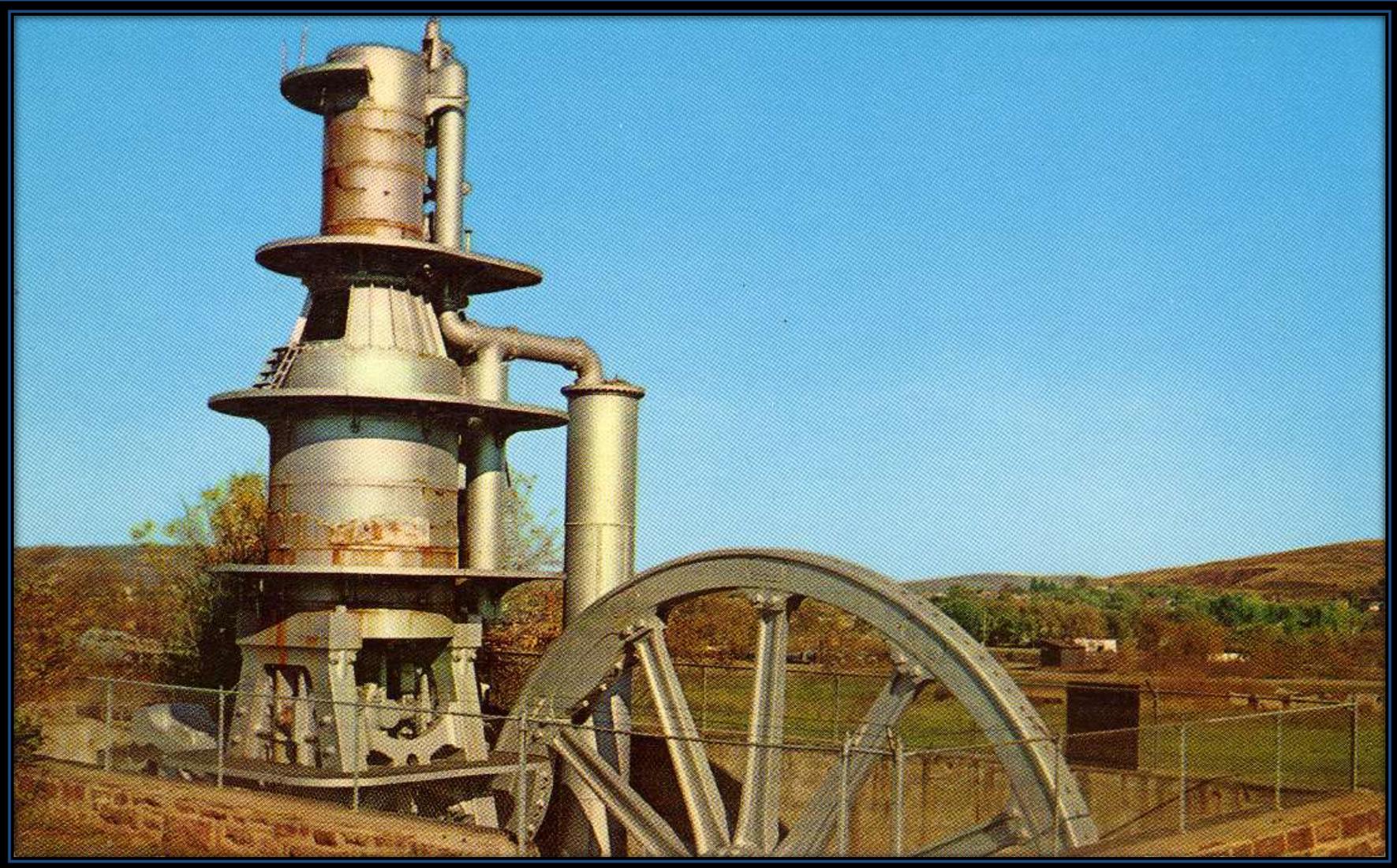
Your government has stated specifically, over an authorized signature, that it is primarily interested, right now, in the “loose scrap” lying around your yard, basement, attic, garage, etc.

Your government knows about the Cornish pump, and has set it aside, temporarily, as an “ace in the hole,” to be broken up and carted off, on call.

The Cornish pump, your government says, will be right where it is now when it’s needed. Nobody’s going to steal it.

Your government is now setting up a new agency to handle heavy units like the Cornish pump, which can be broken up for shipment only at considerable expense – much more than would be realized by its sale to any authorized scrap dealer.

The Cornish pump has not been overlooked. It has been inspected by the state salvage director, who has relayed all information on it to the federal salvage department, which has said: “Get out the loose scrap first. We’ll get around to the Cornish pump.”



This unused postcard view, probably dating between 1950 and 1960, showed the Cornish Pumping Engine painted with aluminum paint. Chain-link fencing still surrounds the with the red sandstone foundation, but the steel head frame had disappeared, taken during a scrap metal drive during World War II. [William J. Cummings]



Painted orange and yellow-gold with black trim, this unused postcard view of the “Cornish Mine Cornish Pumping Plant” probably dates between 1960 and 1970. [*William J. Cummings*]



This photograph of the Cornish pumping engine was taken by William Erickson, who owned Erickson's Studio on Hooper Street in Kingsford with his wife Mary (Weinert) Erickson. Although a black-and-white photograph, the black outline on the spokes of the 40-foot flywheel indicate a date after the pump was painted orange and yellow-gold with black highlights, probably sometime in the 1960's.

In his column appearing in *The Daily News* on April 23, 1983, E.H. "Hap" Rondeau, a veteran staff reporter, recalled his youth as one of the boys growing up at 25 Location where the Cornish pumping engine was one of the "playgrounds" requested by his group. He remembered the "winding steel stairs, many nooks and crannies for hiding from imaginary enemies, and above all, the 'big challenge'." Hap noted that "you either failed or succeeded in the 'big challenge' the day you decided, of course goaded on by your buddies, to walk over the top of the wheel." Imagine walking the 40-foot flywheel to prove yourself to your pals!
[Menominee Range Historical Museum]

BUILDING THE CORNISH PUMPING ENGINE AND MINING MUSEUM AT C LUDINGTON SHAFT OF THE CHAPIN MINE – 1

The Menominee Range Historical Foundation purchased the Cornish pumping engine from Dickinson County for one dollar on September 12, 1978, with the understanding that the Foundation would assume all responsibility for developing a permanent historic mining site. In the fall and winter of 1982-1983, a metal building 80 feet by 70 feet and 50 feet in height was erected by Smith Metal Structures, Inc., general contractor, at a cost of \$101,000 to preserve the famous pumping engine for future generations.

In 1986, an anonymous gift provided funds to construct an attached mining museum annex at a cost of \$40,000 which displays mining equipment donated to the Menominee Range Historical Foundation by the Cleveland Cliffs Iron Company when they closed the Mather B in Negaunee, Michigan, and by the Inland Steel Corporation when they closed the Sherwood Mine in Iron River, Michigan. Seven semi-truck loads of equipment were donated. Nine additional pieces of equipment were donated by Robert C. Hoyle.



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James "Jimmy" Goulette and his wife Ida played a major role in preserving the Cornish Pumping Engine and raising funds for the erection of the Cornish Pumping Engine Museum. Jimmy, pictured here in front of the museum on September 18, 1988, was a Michigan State Legislator for many years and a Legislative Consultant of the Michigan Iron Mining Association for over twenty-five years. Through their personal generosity and Jimmy's ability as a fund raiser, these Iron Mountain natives helped assure that future generations would learn about the history of early mining on the Menominee Iron Range. *[Menominee Range Historical Museum]*



On Friday, June 25, 1983, the Cornish Pumping Engine was formally dedicated as a National Historic Site, and the new Cornish Pumping Engine Museum was opened at the same time. On June 6, 1987, the Chapin Mine Pumping Engine was dedicated as a National Historic Mechanical Engineering Landmark. [William J. Cummings]



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This cage was used to transport men and material to the various levels of the Sherwood Mine in Iron River, Michigan. Manufactured by Lake Shore, Inc., of Kingsford, Michigan, the cage was donated by the Inland Steel Company, of Chicago, Illinois. The blacksmith tools, including drills and a forge at the right, were donated by Michael Feldhausen, of Iron Mountain, Michigan. *[William J. Cummings]*



This electric underground engine was used to haul cars transporting men and equipment in the Mather Mine in Ishpeming, Michigan, and was donated by Cleveland Cliffs Iron Company, of Cleveland, Ohio. *[William J. Cummings]*



These two underground railroad cars, one for hauling timber and the other for transporting dynamite and other blasting material, were used in the Sherwood Mine in Iron River, Michigan, and were donated by the Inland Steel Company, of Chicago, Illinois. Great care was exercised by the miners and other workmen around the dynamite car. *[William J. Cummings]*



This rocker dump car, on the right, was used to transport iron ore from mining areas to the pocket for hoisting to the surface. If the ore was sticky, a vibrating ram was used to empty the car. Both the rocker dump car and the dynamite car on the left were used in the Sherwood Mine in Iron River, Michigan, and were donated by the Inland Steel Company, of Chicago, Illinois. Wooden walkways guide visitors past the mining displays in the mining museum annex. *[William J. Cummings]*



THE END