Kathleen Mine Tipple
SE1/4, NW1/2, Section 5
Township 7 South, Range 1 West of 3^{rd} P.M.
Elkville Quadrangle
Jackson County
Illinois

IL HAER No. JA-2003-1

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

by
Christopher Stratton
Floyd Mansberger
and
Heather Stanley

Fever River Research
Springfield, Illinois

Illinois Historic American Engineering Record
Illinois Department of Natural Resources
Springfield, Illinois 62701

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ILLINOIS HISTORIC AMERICAN ENGINEERING RECORD

IL HAER No. JA-2003-1

Location: The Kathleen Tipple is centrally located within the surface workings of the Union Colliery Company's Kathleen Mine, which is situated immediately to the east of the community of Dowell. The Kathleen Mine is located on the N1/2, SE1/4 of Section 5, Township 7 South, Range 1 West of Third Principal Meridian (Jackson County). The Kathleen Mine is located in north-central Jackson County less than one mile south of the line separating Jackson County from Perry County, to the north of it. Dowell lies adjacent to the Illinois Central Railroad, approximately five miles south of the city of Du Quoin.

Present Owner: James Cobin
17 Cobins Lane
Dowell, Illinois 62927

Present Occupant: Cobin's Salvage Yard, Inc.
Dowell, Illinois 62927

Present Use: After the Kathleen Mine was closed in 1947, James Cobin purchased the property on which the surface complex was located and started a scrap-metal business at the site (Cobin's Salvage Yard, Inc.). Cobin's first scrap came from the mine buildings and equipment. Between the scrapping activity, decay, and a previous mine reclamation project (conducted in 1999), all of the above ground evidence of the mine has been destroyed or covered up, except for the concrete tipple in question.

Significance: Constructed in 1917-1918, the Kathleen Tipple is a rare surviving example of an early-twentieth-century shaft-coal-mine tipple in Illinois. The tipple at the Kathleen Mine is one of only three known tipples constructed of reinforced concrete in Illinois. Designed by the Chicago architectural/engineering firm of "Allen and Garcia," the tipple represents a distinctive type often associated with this engineering firm. Although the precise number of extant tipples dating to the early years of the twentieth century in the state is not known, the number is likely quite small in large measure to the fact that most tipples were either of timber or steel-frame construction, and hence either rotted away or were scrapped out long ago. Indeed, the fact that the Kathleen Mine tipple was constructed of concrete is the only reason that the structure still stands today, considering that nearly everything that was steel on the structure was scrapped out. The use of poured-concrete for the tipple is unique in and of itself, and this stands as a testament to the increasing ingenuity engineers exhibited in the use of poured concrete during the steel shortage that occurred during World War I. The founding and subsequent development of the town of Dowell is intimately linked to the "Kathleen Mine."

Part I. HISTORICAL INFORMATION

A. Physical History:

1. Date(s) of Erection:

Established by the Union Colliery Company of St. Louis, the Kathleen Mine was rated as one of the largest and most-modern coal operations in Southern Illinois when it started production in 1918. The tipple at this mine was constructed during late 1917 and early 1918.

2. Architect:

As the prominent nameplate on the Kathleen tipple indicates, the structure was designed by the Allen and Garcia Company, an engineering firm based in Chicago.[1] Established in circa 1911 by Andrew Allen and John Garcia, the firm claimed "to include all branches of coal mine engineering and to furnish to the mine operator expert services starting with the development and operation of the mine and extending to the design and construction of all operating units about the plant." At the time Allen and Garcia designed the Kathleen Mine tipples, their offices were in the McCormick Building in downtown Chicago. Although much of the firm's projects were in the Midwest, it also undertook projects as far a field as Pennsylvania and Wyoming. The company's participation in the Southern coalfields eventually led it to open a second office in Birmingham, Alabama. Some of the specialty items designed by Allen and Garcia included coal preparation plants, a skip-hoisting system, an overturning self-dumping cage, and a semi-automatic coupler.[2] The firm also developed a tipple design that was distinctive of their work." The 1918 *Coal Report* refers to the two tipples at the Kathleen Mine as being of the "Allen and Garcia type."[3] It is unclear what role—

[1] Department of Mines and Minerals, *Annual Coal Report* (Springfield, IL: State of Illinois, 1918), 223-224. The nameplate on the tipple is marked: "Allen and Garcia Co. / Engineers / McCormick Building, Chicago."

[2] *Keystone Mining Catalog* (New York: McGraw-Hill Catalog and Directory Company, 1928), 20-23.

[3] Department of Mines and Minerals (1918), 223-224. Presently, little is known about the engineering firm of Allen and Garcia. One of the earlier projects documented for this firm was the design and construction management associated with the construction of a new transforming station and electrical distribution lines constructed by the Southern Illinois Light and Power Company (of Hillsboro) at Greenville, Illinois (http://www.daleeccles.net/newspaper_articles_1914.htm). The firm also designed and oversaw the construction of the Reliance Tipple located in Reliance, Wyoming in 1936 (http://www.wwcc.cc.wy.us/wyo_hist/Depression.2.htm). The firm also was

if any—the engineering firm played in the design of the other buildings, or in the method of extraction at, the Kathleen Mine. The existence of such firms as Allen and Garcia is indicative of the trend away from "vernacular" mining towards large-scale, engineer-designed, corporate mining in Illinois during the early twentieth century.

In 1928, the trade journal *Coal Age* carried a short note (with picture) about John Garcia and his recent award of the Doctorate of Engineering degree from the School of Mines and Metallurgy at the University of Missouri at Rolla. According to this article, Garcia received his B.A. degree in Mine Engineering from the same university in 1900, and his Engineer of Mines degree (again from the University of Missouri at Rolla) in 1903. Mr. Garcia, with Andrew Allen, had obtained extensive experience in the Oklahoma and Illinois coal fields.[4] Together, the two had formed a "consulting organization specializing in construction, development, operation, and examination and reports on bituminous coal mines." In 1928, the firm of Allen and Garcia employed approximately 100 engineers, and Mr. Garcia had spent a large part of the previous year in Russia "where his company is engaged in extensive consulting work for the Soviet Government."[5]

Both Andrew Allen and John Garcia contributed professional papers to various engineering periodicals such as the *Transactions of the American Institute of Mining and Metallurgical Engineering* as well as the trade journal *Coal Age* (see references cited).

3. Original and Subsequent Owners:

The following is a list of the owners of the land on which the Kathleen Mine is located between the years 1918 to the present date. The dates provided are not based upon a traditional chain-of-title research, but on a general understanding of the landownership at this site.

Union Colliery Company of St. Louis	1917 to 1947
James Cobin	1947 to Present

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responsible for either constructing or opening the Geneva Mine near Dragerton, Utah in 1942 (http://www.lofthouse.com/USA/Utah/carbon/1930c.html).

[4] Cartlidge references a John A. Garcia who was a chief engineer with the Dering Company in 1909 and was consulted with regard to the Dering No. 18 mine fire at West Frankfort. It is possibly that this individual may be the same John Garcia who founded the engineering firm with Andrew Allen two years later. Oscar Cartlidge, *Fifty Years of Coal Mining* (Oregon City Enterprise, 1933), 42.

[5] "John Garcia," *Coal Age* 33, no. 6 (1928), 386.

4. Builders, Contractors, Suppliers:

Although designed by the architectural firm of Allen and Garcia, the actual builders of the concrete tipple at the Kathleen Mine (and the other associated buildings at the site) are unknown.

5. Original Plans:

The original plans for the tipple and other buildings at the Kathleen Mine were not located, and are presumed to be non-existent.

6. Alterations and Additions:

Although the tipple remains at its original location, the setting has been dramatically altered by the complete destruction of all the other mine-related buildings that formerly surrounded it. These buildings were partially scrapped out after the mine was abandoned in 1947, and the surviving building remnants were destroyed, or covered up, as part a mine reclamation carried out in 1999. The terrain around the mine site also was altered to some extent by the mine reclamation, in respect to the moving of gob and the construction of a water detention pond on site. Additionally, all of the machinery and much of the steel structure once present on the tipple have been removed and/or salvaged.

B. Historical Context:

1. History of Coal Mining in Jackson County

Coal production was important to the history of Jackson County. Located in the southern part of the state, Jackson County had a successful coal mining industry in part because of its proximity to the Mississippi River, actually touching the river for over thirty miles. In addition to its advantageous location, the county's superior quality of the coal—rich in carbon and lacking the impurities of sulphuret of iron—meant it was in high demand among manufacturing cities, particularly nearby St. Louis.[6] Coal mining began as early as 1812 in Jackson County, however it wasn't until 1822 when the "Jackson County Coal Company" opened and began the relatively steady production of coal. The Grand Tower Mining, Manufacturing, and Transportation Company began operation in 1864, putting the Jackson County Coal Company out of business. The Grand Tower Mining, Manufacturing, and Transportation Company built the Grand Tower Ironworks and the Carbondale Railroad, which increased the volume of coal transported from the county and provided employment for residents of Jackson

[6] *History of Jackson County, Illinois* (Philadelphia: Brink, McDonough, and Company, 1878), 37.

County. By the late 1870s, the company was known as the "wealthiest corporation" in Jackson County.[7]

Coal produced in Jackson County provided fuel for four railroads in the county as well as steam powered barges on the Mississippi. Much of the coal from Jackson County was sold to New Orleans, Carbondale, St. Louis, and Cairo.[8] Another important mining operation was the Gartside Coal Company, which began operation in 1872, having a total of four mine shafts. The Lewis Coal Company and Carbon Hill Mines were two of the smaller collieries in Jackson County. Overall, the coal industry played an influential role in the history and economic development of Jackson County during the nineteenth century.

It was not until the early years of the twentieth century that capital and mining technology reached a point where the deeper coals underlying the interior of the county could be effectively exploited. During these years, coal mines became more mechanized, industrial facilities that were generally corporate owned and operated. By the 1910s, the inland coal mines located in southern Illinois became the major producers of Illinois coal.

Herbert and Young noted that "within the past few years, considerable development has been made in the coal-mining industry in Illinois and Indiana… perhaps the two most striking features are the entry into the producing fields of certain large consumers of coal and the magnitude of some of the new operations."[9] At that date, these authors note the entry of the Chicago and Northwestern Railroad, the Chicago, Burlington and Quincy Railroad, the Standard Oil Company of Indiana, the Union Electric Light and Power Company of St. Louis, and the U.S. Steel Corporations entry into the regions coal mining industry. Although prior to World War I, large consumers generally were able to purchase coal in the open market cheaper than they could produce it, the disruption in supply caused by the war led several large consumers to pursue their own mining ventures. As these same authors note, many of these new mines were designed for large capacity production and "an interesting rivalry among some of the mines of large output" had developed. The authors note that

> for a few years, the record for a day's output from a shaft mine in the bituminous-coal districts of the United States, and probably in the world, was held alternately by the No. 3 mine of the Superior Coal Co., at Gillespie, and the No. 1 mine of the New Staunton Coal Co., at Livingston. Subsequently, the context passed to the

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[7] Ibid., 39.

[8] Ibid.

[9] C. A. Herbert and C. M. Young, "Engineering Features of Modern Large Coal Mines in Illinois and Indiana," *Transactions of the American Institute of Mining and Metallurgical Engineers* 63 (1920), 808.

> south and the record was held alternately by the Orient mine of the Chicago, Wilmington & Franklin Coal Co. at Orient, Ill., and the No. 1 mine of the American Coal Mining Co., at Bicknell, Ind.[10]

In 1920, Herbert and Young choose six mines of note for "exhibiting the most striking recent developments." These mines included 1) the No. 2 mine of the Standard Oil Company (at Schoper, Macoupin County, now destroyed), 2) the No. 4 mine of the Superior Coal Company (seven miles southwest of Gillespie, Macoupin County, status unknown), 3) the Kathleen mine of the Union Colliery Company (Dowell, Jackson County; now destroyed), 4) the No. 2 mine of the Bell and Zoller Mining Company (1½ mile southwest of Zeigler, Franklin County; status unknown), 5) the Valier mine of the Valier Coal Company (3 miles north of Christopher, Franklin County; status unknown), and 6) the No. 2 mine of the American Coal Mining Company (2½ miles southeast of Bicknell, Indiana; status unknown). Typical of this period, the plans and/or design of these large industrialized facilities were developed by "engineers of experience in coal mining and of perfect familiarity with the conditions to be met."[11] Each of these mines had an expected output of 6,000 to 8,000 tons of coal per day. Subsequent changes in the plant designs of these new breed of mines included 1) larger sized shafts to accommodate the necessary hoisting and ventilation needs, 2) improved hoisting equipment (larger hoists, many being electric powered), and 3) new layout of the underground workings to facilitate the movement of men and materials to accommodate the modern mining techniques, and to improve upon safety. With regard to tipple design, the authors note that "the construction of the tipples shows only one striking novelty, the concrete air-shaft tipple of the Kathleen mine…".[12]

2. <u>History of the Union Colliery Company of St. Louis</u>

The Kathleen Mine was established by the Union Colliery Company of St. Louis, Missouri, which also had branch offices in Milwaukee, Racine, and Kenosha, Wisconsin, as well as Detroit, Michigan. Apparently, the Union Colliery Company was a subsidiary of the Union Electric Light and Power Company of St. Louis, which in turn was a subsidiary of the North American Company. The Union Colliery Company also owned the Kentucky Coal Company, which operated nine mines in western Kentucky and maintained a fleet of 300 coal

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[10] Ibid., 809.

[11] Herbert and Young further noted that "recent progress in mining points to an increase of the percentage of coal extracted. In conclusion it may be stated that present developments show application of the highest engineering skill and thereby indicate the realization of the necessity of engineering in coal production and foreshadow growth of the functions of the coal-mine engineer." Herbert and Young (1920), 836.

[12] Ibid., 820.

barges on the Ohio and Mississippi Rivers.[13] Apparently the company also had coal interests in Ohio, and coal from the Kathleen Mine was to be "supplied to power plants in St. Louis and Milwaukee and to the open market." In 1918, the local officials in charge of the Kathleen Mine were Edward Bottomly, general superintendent; Charles Gottschalk, chief engineer; Robert England, top foreman, and James Wilson, mine manager.[14]

Herbert and Young discuss the development of the Kathleen mine in perspective to the coal resources of the region, and note that the Kathleen mine "is situated near the bottom of the monoclinal fold, commonly known as the Du Quoin anticline, which passes a little east of north across the eastern side of Perry County."[15]

> After considerable exploratory work the Union Colliery Co. decided to develop a property so situated that about one-third of the coal will be taken from the plateau on the west side of the fold, where the depth is about 90 ft., about one-third from the slope of the fold, and about one-third from the east side where the average depth is about 250 ft. (76 m.). With such a topography of the coal bed, the location of the shaft required careful consideration. Since the coal east of the steepest part of the fold continues to dip slightly to the east, the only position of the shaft that would have allowed a general down-grade from west to east would have been on or near the east boundary of the plot. This, however, would have required the development of a one-sided mine and the surface conditions would have been unfavorable. Study of conditions led to the location of the shaft as far down the slope of the monocline as the surface conditions would permit. Development underground has shown that the bottom of the monocline was not reached but that the steep grade, approximately 5 per cent., extends for a short distance to the east of the shaft. The larger part of the coal will travel down grade but some will have to be hauled up an adverse grade. The grade on this monocline has been found to average from 5.2 to 5.3 per cent. but is not constant, appearing rather as a series of steps in which flatter and steeper parts alternate. It will be necessary to use mechanical means to control the movement of the cars approaching the shaft when uncoupled from the locomotive.

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[13] In 1918, the Kentucky Coal Company was described as being "about the only river [coal] company left." ("Kathleen Mine of the Union Colliery Company at Dowell, Illinois," *Coal Age* 13, no. 26 (1918), 1188.)

[14] "Kathleen Mine of the Union Colliery Company at Dowell, Illinois," *Coal Age* 13, no. 26 (1918), 1188; C. A. Herbert and C. M. Young, "Engineering Features of Modern Large Coal Mines in Illinois and Indiana*--I," *Coal Age* 16, no. 21 (1919), 820-821.

[15] Herbert and Young (1920), 811.

> The average thickness of all sections of the coal thus far made at the Kathleen mine is 8 ft. 3 ½ in. (2.5m.), the thickest coal being on the eastern side of the monocline. It is not expected that much water will be encountered as the other mines in the vicinity have no trouble at least unless the roof is broken by the removal of coal. Little trouble from gas has been experienced in the neighboring mines.[16]

The Kathleen Mine was rated as one of the largest and most-modern coal operations in Southern Illinois when it started production in 1918. The mine was opened during a period where the demand of coal was exceptionally high in the United States, on account of increased industrial consumption during World War I. The surface complex at the Kathleen Mine featured a fan house, boiler house, shower house, blacksmith and machine shop, a combination office and store room, a water tower, and two tipples, each of which had an associated hoist-engine house. The majority of the buildings at the site were of brick and/or steel-frame construction. Both tipples at the site were designed by Allen and Garcia, an engineering firm based in Chicago that specialized in mine structures.[17]

The 1918 *Annual Coal Report* gave a fairly lengthy description of this new mine, which they noted "promises to be one of the most substantial and modern coal mines in Southern Illinois."

> The Union Colliery Company of St. Louis is constructing a large and modern mine in Jackson County, on the Illinois Central Railroad, five miles south of Duquoin [sic]. Both shafts have been sunk to the coal, which is No. 6 seam with average thickness of 8 feet 3 inches, main shaft 260 feet to bottom of seam. The air shaft tipple build of reinforced concrete has been completed. A Wellman Seaver Moran electric hoist has been installed and equipped with a 250 horsepower a.c. motor, a rotary dump in the tipple, screen and mine run chute, so mine run, lump and screening coal can be loaded from this shaft. The shaft is 26 feet 4 inches by 12 feet 6 inches over all and is absolutely fireproof throughout. The lining is of reinforced concrete with steel buntons. The air chamber is 8 feet by 12 feet 6 inches inside and is separated from the stairway and hoisting compartment by a 10-inch reinforced concrete wall. A 12 foot by 5 foot high speed reversible Jeffery fan is being installed, having a 200 horsepower motor drive and steam engine for an auxiliary drive. The fan house will be of brick and reinforced concrete. The machine and blacksmith shop, store

[16] Ibid., 809-810.

[17] Department of Mines and Minerals (1918), 223-224.

> room and office building is fire proof throughout; the office is on the second floor above the store room and has every convenience. A 4-track steel tipple of the Allen & Garcia type is under construction and will be equipped with shaker screen, picking tables and loading booms. A storage track for 110 loaded cars has been provided for; there will also be room for that many empty cars above the tipple. A narrow gauge track has been laid between the two standard gauge tracks, extending from the end of the empty track through the tipple to the end of the load storage track. A 20-ton steam locomotive is used for handling the cars to and from the tipple. The main shaft will also be fireproof throughout with reinforced concrete lining and steel buntons.[18]

Subsequent published articles on the Illinois coal industry authored by C. A. Herbert (Mining Engineer with the U.S. Bureau of Mines, Vincennes, Indiana) and C. M. Young (Assistant Professor of Mining Research, University of Illinois, Champaign-Urbana, Illinois) gave similar descriptions of the Union Colliery facilities at Dowell.[19]

It is somewhat unusual that the thoughts of one of the engineers or developers of the Kathleen Mine have survived to the present, having been published within the trade journal *Transactions of the American Institute of Mining and Metallurgical Engineers.* In 1920, Eugene McAuliffe (of St. Louis, and apparently associated with the Union Colliery Company) stated

> when we undertook the development of the Kathleen mine, near Du Quoin, certain features greatly influenced the construction and underground development. The country is very flat, so that the usual gravity yard movement of empty and loaded coal cars would entail a very heavy fill at the empty-car end of the tracks, with some form of car-pulling arrangement to move the loads where it was practically impossible to provide a gravity movement. So the yard was made level, except for 1000 ft. (304 m.) under the two tipples, where the cars are moved by gravity and controlled under the main-shaft tipple by four Fairmont car retarders. Both tipples are spread sufficiently to admit of introducing a narrow-gage track and locomotive. One 18-ton locomotive is at present employed in moving empties down to a point above the main-shaft tipple and the loads off the track scales down into the storage yard; ultimately a 25-ton locomotive will be employed on the loaded side of the tipple. This form of car movement and control will admit of

[18] Ibid.

[19] C. A. Herbert and C. M. Young, “Engineering Features of Modern Large Coal Mines in Illinois and Indiana*--I,” *Coal Age* 16, no. 21 (1919); Herbert and Young (1920).

> handling empty and loaded cars promptly in winter weather without the employment of a large number of men, as is commonly practiced." McAuliffe further notes that "the main-shaft tipple was designed to include ample screen area with picking tables and loading booms on the nut, egg, and lump tracks, insuring the best possible dry cleaning of the screened product. The control of all machinery in the tipple is in the hands of one operator, centrally located. A number of push-button controls conveniently located at different points in the tipple enable any employee to throw off the power instantaneously."[20]

McAuliffe further states that

> in designing the underground layout, including pit cars with roller-bearing wheels and a capacity of approximately 5 tons, together with a two-car rotary dump, due attention was given to the matter of reducing to a minimum the number of employees required to handle the mine bottom. One operator, centrally located at the shaft bottom, handles the movement of the loaded trip over two pairs of pit car scales, placed tandem, through the rotary dump, thence to the empty-car tracks. All the cars remain coupled throughout; that is, each trip is coupled to the one proceeding it, making a continuous train passing through the rotary dump, sufficient empty cars being cut off below the rotary dump to meet the requirements of the outbound empty trip. This reduces the labor of coupling and uncoupling at the shaft bottom to a minimum. The rotary dump and its attendant mechanism, including the trip control, are handled by one operator through the medium of compressed air. It was our idea to reduce as far as practicable the number of men employed at other than coal loading, using the largest possible transportation unit, reducing transportation costs. It was thought that a high hourly hoisting capacity would be desirable in view of a possible reduction of hours.[21]

Yet another of the relatively innovative aspects of the Kathleen Mine was the design of the wash houses. McAuliffe noted that

> the Illinois mining law requires the construction and maintenance of wash houses for employees. In designing these, an attempt was made to insure absolute cleanliness. Two steel lockers were provided for each employee, one for pit clothes and one for street

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[20] Herbert and Young (1920), 837.

[21] Ibid., 837.

> clothes; also provision for drying damp clothes, so as to insure as far as possible the absence of disagreeable odors so commonly experienced in miner's wash houses. No provision for washing other than through the medium of a shower bath was provided, with the result that 95 per cent of the employees fully bathe and change their clothes before leaving the wash house. No seats whatever are provided in the locker room, which discourages loafing there.[22]

3. <u>Development of Dowell</u>

The town of Dowell is located in north-central Jackson County, less than a mile south of the line separating Jackson from Perry County to the north. Dowell lies adjacent to the Illinois Central Railroad and is situated approximately five miles south of the city of Du Quoin. The founding and subsequent development of the town is intimately linked to the Union Colliery Company's development of the "Kathleen Mine," a coal mine that was in operation between the years 1918 and 1947.

In 1920, Eugene McAuliffe (of St. Louis, and apparently associated with the Union Colliery Company during the initial setup of the Kathleen Mine) stated

> when we undertook the development of the Kathleen mine… the matter of providing houses for mine employees was given very serious consideration. The decision finally reached was that the coal company would confine its effort to insuring the sale of building lots and the construction of houses for its employees under terms that were fair and reasonable, with ample provision for time payments either made to a townsite company separately organized, in which the mining company has no financial interest, or through a building and loan association.[23]

The *Du Quoin Evening Call,* the regional newspaper servicing much of the area, wrote a feature article in March 1918 about the activities at Dowell. The newspaper stated that

> The advent of spring has given a marked impetus to building activity at Dowell, the new town five miles south of Du Quoin where the Union Colliery Company of St. Louis is opening up one of the largest bituminous coal fields of the United States. A rich vein of coal has been found in both the main and air shafts at the

[22] Ibid., 838.

[23] Ibid.

> mine and the work of driving an entry to connect the two is now well underway.[24]

In June 1918, the trade journal *Coal Age* noted that

> a town site of 360 acres has been purchased [by the Union Colliery Company] and laid out in building lots. Part of this tract is covered with a fine growth of timber, six acres of which are to be improved for park purposes and provided with recreation equipment for the children. This new town is to be called "Dowell" and has under construction at present a hotel, brick store building and 25 houses.[25]

By late December of 1917, the town's developers regularly were carrying advertisements in the *Du Quoin Evening Call* promoting the community as a "Town of Possibilities" and encouraging prospective buyers to "Buy a Lot at Dowell and Do Well." Apparently, building lots in the commercial district sold well and had mostly been purchased by the end of March 1918. As the *Du Quoin Evening Call* noted in March 1918, "nearly all the lots in the business section of the town have been sold and several new buildings are planned at this time." The first commercial building erected in town was a hotel operated by Mr. and Mrs. August Joffen (who had moved from nearby Du Quoin). The second commercial enterprise was the Dowell Store Company's building. The *Du Quoin Evening Call* noted that

> The contract for the erection of a large two-story brick building which is to house the Dowell Stores Co. has been let and work on that structure will likely start within the next few days or as soon as material arrives. The railroad situation at this time is such as to retard freight shipments but it is thought the building will be completed in at least sixty days time. The Dowell Store Co. has been incorporated and stock is now being sold.[26]

Another earlier businessman in town was J. M. Griffen, who purchased two lots in the commercial district for his general mercantile business. Prior to coming to Dowell, Griffen (transacting business under the business name of Griffin and Jones) had been involved in the same line of trade in Herrin, a large coal town in nearby Williamson County. Other early lot purchasers included "citizens of Du

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[24] "Business Activities at Dowell," *Du Quoin Evening Call,* March 29, 1918, (p. 1 col. 3).

[25] "Kathleen Mine of the Union Colliery Company at Dowell, Illinois," *Coal Age* 13, no. 26 (1918), 1188.

[26] The Dowell Store Company's building is still extant and represents one of the more significant buildings dating from the early years of this community that is still present on the landscape. "Business Activities at Dowell," *Du Quoin Evening Call,* March 29, 1918, (p. 1 col. 3).

Quoin, Elkville, West Frankfort, Orient, Herrin, St. Louis, Murphysboro, Carterville, Makanda and other southern Illinois towns."[27]

By 1920, the Kathleen Mine was in full production, and the community of Dowell was in full stride. The U.S. Population Census compendium indicates that the town had attained a population of 422 individuals by that date. The analysis of the actual 1920 Federal Population Census enumeration provides a detailed demographic profile of the community of Dowell, Illinois for that year. According to the census, as noted in the Compendium, there were approximately 422 individuals living within this mining community at that date. Of these individuals, there were a total of 80 separate "households" containing 231 adults and 191 children.[28] The *Funk and Wagnalls Standard College Dictionary* defines the term "household" as "a number of persons dwelling as a unit under one roof; especially, a family living together, including servants, etc." The same source also provides a list of definitions for "family" including the following "parents and their children" and/or "a group of persons forming a household." Both of these definitions are appropriate for describing the character of the households in the community as many of the 80 households were occupied by two or more families (parents and their children), and/or by individuals who rented or boarded.[29]

Typical of a "frontier" or "mining" community, the adult population in Dowell was outweighed by males over females nearly two to one. In 1920, the community was comprised of 146 men and only 84 women. Within the community at that date there were 77 married couples. Of the men, approximately 47% (n=69) were married; in contrast, nearly 92% (n=77) of the adult women were married. In 1920, only seven adult women in the community were listed as either single or their spouse was deceased. The average number of children per family varied, with thirteen families with a single child, twelve families with two children, eighteen families with three children, twelve families with four children, one family with five children, three families with six children, and a single family with eight children.

In 1920, the working population of Dowell consisted of approximately 153 individuals. Of this working population, seventy-eight individuals (representing approximately 51% of the working population) were between the age of 21 and 35. In contrast, forty-nine individuals (representing 32% of the workers) were between the age of 36 and 50, sixteen individuals (approximately 10.5% of the

[27] *Du Quoin Evening Call,* March 29, 1918, (p. 1 col. 3).

[28] U.S. Bureau of the Census, *Fourteenth Census of the United States: 1920—Population* (Washington, D.C., 1920).

[29] *Funk and Wagnalls Standard College Dictionary*. New York: Funk and Wagnalls Publishing Company, 1973, pp. 478, 650; and U.S. Bureau of the Census, *Fourteenth Census of the United States: 1920—Population* (Washington, D.C., 1920).

working population) were under the age of 21, and ten individuals (representing only 6.5% of the working population) were over the age of 50. The youngest worker (a clerk in the butcher shop) was only 15 years of age. In contrast, the oldest worker was a 65-year-old miner. Additionally, a 78-year-old, apparently retired male without an occupation listed was present. As would be expected with a frontier mining community, the working population in this community was skewed slightly in favor of the young worker. This working population was predominately male and foreign born. Of the total working population ninety-two individuals were immigrants while sixty-one were U.S. born (see Table 1 and 2). The dates of immigration recorded by the census range from 1870 to 1919, with a majority of immigrants entering the United States between 1900 and 1914.

Table 1

Immigrant Working Population

	Foreign Born	
County	#	%
Austria	36	39.1%
Belgium	1	1.1%
England	12	13.0%
France	12	13.0%
Germany	1	1.1%
Hungary	12	13.0%
Italy	6	6.5%
Poland	2	2.2%
Russia	7	7.6%
Scottland	3	3.3%
Totals	**92**	

During the 1920s Dowell's working population had a small but prominent "white collar" class that consisted of merchants and tradesmen, who operated the commercial center of the community. The commercial properties included: a bakery, a butcher shop, a general store, a grocery store, a lumberyard, a meat market, and a shoe repair shop. Of these businesses, most were owned by non-residents. At this time, only two of the businesses were owned by Dowell residents: a native Illinoisan (32-year old G. Naualey) owned the meat market, and an Austrian immigrant (39-year old P. Makrim [spelling?]) was the proprietor of the general store. Nonetheless, these businesses employed a variety of individuals, with the census listing occupations such as baker and bakery manager, boarding house servant, butcher shop clerk, general laborer, general store manager, grocery store manager, house carpenter, lumberyard laborer and teamster, manufacturing company salesman, shoe repair manager, and coal mine teamster. These occupations were more likely to be held by native-born Illinoisans. Only four immigrants worked in these "white collar" jobs, compared to nine who were from Illinois, and one from Pennsylvania. As expected for this time period, the majority of the "working" population of Dowell was men, and the majority of the women in the community were recorded by the census simply as the wives of the working men. However, a handful of women were accounted for in the working population including one woman who was employed as a boarding house servant and instances where women were listed as "head of house" by the census.

Table 2

Native Working Population

Region	U.S. Born #	U.S. Born %
Midatlantic		
Pennsylvania	12	19.7%
Virginia	1	1.6%
Midwest		
Illinois	30	49.2%
Indiana	2	3.3%
Iowa	1	1.6%
Nebraska	1	1.6%
Ohio	5	8.2%
South		
Texas	1	1.6%
Upland South		
Arkansas	1	1.6%
Kentucky	3	4.9%
Tennessee	4	6.6%
Totals	**61**	

The development and success of Dowell was largely dependent upon the coal mining industry. As noted above, the 1920 census indicates 153 individuals of the adult population worked outside of the home. Of these, 124 individuals (representing 81% of the non-home workers) worked in the mines (and were simply listed as "miner" in the census return).

The mining population in Dowell was predominately foreign born with twice the number of recent immigrants in the mines as native born Americans. In 1920, the census taker noted that eighty-one miners (representing 65% of the miners) were foreign born, in contrast to the forty-three (representing 35% American born miners). This dichotomy was typical of mines throughout the state and reflects the fact that coal mining represented an ideal entrance-level occupation for new immigrants—one that was widely available, could be entered with limited perquisite skills, and presented less competition from native-born Americans due its laborious and dangerous character. The immigrant mining population in Dowell was largely represented by men from Austria (n=34), England (n=10), France (n=8), and Hungary (n=12). Smaller populations of immigrant miners were from Belgium (n=1), Germany (n=1), Italy (n=3), Poland (n=2), Russia (n=7), and Scotland (n=3). The American born mining population were represented predominately by Illinoisans (n=16) and Pennsylvanians (n=11), but the states of Arkansas (n=1), Indiana (n=2), Iowa (n=1), Kentucky (n=3), Nebraska (n=1), Ohio (n=5), Tennessee (n=2), and Texas (n=1) were represented as well. The number of Pennsylvanian miners suggests the movement of miners from the coal regions of that state to Illinois during the early years of the twentieth century.

While immigrants represented approximately twice the number of native born miners, it is interesting to note that the overall economic status of the immigrant mining population was higher than the native born mining population. The dichotomy of the socio-economic status of the mining population is illustrated by the comparison of homeownership among immigrants compared to U.S. born miners. The census reports that twenty-eight immigrant miners (representing nearly 35% of the immigrant miner population) were homeowners compared to only seven U.S. born miners (representing only 16% of the American born miners). Conversely, there were twenty-one immigrant miners who rented housing (representing approximately 26% of the immigrant mining population) and thirty-two that boarded (representing approximately 40% of the immigrant mining population). In contrast, fifteen American-born miners rented (representing approximately 35% of the American-born miners) and twenty-one American-born miners boarded (representing nearly 50% of the American-born miners). As this illustrates, the vast majority of the miners were boarders—indicating the relatively transient character of the mining population, whether foreign-born or American-born.

Ann Stepson, a lifelong resident of Dowell, estimates that the town may have had 1,000 people or more at its peak and remembers the business district as thriving during her childhood and young adulthood.[30] The 1930 U.S. Population Census indicates that the community had 832 inhabitants—nearly double the earlier 1920 population, and consistent with Ms. Stepson's estimate. The Kathleen Mine was

[30] Stepson (2002). This number is clearly high—as the 1920 and 1930 U.S. Population Census returns indicate.

the principal employer in town, and its closure in 1947 understandably had a devastating impact on Dowell.[31] Today, Dowell consists of less than 500 residents and has no retail establishments. The Dowell Store Company building is one of the few buildings that remain standing in the commercial district.

4. Mine Tipples and/or Headframes as a "Building Type"

Shaft mines required hoisting equipment to raise and lower materials, workmen, and product in and out of the mine. With greater depth, these hoisting plants became much more complex. The simplest methods of hoisting are *unbalanced* systems associated with one-compartment shafts. More complex *balanced* systems are associated with two-compartment shafts where the weight of one car or skip traveling up is offset by the weight of a similarly descending car or skip. The arrangement of hoisting drums and cages can become fairly complex depending on the number of levels being served by the lift. Often multiple engines (Two-stage hoisting) are used for multiple levels.

The smallest and/or simplest of mines often incorporated a hand windlass into the operation. Although these structures were of low investment, they similarly were of low efficiency and had a small hoisting capacity. Typical of small-scale operations, a windlass was effective to a depth of only 75-100'.[32] Although simple windlass structures were common among the early prospectors (particularly in the lead mine region of northwestern Illinois), they were fairly uncommon among the early coal mines of Illinois. Other simple means of hoisting included the crab winch.[33] Although both the windlass and crab winch were generally hand-powered operations, horsepower was sometimes utilized with these facilities.

With greater depth, more efficient methods of hoisting became necessary. One of the earlier systems of mechanical hoisting was the horse whim or gin—which are often referred to as the "Cornish" whim or gin.[34] The horse gin consists of a hoisting drum with a vertical axis connected to a simple horizontal arm or sweep. A horse or mule harnessed to the sweep and walking in circles generates the motive power. Rope wound around the horizontal drum passed through a pulley located over the shaft and down into the mine. The simple frame system supporting the sheaves over the shaft is called a headframe. Early examples of

[31] U.S. Bureau of the Census, *Fourteenth Census of the United States: 1920—Population* (Washington, D.C., 1920); and U.S. Bureau of the Census, *Fifteenth Census of the United States: 1930—Population* (Washington, D.C., 1930).

[32] Robert Peele, *Mining Engineers' Handbook,* 12-57.

[33] International Textbook Company, *Hoisting*, (Pennsylvania: International Library of Technology, 1906), 2.

[34] The word "gin" has its origins in the word "engine," and is defined by Webster as, "a machine or instrument by which the mechanical powers are employed in aid of human strength." Noah Webster, *An American Dictionary of the English Language*, (Massachusetts: George and Charles Merriam, 1854), 502.

horse gins had the potential to be fairly large and complex structures. Pictures of early horse gins have been documented in both the early lead mine region of Jo Daviess County[35] as well as within the coal mine district of St. Clair County.[36]

By the middle nineteenth century, more industrialized mines replaced the horse gin with steam powered hoisting engines, which in turn were replaced eventually by internal combustion (gasoline and/or diesel) and electric driven systems. Throughout the latter nineteenth and early twentieth centuries, however, the steam driven hoisting engine was the primary method of hoisting at the Illinois coal mine.[37] The size (and hoisting capacity) of these engines varied greatly. The hoisting engine generally was housed within a separate building immediately adjacent to, and in line with, the headframe. The engine house generally consisted of the hoist engine room (which housed the hoist apparatus consisting of geared drums for winding rope or cable) and an adjacent engine room (which housed the steam engine and boiler). Multiple chimneystacks were generally associated with the engine room.

The headframe is the structure located immediately above the shaft. The headframe supports the sheave(s) (or large stationary wheel upon which the rope from the winding drum passes over upon its way to the ore bucket located in the shaft). Although often used interchangeably with the term "tipple," the headframe is that part of the structure that houses the hoisting mechanism, whereas the tipple is that part of the structure that houses the coal processing, car dumping and weighting equipment and/or chutes. The Illinois Coal Association defines a "tipple" as "surface processing structure for cleaning and sizing coal and automatically loading it onto railway cars or trucks for movement to market."[38] Shurick elaborates and notes that "bituminous coal is prepared for the market at the tipple, where it is dumped from the mine cars into railroad cars for shipment to the point of consumption. The term tipple is applied indiscriminately to any kind of structure by means of which coal is dumped into the railroad cars. It may consist of anything from a simple temporary frame structure used for dumping a limited tonnage of prospect coal, to a very elaborate combined headframe and tipple, equipped with several sets of screens, picking tables, conveyors, elevators,

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[35] Floyd Mansberger, Tim Townsend and Christopher Stratton, "The People Were Literally Crazy: The Lead and Zinc Mining Resources of Jo Daviess County, Illinois," (report prepared by Fever River Research [Springfield, Illinois] for INDECO (Bettendorf, Iowa) and the Abandoned Mine Land Reclamation Division, Illinois Department of Natural Resources, 1997).

[36] Floyd Mansberger and Christopher Stratton, "Pick, Shovel, Wedge, and Sledge: A Historical Context for Evaluating Coal Mining Resources in Illinois," (report prepared by Fever River Research [Springfield, Illinois] for Illinois Department of Natural Resources, 2004).

[37] As late as the 1940s, steam powered systems were still being constructed in Illinois. The Belleville Vertical Files (coal mines) contains a 1940s photograph illustrating the last of the steam powered mines being demolished.

[38] Illinois Coal Association (1992), 62.

etc. In shaft mining, the headframe by which the coal is hoisted from the shaft is usually incorporated in the tipple structure itself, thus developing a distinctive form of structure varying in some respects from the simpler form of tipple used in drift or slope mining."[39] As Shurick notes, the headframe and tipple often are incorporated into a single structure.[40]

Within this broader definition, a coal tipple consists of two basic mechanisms or components: one, a hoist system by which a cage and/or coal car can be raised or lowered into the mine shaft (the headframe); and two, a screening system through which coal hauled from the mine is dumped, weighed, sorted by size, potentially stored, and then loaded onto either rail cars, trucks, or wagons. The headframe is located directly over the shaft, and the rope attached to the cage passes over a large sheave wheel at the top of the headframe and then down to the hoisting engine located in line with, and one side of, the headframe. The rising coal car reaches the height of the headframe and then is dumped (either by hand or automatically) onto the tipple proper. The tipple structure may be simple or relatively complex with the coal falling into a hopper or directly onto a set of sloped screens. In the tipple, the coal is generally sorted by size (such as the three common grades of Slack, Egg, and Run of the Mine or Lump common during the late nineteenth and early twentieth centuries) and stored in elevated hoppers prior to being loaded onto a railroad car (Shipping Mine) or other form of transport (such as wagons or trucks at Local Mines). Additionally, in many early mines, each load of coal leaving the headframe would be weighed prior to processing in order to credit each miner with the appropriate amount of coal.

The head frame is a wood, iron, steel, or concrete structure constructed over, or adjacent to, the shaft to support the sheaves (head sheaves) over which the hoisting ropes are conducted from the cage or ore bucket in the mine shaft to the drum of the hoisting engine. The upper portion of the guides for the cage is also incorporated into the sidewalls of the headframe.[41] With shaft mines, the headframe is generally located immediately over the shaft. With slope mines, if a headframe is present, it is located to one side of, and in line with, the sloped entry shaft. The height of the headframe is dependent on the elevation of the cage landing (or skip dump) above the surface, overall height of the cage or skip in dumping position, and an allowance for overwinding. Whereas many early headframes incorporated only a single cage (and sheave), more sophisticated headframes by the late nineteenth century incorporated counterbalanced cages (with one cage going down while the second was going up), which required two sheaves.

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[39] Adam T. Shurick, *The Coal Industry* (Boston: Little, Brown and Company, 1924), 138.

[40] Ibid.

[41] International Textbook Company, 31.

In its simplest form, a headframe consists of two upright posts supporting a horizontal beam upon which the sheave is attached. As headframes are under great stress created by the load of the ore bucket in the shaft and the pull and vibration of the winding drum located on the adjacent surface, inclined struts or bracing is generally required to prevent the collapse of the structure; as such, the two upright posts of these simple two-post headframes are generally strengthened by two inclined struts located between the upright posts and the winding drum. More sophisticated headframes consisted of four upright posts with inclined struts (and thus known as Four-post headframes).

Tipples (and their associated headframes) were constructed of a variety of materials over the years, including heavy timber, poles, cast iron, steel and, much more infrequently, concrete. In 1917, Burr comments that "there are three principal structural materials that have been used for headframes—wood, steel and reinforced concrete. Wood has been used since mining began and has done good service in its way."[42] The earliest of headframes in Illinois were constructed of heavy timber frames. These early frame structures utilized mortise and tenon techniques typical of nineteenth century timber-frame construction. As Peele notes, although the "general principles of design are the same for any framed structure," the "severe conditions of mining and great variation of load require larger safety factors than ordinary structures."[43]

Prior to the late nineteenth century, headframes often were rather simple affairs that did not incorporate a tipple into their structure, but solely functioned to support the overhead sheave. These headframes were often constructed with local materials, which consisted predominately of hardwood lumber (oak, hickory). With the advent of the railroad and improved transportation systems, non-local materials (particularly softwood lumber) became more available. Later timber-frame structures incorporated less sophisticated joinery and the use of metal hardware (plates and bolts). With the addition of screens, the headframe (with tipple) became considerably more complex. Timber headframes constructed during the latter years of the nineteenth century were fairly complex structures.

Headframes were often completely, or partially, enclosed to protect the frame and the men working inside the structure from the weather. Initially wood, and later sheet metal, was used to enclose these structures. As one textbook noted, "a covering of boards is the warmest. All woodwork should be painted with fireproof paint and ample means for extinguishing fire should be provided. A covering of corrugated sheet iron well painted on both sides to prevent rusting is often used instead of wood and lessens the danger of fire, but is not as warm a covering as wood."[44] The same source also notes "in many states, it is required

[42] Floyd Burr, "The Design of Headframes." *The Engineering and Mining Journal* 103, no. 14 (1917), 611-621.

[43] Peele, 12-62.

[44] International Textbook Company, 42-43.

by law that the top of the shaft be protected by a fence or by gates to prevent persons falling down the shaft. This protection is secured at the sides of head-frames by extra timbers or beams forming part of the frame, or by means of a fence placed near the sides of the frame. The ends of the shaft are protected by a bar placed across uprights, by gates that swing like an ordinary door, or more generally by vertical sliding gates that are raised by the cage when it comes to the surface and drop into place when the cage descends."[45]

It was during the later nineteenth century, with the increased mechanization of the industry and complexity of design associated with mining that several nascent engineering firms began to specialize in the design and construction of mining structures. In circa 1900, Warren Roberts constructed his first tipple—a frame structure—at Mine No. 1 of the Egyptian Coal Company, near Harrisburg. This combination tipple and headframe was constructed "of yellow pine, three tracks, with shaking screens," (see illustration).[46] As one observer noted, this tipple was "a substantial piece of equipment which he was quite proud and which, for that day, was very up-to-date, although I surmise that there comes a smile to his lips now when he thinks of the first-born of his brain as compared to some of the elaborate steel structures with Marcus screens and Arms air cleaners which he and his associates erect today."[47] After constructing his first tipple, Roberts soon thereafter formed a partnership (Roberts and Schaeffer Company, Chicago) that specialized in the design and construction of mining structures.[48]

Unfortunately, although timber was readily available and clearly one of the cheaper materials available for construction, it had its problems—the most obvious of which was that it was prone to decay. Additionally, wood was very susceptible to fire. Speaking of conditions in Illinois mines during the 1910s, Andros noted that

> At the older mines tipples are usually of frame construction and at many of them proper precautions against fire are neglected. Often inflammable material, such as empty oil barrels… is stored near the tipple. The frequent loss of tipples by fire emphasizes the need

[45] Ibid., 43-44.

[46] Cartlidge (1933), 26.

[47] Ibid.

[48] As one of his contemporaries wrote, "from this small beginning arose a vast business which now extends to practically every mining country of the globe. His business increased rapidly, for it was but a few years until there was an R. & S. four-track steel tipple with electric hoist at Buckner, Franklin County, which was a far cry in design from his first effort. Mr. Roberts and I collaborated in writing a description of this mine and plant for 'Mines and Minerals,' or then it may have been called 'The Colliery Engineer'." Cartlidge (1933), 26.

> of greater care in the storing of combustible material on the surface.[49]

One has only to look through the newspapers of early mining communities such as Belleville (St. Clair County) to understand the extent of fire damage on the predominately frame structures at many of these early mines. A casual inspection of the Belleville newspaper noted the destruction by fire of a variety of mining structures during the nineteenth and early twentieth centuries.

John Garcia, writing about the development of modern steel tipples during the early years of the twentieth century, noted that

> in the old days the shaft was put down in the cheapest possible manner, small, cramped and timber lined, and the tipple was placed immediately on the curbing or in some cases just outside of it. This structure usually consisted of six heavy, vertical timbers placed at the corners of the two hoisting compartments, braced laterally by batter braces and carrying the sheave wheel on cross timbers at the top. A heavy timber brace was then framed between the sheave deck and the engine foundations. The weighhouse was supported by similar bents placed between the tracks, and the screens were hung or supported underneath and covered by a loading shed." Garcia further notes about the design of these structures, "when shaker screens began to come into use, it was found necessary to support them on an independent interior structure, as it proved difficult to produce and maintain a timber frame of sufficient rigidity to prevent the vibration of the screens from affecting the scales and seriously damaging the main building. On this account also, it became common practice to carry the screens on various systems of rollers, instead of hanging them as formerly, in order to avoid the great heights of the necessary overhead structure.[50]

By the 1870s, one alternative to timber framing that was being utilized in Illinois, and the nation as a whole, was cast-iron. Cast iron, which lacked tensile strength like timber, was relatively fireproof and resistant to rot. One of the major drawbacks to the use of cast iron in the mining industry was its relative expense. Early cast iron (and steel) headframes were constructed with channel bars tied together with lattice bracing to form beams. Later steel structures were constructed with more substantial I-beams.

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[49] S. O. Andros, *Coal Mining in Illinois*, Illinois State Geological Survey, Bulletin 13, (Urbana: University of Illinois, 1915), 214.

[50] Garcia (1913), 786.

Cast iron headframes in Illinois appear to have been fairly rare, and not even discussed by Burr.[51] Although this author is aware of only one potential example of a cast iron headframe in Illinois, they probably were of more widespread use than presently known. One of the few examples of a potential cast iron headframe in Illinois is the structure located at Conrad Reineke's Mine No. 1 near Belleville (and illustrated in the 1881 Brink, McDonough and Company's *History of St. Clair County, Illinois*).[52]

[51] Burr (1917).

[52] Conrad Reinecke was an extremely successful businessman from Belleville. Reinecke was born in Martzaum, Hess Cassell, Germany in May 1844. The family immigrated to the United States, via New Orleans, in the 1850s. Although his father found work in a distillery in Belleville, he "was a miller by trade, and followed that calling in Germany. He was a man who at one time was possessed of large means, but he made some unfortunate ventures and lost all of his savings excepting sufficient to bring him and the family to America. When he arrived here he was penniless. This loss was a series blow to the family, as it compelled all the members of the family to become self-supporting at a very early age." (Brink, McDonough and Company 1881:225). During his early childhood, Conrad attended the public schools, but at the age of thirteen, "he hired out to a man by the name of Ward to work on a farm, for which he received seven dollars per month and board. He was faithful and remained with Mr. Ward for six years. He then learned the blacksmith trade, and did work in that line for coal miners, which gave him some idea of the business. He then worked at the mines and became superintendent; then went into partnership with his brother-in-law in the business, which latter undertaking was very unprofitable, as the concern failed, owing to the unwise action of his partner." Chapman suggests that Conrad set aside his blacksmithing business in circa 1865, at which time (at the age of twenty-one), "he began coal-mining as superintendent and manager for John A. Reeves, with whom he remained until 1871. At that time, having through economy and prudence acquired sufficient means, he became a partner of William M. Reeves, a son of this former employer, in operating a mine at Reeves Station." As noted by the earlier history, this partnership was unsuccessful, and he went into business for himself. The 1881 county history suggests that he remained in partnership with Reeves for only six months, whereas the later 1892 county history suggests he remained in the partnership for three years. At any rate, about 1872-74, Reinecke "invested… in coal and commenced buying and selling, and was exceedingly fortunate, and made money rapidly. At the end of six months he sunk a shaft of his own, and after he got it in working order he began going upward to prosperity. By his speculation in coal the first winter in St. Louis he made $7,000. He then with that money leased land, sunk a shaft, and when completed he was $6,000 in debt." (Brink, McDonough and Company 1881:225). The 1881 county history noted that "he has now two of the best mines in the county, which are certain sources of wealth under such experienced management as his." Brink, McDonough and Company, *History of St. Clair County, Illinois* (Philadelphia, 1881), 225. Chapman Brothers, *Portrait and Biographical Record of St. Clair County, Illinois* (Chicago, 1892), 205.

Reinecke was still operating this original shaft in 1892. By that date, he removed "about seven thousand bushels of coal per day. He has shipped as many as fifteen thousand bushels per day on the Louisville & Nashville Railroad and gives employment to about fifty men. He has purchased the coal underneath about one hundred and sixty acres of land and has been an important factor in the development of the bituminous coal resources of Western Illinois." In 1892, Reinecke was the President and owner of the majority of stock in the Reinecke Coal Company which had "extensive mining interests near the Louisville & Nashville Depot and at Madisonville, Ky." (Chapman Brothers 1892:205). The 1892 county history further noted that "the mine of which Mr. Reinecke is owner is equipped with all the necessary machinery and appliances for the successful operation of the business, and the management and practical details of the work are in the hands of a man who is thoroughly familiar with every branch of the business. He is the organizer of the Reinecke Coal Company, which has a capital stock of $100,000 paid up. I. Bailey is the Secretary of this company, also Treasurer and General Manager. Shipments of his coal are made exclusively by rail to all parts of the South, where the product of his mine is especially noted as a superior quality and is in large demand throughout the territory covered by his trade."

During the late 1890s, a new product—steel—came into use for the construction of mine tipples. By circa 1900-1905, if a mining operator wanted to build with any permanence, he was more apt to build with steel which was not only impervious to rot (more-or-less compared to wood), but also was fireproof and much more durable than wood. As one mining handbook noted during the early years of the twentieth century, "wherever permanency of head-frames is required, if steel is obtainable at a price at all comparable with wood, steel structures are being used, as timber frames rot."[53] Andros, illustrating a "Fireproof steel tipple" of "a typical modern surface plant in District VI" noted that "at almost every new mine a steel tipple is built."[54] In 1917, Burr noted that "structural steel has been largely used for the last 20 years or more at new shafts and for replacements at old shafts. It possesses attractive properties of permanence not possessed by wood."[55]

During the early years of the twentieth century, fireproof construction methods became standard practice, and mandated by law. A new provision of the State Mining Law which was passed in 1913 required that all new shafts constructed after that date be of fireproof construction. Although a few shallow masonry shafts were constructed after this law was passed, the vast majority of the new shafts after this date were concrete lined. One of the earliest concrete coal mine shafts constructed in the United States was constructed by the Big Four Wilmington Coal Company's No. 6 mine at Coal City. These two circular shafts, which were lined with concrete, were completed in the spring and early summer of 1903. The concrete was reinforced with iron bars and twisted rods.[56] The development of the "cement gun" (which sprayed a cement coating onto a surface) and/or "gunite" during these years further lead to improved fireproofing techniques in previously constructed timber shafts.[57]

Whereas timber has good compressive strength, steel has both good compressive *and* tensile strength. As such, the structural design of timber headframes differs significantly from the design of steel headframes. Similarly, both cast iron and concrete has poor tensile strength. Headframes generally have vertical posts aligned relatively parallel to the vertical pull of the rope in the shaft (albeit the base of the headframe is generally slightly wider than the head), and a stabilizing strut that is at an angle similar to that represented by the rope traveling from the hoisting drum to the headsheave. In timber frame structures, the strut must be in a compressive location between the headframe and the hoisting engine. In contrast,

[53] International Textbook Company, 35.

[54] Andros (1915), 214.

[55] Burr (1917), 614.

[56] Andros (1915), 197.

[57] Ibid., 200.

with steel construction, the frame can be of lighter construction with the inclined strut located opposite the hoisting engine and in a tensile location.

Although timber headframes were generally designed/engineered by, and/or constructed by, the local mine operator and his crew, the more sophisticated iron and steel structures during the early years of use were often designed by engineers from the structural steel company based on the design needs supplied to the that firm by the mining company. By the 1890s-1900s, though, mining engineers such as the Roberts and Schaeffer Company, or Allen and Garcia Company—both firms based out of Chicago—began specializing in the design and construction of mining structures such as steel headframes and tipples. By the early 1910s, the firm of Allen and Garcia had developed a steel tipple and headframe design that became associated with their name (an "Allen and Garcia type tipple").[58] Writing in 1919, L. V. Rice, a Chicago mining engineer, noted the "splendid" character of Illinois' steel tipples of the day and that he "had occasion to design the third steel tipple" [constructed in Illinois] in 1899. He further noted that "the first [steel] tipples were built with light material, compared with the present practice, and the progress and advance in the art have been very marked."[59]

John Garcia, writing in *Modern Steel-Tipple Design* in 1913, noted that "the introduction of steel and concrete into the construction of mining buildings has revolutionized engineering practice in their design and erection. This is especially true in coal mining, where large tonnages have to be handled and where the structures are subject to fire from both surface and underground." Speaking of steel structures, Garcia comments that they have been constructed in the Illinois and Indiana coal fields for only "the past ten or fifteen years… [since the late 1890s], and even to this day have not been generally adopted in either of these states, except that fireproof structures are now required by law in Illinois." These new building materials, as he notes, fit well into a philosophy of greater safety and longer use life at the coal mines."

Discussing the first steel tipples, Garcia wrote that

> the first steel tipple followed almost exactly the lines of the accepted design in wood. At least six steel columns were placed on or adjacent to the curbing, the screens were carried on an independent structure and the batter braces connected as formerly, and the whole structure interwoven with a network of light angle bracing. The actual working stresses in the tower were found to be surprisingly small, and the required sections were made correspondingly light. The first designers did not realize that steel

[58] Robert Peele notes that the Allen and Garcia headframe, constructed of steel, had a single or narrow back-brace. Peele (1941), 12, 61-62. See also Garcia (1913), 786-788.

[59] Herbert and Young (1920), 842.

> is an elastic material and that a structure of sufficient theoretical strength would lack entirely the rigidity necessary for satisfactory operation under the shock of hoisting and dumping and constant vibration of the screens." Garcia continues by noting that "it is not surprising, therefore, that the first steel structures were distinctly less rigid and satisfactory than their wooden predecessors. They had just one advantage—they were fireproof. The freedom from shrinkage and rotting was offset by the rusting of the metal and the extreme liability of the light members to damage from accident. Any damage to the shaft, any settlement around it, or fire in the curbing, had almost as destructive an effect on the tipple as if it had been built of wood, and the operators rightly began to wonder whether even the small increased cost of steel over wood was worth while.[60]

Garcia noted that

> the first step toward the construction of a steel tipple distinctly superior to wood was in the adoption of the 'A-frame' design, in which the legs of the tower are carried onto firm ground well away from the shaft. Another improvement introduced about the same time consisted of crossing the tracks with a clear span and carrying the screens on a bridge so as to avoid the inconvenience and danger of columns located between the tracks. The 'A-frame' tipple, while a distinct improvement over previous designs, and greatly superior to the wooden structure in strength, permanence and rigidity, had some serious drawbacks. The guides had to be carried inside of a widely spreading tower by means of substantial horizontal frames, which even if of sufficient strength, were particularly liable to damage and corrosion. Even at the best they added greatly to the cost of the structure. In this respect the old form of six-column tower, when the footings are carried a sufficient distance outside the shaft, still has an advantage over the 'A-frame,' although this advantage is entirely neutralized by the greater complexity of the structure.

Garcia further comments, "in all these designs the independent screen structure was a uniform feature. The effect of the vibration of the screens was so little understood and so inadequately analyzed that none of the designers appeared to be brave enough to break away from the prevailing practice and plan a structure that should be stiff and strong and with the unavoidable vibration so localized that

[60] Garcia (1913), 786-87.

no damage could come to the structure or inconvenience to the operation of the scales."[61]

As Garcia noted the significance of the use of concrete, and commented that "in the meantime, there came a development in the direction of concrete or concrete-lined shafts. Such construction not only removes the danger of fire, but makes the shaft curbing, in most cases, the best and most substantial as well as the least expensive foundation on which to place the tower. The principal advantage of the 'A-frame' structure was thus removed."[62]

Discussing the development of the Allen and Garcia Type tipple, Garcia stated that

> about two years ago [circa 1911], the Allen & Garcia Co., of Chicago, took up the problem of building a tipple over a concrete shaft and decided to place the main column members directly on the curbing. A system of construction was evolved and protected by patents, which seemed to be a distinct improvement over any previous construction. So simple was it that the only wonder is that it was not devised long before; in fact, the only reason that can be assigned is found in the gradual steps outlined above, from which the steel tipple was evolved…. Instead of putting uprights at the corners of the shaft, two main columns are placed in the middle of the curbing at either end, just back of the guides, these members themselves being carried directly by, or bracketed from, these columns. The center guides are also carried by a vertical column directly between them, it being hung from the main structure so as not to rest on the buntins and bracketed at several points so as to have ample lateral and longitudinal stiffness.[63]

Discussing the configuration of the tipple, Garcia comments that "the main structure carrying the weighhouse and screens is built over the tracks at right angles to the hoisting frame and designed so as to give the greatest possible rigidity to the tower and to carry the shock of dumping directly to the ground." Having created a "tower of extreme rigidity," Garcia observed that "it is an easy matter to design a screen structure so stiff that the vibration of the shakers will have little or no effect upon it and the screens can then be hung on properly journaled, rigid hangers so as to operate with only a small part of the friction and

[61] Ibid., 787.

[62] Ibid.

[63] Ibid.

wear incident to roller supports." This new design was christened the "A. & G. Patent Tipple."[64]

By the early years of the twentieth century, headframes were predominately constructed of steel. Even so, there was a great variety in headframe design. During these years, the use of reinforced concrete became widely used for a variety of domestic and industrial purposes—including the experimentation with mine headframes and tipples. The earliest documented concrete headframe constructed in Illinois was constructed by the Union Colliery Company at the Kathleen Mine. This mine was located on a large tract of land (3,000+ acres in size) located approximately five miles south of Du Quoin, and the present site of Dowell, Illinois. The Union Colliery Company developed "a big 1000-ton-per-hour" state-of-the-art coal plant in mid-1918. As the trade journal *Coal Age* noted, "substantial up-to-date buildings [at the mine] are equipped with the most modern devices for handling coal efficiently and economically."[65] The trade journal continued by noting that "possibly the most striking object at the mine today is the reinforced-concrete tipple at the air shaft, the only structure of its kind in the Illinois-Indiana field."[66] In contrast, the main tipple was constructed of structural steel.

While promoting his use of concrete in the construction of a headframe in Vulcan, Michigan in 1917, the engineer Floyd Burr attempted to make some sense out of the "types" of headframes in use at that time, and presented a classification of headframes. Burr classified headframes into one of three general classes, which included headframes 1) with inclined struts (or "back stays" as he calls them) located approximately in the plane of the resultant or resultants of hoisting cable stresses, passing through the center of the head sheave and enabling these stresses to find their way in a single and most direct pass to the foundation; 2) with inclined struts located with the plane of the backstays not in line with the plane of the resultant and, consequently, the hoisting produces not only compression in the backstays, but also compression or tension in the front columns, such stress being compression when the back columns are flatter than the resultant and tension when they are steeper; and 3) the plane of the resultant does not pass through the center of the head sheave and the distribution of stresses between the front and back columns is indeterminate.[67] Burr further classified headframes in a relatively confusing classificatory system based on a variety of traits that focused on the frame's position over the shaft, presence of intermediate columns, presence of side stays or brace columns, presence of battered or inclined columns, the path

[64] Ibid., 788.

[65] *Coal Age* (1918), 1122.

[66] Ibid.

[67] Burr (1917), 615.

of the skip, as well as the presence or absence of diagonal cross braces or knee braces for girts.[68]

A much more simplified "classificatory system" was presented by the International Textbook Company in 1906. At that time, discounting the simple tripod with three pole legs, mining engineers apparently recognized three basic types of headframes.[69] These were 1) the "Triangular" or "A-type", 2) the "Square Type with an Inclined Brace", and 3) the "Square Type without an Inclined Brace."[70]

According to the International Textbook Company, the A-type headframe was common among the anthracite mines of Pennsylvania, and was noted as "quite commonly used for timber frames, though the details of construction vary in different localities."[71] The height of this frame is generally from 30 to 50 feet. A pair of central vertical posts are flanked each side by inclined struts that are roughly parallel with the hoisting rope—together forming a bent with a distinctive triangular form. Joints are often formed with cast iron sleeves and steel rods with turnbuckles give added rigidity to the frame. A more simplified version of this headframe consists of a slightly forward projecting post with a single inclined post (and lacks the second set of inclined posts noted above). This form of headframe—although still classified as a Triangular or A-type, was referred to as an "ordinary timber gallows frame used at many ore mines" in 1906.[72] The A-type headframe was the most economical to construct, and was adapted to a variety of small coal mines throughout the United States. Mentzel discussed the use of such headframes for prospecting purposes.[73]

The two-post variety—with an inclined strut—appears to have been a relatively early and/or traditional form of simple headframe design. This headframe design was illustrated with the sketch of an early English coal mine or "colliery" from the 1840s (see Supplemental Materials Figure JA-2003-1-S21).[74] The two

[68] Ibid.

[69] Robert Peele discusses three types of headframes, which he refers to as of the A-type, 4-post type, and 6-post type. I suspect the 4-post and 6-post types refer to the number of upright posts surrounding the shaft, and may be either braced with an incline or not. As Peele comments, "where a rock-house or tipple is combined with the headframe, the 4- or 6-post type lends itself a little more readily to the construction." Peele (1941), 12-61-65.

[70] International Textbook Company (1906), 36.

[71] Ibid.

[72] Ibid., 38.

[73] Charles Mentzel, "Prospecting Headframe," *The Engineering and Mining Journal* 94, no. 14 (1912), 636-637.

[74] This illustration (see Supplemental Materials Figure JA-2003-1-S21) depicts a relatively sophisticated, industrialized mine of the period. Distinctive features of this mine include the engine house (E), the "upcast shaft" with its tall chimney or "furnace" (A), and the two headframes (D and F). The main shaft headframe (D) is simply

headframes depicted in this illustration are of similar construction, and consist of a sheave attached to a horizontal beam supported by two upright posts located directly beneath the center of the sheave. A single set of diagonal braces or struts extend off one side of the main upright posts. A set of steps is incorporated into the top surface of the diagonal brace. The shaft appears to have been fenced for safety. Several of these simple headframes appear to have been constructed in early St. Clair County.[75] Although the majority of these St. Clair County headframes appear to have been of timber construction, one example (see Supplemental Materials Figure JA-2003-1-S32) may represent a pre-1881 example constructed of cast iron.

The "Square Headframe With Inclined Brace" appears to have been one of the more common forms of headframe constructed during the nineteenth and early twentieth centuries. These headframes were constructed with a variety of materials—including timber and steel as well as concrete. These structures were constructed in great variety, with variation in the number of primary posts surrounding the shaft, the character of the upright posts (straight or battered), the presence of secondary bracing (such as cross bracing, knee bracing, or secondary canted posts) and the character of the inclined bent. Major structural differences developed during the late nineteenth and early twentieth centuries with the introduction of steel, and the contrast between steel and earlier timber designs. By the 1910s, firms such as Allen and Garcia had developed distinctive headframe designs (such as their "three-leg type" headframe) that had become synonymous with their companies.[76]

The "Square Headframe Without Inclined Brace" consisted of four (or more) upright posts set near each corner of the shaft opening. The sheave was mounted at the head of the posts, which may have been canted slightly inward over the mouth of the shaft. As the name implied, no inclined struts were used for strengthening the frame. Headframes of this design had one set of upright posts in compression, and the other in tension. Timber is not well suited for tensile stresses. Although timber headframes of this design were constructed over many shallow shaft mines, they had to be sufficiently braced and constructed with substantial timbers (particularly the upright posts that were in tension) that their use was not practical with deeper mines. But the use of steel (which has both compressive and tensile strength) eliminated the use of inclined braces with many

identified as "Head Gear," whereas the second shaft headframe (F) is identified as the "counterpoise." Presumably, the engine house (with its large vertical drum) was steam powered (note the chimney on the building). All buildings were constructed of stone, and suggest an element of permanence—unlike many of the nineteenth century mines constructed in Illinois. Nelson R. Boyd, *Coal Pits and Pitmen: A Short History of the Coal Trade and the Legislation Affecting It*, 2nd ed. (London: Whittaker and Company, 1895), 93.

75 Mansberger and Stratton (2004).

76 Garcia (1913); Herbert and Young (1920), 821.

mining operations. Many of the early steel headframes, with lattice beams, were constructed of this type. However, these structures were apt to become unstable as the tower became taller. Hence, with the need for additional height (generally associated with more sophisticated tipples), lateral rigidity was necessary in the form of the inclined brace.

5. Concrete as a Building Material

During the early years of the twentieth century, a new "modern" building material revolutionized the construction industry. This new material—concrete—is a mixture of cement (a burned lime with clay content), sand, water, and an aggregate (such as gravel or cinders).[77] As a building material, the use of concrete has been known for some time, having been developed by the Romans (and contributing significantly to the ancient Roman landscape).[78] Concrete technology was all but forgotten during the post-Roman period, and it was not until the middle eighteenth century that its "secrets" were rediscovered.[79]

With the construction of the Erie Canal through upstate New York, and the later construction of the Illinois and Michigan Canal (during the 1830s and 1840s) the discovery of natural hydraulic cements in the United States spurred an interest in and growth of the natural hydraulic cement industry in this country. By the later 1840s, several pockets of "grout" construction (monolithic walls constructed of lime mortar, sand, water and a gravel aggregate poured between wooden forms) had developed in the United States. "Gravel wall" or "grout" construction was a technique that utilized locally available gravel, lime mortar and stone cast between wooden forms similar to present day poured concrete construction. According to Fowler, Joseph Goodrich apparently introduced this process to the Midwest in 1844 and was "the original discoverer of this mode of building."[80]

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[77] Lime, a necessary component of mortar and plaster, is manufactured from burned limestone. Lime produced from a relatively pure limestone (calcium carbonate) produces a white lime that results in a relatively soft, white mortar. In contrast, impure limestone that contains relatively high clay content, when burned produces a rather yellow-colored lime (often referred to as natural hydraulic cement). Natural hydraulic cement when mixed with water and sand produces a mortar that is harder than lime mortar and, unlike lime mortar, actually hardens under water. The manufacture of artificial hydraulic cements (manufactured from precise amounts of limestone and clay) were initiated during the early years of the eighteenth century (middle 1820s) on the Isle of Portland—and thus have taken on the name Portland cements. William Coney and Barbara Posadas, "Concrete in Illinois: Its History and Preservation," *Illinois Preservation Series*, no. 8 (1987).

[78] Vitruvius described the use of a mix of mortar and small stones to produce a monolithic wall, such as that employed on the Pantheon in Rome nearly 2,000 years ago. Peter Collins, *Concrete: The Vision of a New Architecture; A Study of Auguste Perret and his Precursors* (New York: Horizon Press, 1959), 19.

[79] Collins (1959).

[80] Orson Fowler, *A Home For All, or the Gravel Wall and Octagon Mode of Building New, Cheap, Convenient, Superior And Adapted to Rich and Poor* (Fowler and Wells, 1853), 19; Floyd Mansberger and Carol Dyson, "Middle Nineteenth Century 'Gravel Wall' or 'Grout' Construction in the Midwest: The Technology and its

Goodrich initially developed grout construction for the building of his hexagonal Milton House, an inn located within the south central Wisconsin community of Milton. By the middle 1850s, grout construction, although never very widespread, had found its way across much of the eastern United States.[81]

Widespread use of concrete in the United States did not occur until the twilight of the nineteenth century. In 1891, instead of using more traditional stone as a building material, engineers responsible for the construction of the Hennepin Canal in Illinois began utilizing concrete for this massive public works project. As Coney and Posadas note, this project—which continued through 1907, "moved the nation into the modern concrete era."[82] During the latter 1890s and early 1900s, many railroad companies utilized concrete for bridge, culvert, and trestle construction,[83] and during the early years of the twentieth century, the new technology quickly became accepted within the general construction trades—particularly in such urban areas as Chicago and New York City.

Although concrete construction had been around for many centuries, its use was not common with the everyday contractor. Contractors, particularly in small rural communities, took a few years to adapt to this new material. It was not until circa 1907-08 that concrete had made its appearance within many of the smaller towns within the state. One such contractor was Adam Rittweger of Scales Mound, Illinois. Adam Rittweger was clearly within the mainstream of construction technology during the early years of the twentieth century when he shifted his attention from blacksmithing to concrete construction.[84] Although Rittweger may

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Geographic Distribution," (paper presented at the 22nd Annual Meeting, Pioneer America Society, Williamsburg, Virginia, 1990).

[81] It is generally accepted that Orson Fowler's 1853 publication *A Home For All, or the Gravel Wall and Octagon Mode of Building* popularized both grout technology and the octagon house form. Although Fowler was instrumental in uniting grout construction with the octagonal form and provided national visibility to both, it was, during the late 1840's and early 1850's that regional publications helped popularize the technology. Agricultural journals such as the *Prairie Farmer* and *Country Gentleman*, carried numerous articles on the advantages and disadvantages of this innovative mode of construction, and subsequently broadened its reputation.

[82] Coney and Posadas (1987), 6.

[83] Atlas Portland Cement Company, *Concrete in Railroad Construction* (New York: author, 1909).

[84] In rural Scales Mound (located in Jo Daviess County), one of the local blacksmiths (Adam Rittweger, 1860-1933) "left the blacksmith business and took up general contracting." Besides constructing several of the more prominent buildings currently present in Scales Mound, Mr. Rittweger also "laid many of the present day concrete walks." Mr. Rittwegger's obituary noted that "of late years, [he] became a cement contractor." In 1910, the U.S. Population of Census indicates that besides Adam Rittweger, three brothers (George, John, and Charles Wickler) were working as "Mason Cement Workers" or "Laborer Cement Work." It is not known whether they were employed by Adam Rittweger or independent contractors. Floyd Mansberger, "National Register of Historic Places Registration Form: Scales Mound Historic District," (prepared by Fever River Research [Springfield, Illinois] for the Illinois Historic Preservation Agency, 1990). Besides the numerous concrete sidewalks in this small rural town (which are impressed with the words "Laid by/ A. Rittweger/Scales Mound, ILL.") several poured, reinforced concrete buildings, distinctive poured concrete porches with simple decorative bands, concrete walled garages, and numerous

not have consulted published sources for the inspiration of his work, many technical books and magazines were published during the early-twentieth century illustrating the use of this new material. New publications such as the Atlas Portland Cement Company's *Concrete Construction About the Home and on the Farm* (which was originally published in 1905), and Fred Hodgson's *Mortars, Plasters, Stuccos, Artificial Marbles, Concretes, Portland Cements and Compositions* (which was published in 1906) were just becoming available to the general contractor. Similarly, such successful magazines as William Radford's magazine *American Carpenter and Builder* (which was first published in late 1905 and touted the utility of concrete construction) and his magazine *Cement World* (which was first published in April 1907)[85] were hitting the newsstand during this same period. The magazine *Cement World* was touted as "the best, largest and most practical trade magazine of cement construction." In 1909, the Radford Architectural Company (Chicago) published a new technical book on concrete entitled *Cement Houses and How to Build Them.* This book represented a blending of both technical methods and house plans. Besides giving a treatise on making concrete and cast concrete block, this book included "Perspective Views and Floor Plans of Concrete Block And Cement Plaster Houses." This book offered approximately 87 house plans adapted to this new material. A similarly important series in the Radford publications was the five-volume *Cyclopedia of Cement Construction* which was released in 1910, and proved to be of immense success. Also in 1910, the Radford Architectural Company published the book *Cement and How to Use It.* In circa 1910, the Atlas Portland Cement Company also published *Concrete Garages: The Fireproof Home for the Automobile.*

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poured concrete foundations were constructed by Adam Rittweger between 1908 and his death in 1933. Major buildings include Louis Durrstein's implement dealership (the lower floor of which was constructed of concrete in 1910), and the Lewis Richard restaurant (constructed in 1911). In 1916, the Scales Mound city council condemned all boardwalks and contracted with Adam Rittweger to replace them with concrete. During the 1910's and 1920s, Rittweger continued building a variety of structures in concrete and stucco, including C. L. Walton's single story electrical generating plant (constructed in 1923). Mansberger (1990).

Although concrete houses and commercial buildings were never very popular during the early twentieth century, Rittweger succeeded in adapting a wide range of concrete porches, foundations, steps, and garages, as well as stucco (as an imitation of concrete) surface finishes during this period to residential as well as commercial buildings in Scales Mound. Additionally, Rittweger added a slight hint of style and decoration to his work that was not common on everyday concrete structures of the period (cf. Atlas Portland Cement Company 1909). Rittweger's impact on the early twentieth century landscape of Scales Mound is still evident today.

[85] Although I have not seen a copy of this issue, the April 1907 volume of *American Carpenter and Builder* (page 138-139) carries a two-page advertisement for charter membership to the magazine. This advertisement notes that the April issue (Volume 1, Number 1) would be out by the 15th of that month. The first issue of the magazine contained articles on the building of the Chicago subway system, the utility of concrete over stone and wood, the construction of a concrete artificial ice plant, the use of concrete in harbor works, a discussion of the causes associated with the failure of concrete structures, the use of concrete in foundations and cofferdams, and the use of concrete in the construction of railway viaducts in Florida.

By the entry of the United States into World War I—and immediately prior to the construction of the Kathleen Tipple, the use of concrete as a building material in commercial, residential, and industrial construction had become fairly commonplace. By this date, the new material was recognized for a variety of everyday building uses, particularly for constructing foundations, retaining walls, culverts, bridge abutments, and even for lining mine shafts. Although widely used for such common features as foundations, concrete was used far less for constructing tipples and/or headframes, as structural steel was better suited for such tasks.

Nonetheless, several engineers and/or companies had been experimenting with the use of concrete for tipple and headframe construction. In 1909, the Atlas Portland Cement Company illustrated a coal and sand station constructed along the Norfolk and Western Railway by the Link Belt Company of Philadelphia. Walter Loring Webb, a consulting engineer from Philadelphia, designed this structure, which has all the components of a working tipple complex. As the cement company noted, "reinforced concrete is peculiarly adapted to the construction of structures which are to be used for the storage of coal on account of its undoubtable [sic] fire-resisting qualities, permanence and strength." Although "the initial cost is higher than wood or steel" for these reinforced concrete structures, they had already proved themselves well by circa 1909.[86]

During the early 1910s, the use of concrete at coal mine facilities had increased dramatically. Trade journals such as *Coal Age* carry a variety of articles on the use of concrete during these years.[87] In 1913, the magazine *Coal Age* carried an extensive story about the use of concrete in the construction of a new mine by the Bunsen Coal Company of Clinton, Indiana. The company constructed the entire facility (including mule stables) of reinforced concrete.[88] Similarly, the same issue of the magazine contains an article about shaking screens installed in a new concrete tipple constructed by the Stearns Coal and Lumber Company in Stearns, Kentucky. This article also noted that the Associated Engineering Company of Louisville and Somerset, Kentucky apparently controlled the rights under which reinforced concrete shaker buildings, tipples, and headframes were manufactured. Although the extent of this company's control of the use of concrete for the construction of mining tipples and headframes is not known at present, it is suspected that they did not have very secure rights to the use of this material on these structures.

[86] Atlas Portland Cement Company (1909).

[87] The trade journal *Coal Age* was a weekly publication that was produced in New York City beginning in October 1911. This magazine, which was "devoted to Coal Mining and Coke Manufacture," contains a wealth of information about the early twentieth century coal mining industry.

[88] It is unclear whether the headframe also was constructed of reinforced concrete. This questions needs to be addressed.

In 1917, Floyd Burr illustrated and discussed in *The Engineering and Mining Journal*, the recently constructed concrete headframe that he had designed for the Curry shaft of the Penn Iron Mining Company of Vulcan.[89] Burr described this headframe as being of moderate height (60') and that it had replaced a "decayed, wooden headframe." Burr described the structure as having

> four principal columns, all 30 in. square, connected by girts 15 in. wide by 48 in. deep. These girts are at elevations 16, 35 and 54 ft. Above the 54 ft. are sheave girders 36 in. deep surmounted by piers of the same height, which will support the sheave bearings. The girts were made 4 ft. deep in order to give great rigidity to the structure and 15 in. wide in order to allow room for working inside the forms and also to make lots of mass to retain heat, the structure being erected in the severe winter weather of the upper peninsula of Michigan. The columns were made large for the same reasons, though long, unsupported lengths in the case of the front columns would have required large cross-section for them in any case. Eight-inch floor at elevations 16 ft. and 35 ft. cover that portion of the area not over the shaft and serve as horizontal stiffening diaphragms. The dump and a pocket of 6 tons' capacity cantilever out from the south side. Reinforcement is entirely of old discarded steel hoisting cables from 1 in. to 1 ¼ in. diameter and, of various types and qualities."

Further discussing this headframe, Burr notes that

> every part of the structure is intended to be simple and substantial, and much of it will incidentally be far stronger than is strictly necessary. Practical considerations often make it seem wise to waste a considerable volume of concrete in order to save time or labor in formwork. The actual concrete is the cheapest part, the preparation of forms absorbing the large portion of the cost. There is opportunity for much development along lines of economical building and handling of forms as well as the making and placing of the concrete. There may be cases where sectional-steel forms would be applicable, but usually this would occur only where a whole plant is to be constructed of concrete and forms could be used repeatedly. The special nature of headframes does not make steel forms seem very attractive (see Supplemental Materials Figure JA-2003-1-S44).[90]

[89] Burr (1917), 617-619.

[90] Ibid., 619.

Noting the utility of concrete construction for headframes, Burr states that it "leaves the many rectangular panels between girts entirely free and open for the passage of the hoisting cables or for the entrance of belts, tramcars, etc. At the ground this allows of the greatest possible freedom for traffic to and about the shaft. Layouts in structural steel are sometimes quite bothersome on account of the common use of diagonal braces." Burr also noted "there are many types of headframe structures in wood and in steel, while of course concrete types are as yet undeveloped. Naturally, the general form of concrete structures will, at least for some time, resemble that of steel or wooden structures, the difference now existing or later to develop being based on the great weight of concrete, the absence of diagonal braces, and the east of executing almost any shape or size in concrete."[91]

Further discussing the design of headframes, Burr noted that "reinforced concrete has been little used so far, but it seems to possess qualities that make it superior to both steel and wood for many situations."[92] Burr further observed that "concrete headframes have not in any sense been standardized yet and, in fact, very few have been built."[93] Similarly, writing in 1918, Peele notes that "special structures… are sometimes erected to meet unusual conditions; for example, the concrete headframe." (see Supplemental Materials Figure JA-2003-1-S44).[94] Peele further noted, "concrete headframes, with members reinforced by steel bars or wire rope, have had some application in recent years."[95] Writing in 1918, Springer discussed the use of concrete at coal mines in the trade journal *Coal Age*.[96]

In discussing the utility of concrete headframe construction, Peele, writing in 1918, discussed the benefits of constructing tipples and/or headframes in concrete. He noted that

> in general they conform to the lines of steel and wooden frames, except that diagonal bracing is usually omitted, the dead weight and massive structure providing for stability. Materials for the concrete should be of the best; use of mill tailings for aggregate is not permissible unless tests determine their fitness. Old hoisting rope is suitable for reinforcing, if thoroughly cleaned of rust and

[91] Ibid., 615.

[92] Ibid., 614.

[93] Ibid., 618.

[94] Peele (1941), 12, 61-62.

[95] Ibid., 12-80.

[96] J. F. Springer, "Concrete in Coal Mine Service," *Coal Age* 13, no. 20 (1918), 916-920.

> lubricant. Standard reinforcing bars, however, lend themselves to the different forms and their properties are fully known. Design, as in steel and wood, depends on local conditions…. Advantages are permanence, non-combustibility and resistance to atmospheric conditions or corrosive gases from the shaft. Absence of diagonal bracing (see Supplemental Materials Figure JA-2003-1-S44) leaves more room for portals, and permits most desirable arrangement of bins and tracks. Rigidity and mass of the structure prevent vibration from dumping skips or cars, or swaying from wind and rope stresses.[97] Comparing unfabricated steel and the raw materials for concrete, the later can be erected more quickly, especially if fast-setting cement is used. Disadvantages. As concrete is not a homogeneous material, design can not be made with the same definiteness and as small a factor as safety as for; also, alterations are less easily made than in a steel frame, which can be strengthened to carry a heavier load than as originally designed.[98]

The concrete air-shaft tipple and headframe at the Kathleen Mine was begun during late 1917 and continued through the winter of 1917-1918. In late 1919, writing shortly after the completion of this structure, authors C. A. Herbert and C. M. Young in an article entitled "Engineering Features of Modern Large Coal Mines in Illinois and Indiana" noted that six new mines exhibited the "most striking recent developments" within the coal mining industry. "In each case the plans have been made by engineers of experience in coal mining and of perfect familiarity with the conditions to be met. These mines, therefore, embody the best knowledge and experience obtainable and represent the highest type of coal-mine engineering in the district at the present time." One of the six mines profiled by these two authors was the Kathleen Mine at Dowell, Illinois.[99] According to these authors, "the concrete tipple of the Kathleen mine is an innovation in the southern Illinois field."[100] While discussing new engineering features of these modern coal mines of Illinois and Indiana, Herbert and Young note that

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[97] Peele's Figure 80 illustrates a three-sheave concrete headframe constructed at the Curry Shaft, Penn Iron Mining Company, Vulcan, Michigan. He references an unidentified volume of the magazine *Engineering and Mining Journal* (see Supplemental Materials Figure JA-2003-1-S44).

[98] Peele (1941), 12-80.

[99] The five other mines discussed in this article were: No. 2 mine of the Standard Oil Company, the No. 4 mine of the Superior Coal Company, the No. 2 mine of the Bell and Zollar Mining Company, the Valier mine of the Valier Coal Company, and the No. 2 mine of the American Standard Oil Company of Indiana.

[100] C. A. Herbert and C. M. Young, "Engineering Features of Modern Large Coal Mines in Illinois and Indiana*--I," *Coal Age* 16, no. 21 (1919), 820.

> the construction of tipples shows only one striking novelty, the concrete air-shaft tipple of the Kathleen mine…. The use of concrete for the construction of tipples is not in itself a novelty, as it has been used in some other districts. In this case concrete was adopted, not because a concrete structure was desired, but because at the time of designing it was doubtful whether steel could be obtained. In spite of the fact that a portion of the concrete was poured when the thermometer registered about 20 below zero, the work is sound and the structure is peculiarly attractive. Moreover, it is perfectly rigid, no vibration whatever being felt when the hoist is running….[101]

Why was the Kathleen tipple constructed in concrete? Although the advantages of concrete had been touted by a variety of engineers such as Burr, it was considerably more expensive to build with concrete than with steel. For the engineers at the Kathleen mine, the lack of steel during the war years was the deciding factor. As the trade journal *Coal Age* noted in late 1919, "the entry of the United States into the war [World War I] was accompanied by various disarrangements of industrial conditions, and a demand for coal in excess of the supply seemed likely to be experienced for an indefinite period."[102] But, although the war created a large demand for coal and the development of new mines, steel production was shifted towards the war effort and was in short supply for industrial development. One correspondent at this time noted that "steel in large quantity for quick delivery is practically out of the question for most industrial requirements."[103] Contemporary advertisements in the magazine *Coal Age* emphasized how difficult it was to acquire structural steel and rail and emphasized

> If we don't want to use wood rails and wood ties, we must take good care of the steel rails, steel ties and steel spikes now around the mine. Keep them out of sulphur water and lift them before the roof falls on them.[104]

Essentially new steel for construction purposes (even for new coal mine structures) was being usurped for more essential war production (see Supplemental Materials Figure JA-2003-1-S7).

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[101] C. A. Herbert and C. M. Young, "Engineering Features of Modern Large Coal Mines in Illinois and Indiana," *Transactions of the American Institute of Mining and Metallurgical Engineers* 63 (1920), 820-821.

[102] C. A. Herbert and C. M. Young, "Engineering Features of Modern Large Coal Mines in Illinois and Indiana*--I," *Coal Age* 16, no. 21 (1919), 820.

[103] "Kathleen Mine of the Union Colliery Company at Dowell, Illinois," *Coal Age* 13, no. 26 (1918), 1186.

[104] Ibid., 1122.

Herbert and Young, writing in the trade journal *Transactions of the American Institute of Mining and Metallurgical Engineers* note in 1920 that

> concrete was adopted [for the Kathleen tipple], not because a concrete structure was desired, but because at the time of designing it was doubtful whether steel could be obtained. In spite of the fact that a portion of the concrete was poured when the thermometer registered about 20 below zero, the work is sound and the structure is peculiarly attractive. Moreover, it is perfectly rigid, no vibration whatever being felt when the hoist is running. The cost of the concrete tipple, as built, was about $6000 higher than the cost of the steel tipple originally intended. A considerable part of the excess was due to the expense of heating the materials and of pouring the concrete during the severely cold weather. At this mine…cars hoisted at the air-shaft will be dumped into Wood single-car rotary dumps.[105]

In describing the construction of the concrete tipple, the same authors in the trade journal *Coal Age* noted

> the concrete tipple was built to handle coal until the steel tipple could be constructed. Steel in large quantity for quick delivery is practically out of the question for most industrial requirements. In view of this the Union Colliery Co. used cement in the structure in question. This tipple will be available at any time later to handle 2000 tons of coal per day if need be, in the event of a temporary failure of hoist motors at the main shaft or stoppage of operations at the large tipple from any cause. The main shaft tipple is equipped with a one-car rotary dump and screens for making several sizes of coal. The mine cars have solid end, roller bearings and a capacity of five tons.[106]

The concrete tipple at the Kathleen mine was constructed during the winter of 1917-18. The journal *Coal Age* further noted that

> In the face of most trying circumstances and during a winter of most unusual severity, work was prosecuted and the tipple built. Concrete was run with the thermometer at 24 deg. below zero without freezing. This was accomplished by housing-in the tipple with lumber and brattice cloth and using salamanders to keep up the inside temperature. In addition the water used in the concrete

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[105] C. A. Herbert and C. M. Young, (1920).

[106] "Kathleen Mine of the Union Colliery Company at Dowell, Illinois," *Coal Age* 13, no. 26 (1918), 1186.

> was heated (as were also the other component materials) by means of steam coils.

With the conclusion of World War I, although concrete continued in use for a variety of mine related structures, concrete tipple construction was limited in scope, as it was far easier to construct in steel. A new tipple constructed near Sparta at the Eden Mine in the middle 1920s incorporated concrete into the construction of the screen house and processing plant integrated into the tipple, but relied on structural steel for much of the headframe and bracing. This tipple was illustrated in a 1925 issue of the magazine *Coal Age* (see Supplemental Materials Figure JA-2003-1-S46).[107]

One of the more substantial, and still extant concrete headframes constructed in Illinois was that constructed by the Sahara Coal Company at Muddy, Saline County Illinois (see Supplemental Materials Figure JA-2003-1-S45). This structure was constructed in 1923 on the site of an earlier mine (O'Gara Mine No. 12, established in 1907) that had just been purchased by Sahara Coal Company. This concrete structure remained in use until the mine was closed in 1938. This headframe has a rather unique design that incorporates girts with upper and lower semicircular tops and bottoms that form large circular openings or panels between the inclined struts and the shaft. Apparently, the inspiration for the design of this structure was from a German example, which was subsequently destroyed by Allied bombing during World War II. This structure was determined eligible for listing on the National Register of Historic Places by the Illinois Historic Preservation Agency in November 1998.[108]

Part II. ARCHITECTURAL INFORMATION

A. General Statement: The Kathleen Mine Tipple is a large concrete structure that was historically associated with Union Colliery Company's Kathleen Mine, a shaft coal mine which operated during the period 1918-1947. The structure was designed by Allen and Garcia and represents a unique concrete example of that engineering firm's patented tipple design. The tipple is positioned over the air and secondary hoist shaft for the mine and consists of two distinct sections: the headframe, whose tall and narrow frame supported the hoisting mechanism for the cage; and the tipple proper, which once contained a series of screens and hoppers for the sorting and processing of coal. A large incline brace (also constructed of reinforced concrete) extends off the east side of the headframe, giving the structure an L-shaped footprint overall. The upper floor of the tipple originally was occupied by a steel-frame "headhouse," where the coal brought up from the mine was dumped for processing. The screens and hoppers located below the

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[107] *Coal Age* 27, no. 23 (June 1925), 843.

[108] Letter from Anne Haaker (Deputy State Historic Preservation Officer) to Joe Pelc (Illinois Department of Natural Resources), dated November 19, 1998.

headhouse also were enclosed with sheet metal. Unfortunately, virtually all of the steel framing on the tipple was scrapped out after the mine was abandoned.

Originally, the tipple did not stand in isolation. There was a fan house located directly adjacent to it on the west and a hoist engine house on the east. These buildings were part of larger surface complex that featured a boiler house, washhouse, blacksmith and machine shop, a combination office and storeroom, a water tower, and a second tipple[109] (located above the main shaft) with its own hoist-engine house and coal preparation plant. All of these buildings were demolished in the years following the mine's abandonment, leaving only the air shaft tipple behind.

Despite the removal of key structural features and equipment, and the wholesale destruction of the surrounding mine surface complex, the Kathleen Mine Tipple retains essential elements in its design and can still be recognized for what it is. The lay person, while perhaps not understanding all of the intricacies of the tipple at first glance, would still grasp the structure's basic function and associate it with coal mining. Of all of the buildings/structures present at a shaft-mine site, a tipple is the most prominent and unique in character. Whereas an office, warehouse, or even shower house at mine might easily be converted to other purposes after a mine is abandoned, such is not the case with a tipple. Indeed, except for a looming gob pile, a tipple is the most potent symbol of shaft coal mining, and the one at the Kathleen Mine is a rare surviving example from the World War I-era.

B. Description of Exterior:

1. Overall Dimensions: The tipple has an L-shaped plan at its base, which measures approximately 63'-6" (north/south) by 47' (east/west) at its widest points. The tipple stands approximately 73' above grade (as measured on the north side).

2. Foundations: The headhouse section of the tipple utilizes the walls of the mine shaft itself for foundations. This is one of the characteristics of the Allen and Garcia type tipple.[110] The shaft was described by the 1918 Annual Coal report:

> The shaft is 26 feet 4 inches by 12 feet 6 inches over all and is absolutely fireproof throughout. The lining is of reinforced concrete with steel buntons. The air chamber is 8 feet by 12 feet 6 inches inside and is separated from the stairway and hoisting compartment by a 10-inch reinforced concrete wall.

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[109] Department of Mines and Minerals (1918), 223-224. As mentioned previously, the main shaft tipple also was designed by Allen and Garcia.

[110] Garcia (1913), 787.

In describing the shaft of the Kathleen Mine, the engineers Herbert and Young state that

> At the Kathleen mine, the main shaft is 261 ft. (79.5 m.) deep to the bottom of the coal and is 11 by 19 ft. 11 in. (3.3 by 5.9 m.) inside. The lining is of concrete approximately 1 ft. thick. The buntons are of 6-in. (15-cm.) 23.8-lb. (10.5-kg.) H-beams set on 5-ft. centers. Guides are 85-lb. (38-kg.) steel rails. The air shaft is 230 ft. deep, 12 ½ by 26 1/3 ft. inside, and the lining like that of the main shaft is 12-in. reinforced concrete. Both shafts were temporarily lined with 3 by 12-in. pine curbing. The shaft is divided into four compartments—hoisting compartment 9 by 12 ½ ft., counterweight compartment 3 by 12 ½ ft., stairway compartment 4 by 12 ½ ft., and air compartment 8 by 12 ½ ft. The air compartment is separated from the remainder of the shaft by a 12-in. reinforced-concrete partition. In this mine only one cage is used, but this has two decks each of which will accommodate 25 men. The counterweight is of concrete with a scrap-iron aggregate. The buntons in the air shaft are 9-in., 21-lb. I-beams. The hoisting capacity of the air shaft is about 800 tons of coal in 8 hours.[111]

The tipple proper is supported by four large (2'x 2') concrete pillars, which were widely spaced to allow the passage rail cars beneath them.

3. Walls: The main structure of the Kathleen Tipple was constructed with reinforced concrete walls that were formed with wooden planks. Although the form of steel reinforcing within the walls is not known, it is suspected that wire rope was used. The concrete generally has a flat appearance, except on the headframe, which has a patterning of recessed wall panels in between the main structural members.

   The walls of the headhouse and those enclosing the coal chutes were constructed of light-weight steel (angle irons) bolted together and covered with corrugated sheet metal. Whereas the entirety of the concrete frame remains, the metal superstructure has been removed (scraped for its metal content).

4. Structural System, Framing: The main structural elements of the tipple are constructed of reinforced concrete, using a system of heavy vertical posts/pillars and horizontal girts. The headframe, which is the tallest and most vulnerable section structurally, is buttressed by the large incline brace extending off its east side. The tipple section also serves as a brace for the headframe (it and the brace span nearly the same distance, approximately 46-47'). For more information, see the attached floor plans and sectional/elevation drawings.

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[111] Herbert and Young (1920), 814.

The workmanship associated with the pouring of the main concrete structure of the tipple remains quite evident. The outlines of boards used to form up the concrete, for example, are still discernable in the concrete. In addition, there are subtle clues—rough edges, dripped concrete, and uneven surfaces—that hint at the difficulties experienced by the vernacular craftsmen who built the tipple in translating the engineer's design from paper to reality. Yet, there is little evidence left of the workmanship associated with the steel-frame portions of the structure.

5. Porches, Stoops, Balconies, and Bulkheads: A catwalk was located on the east side of the headhouse. The steel railing associated with this catwalk was still present at the time of the field investigation, although the headhouse itself had been removed. Another catwalk was present at the very top of the tipple, which allowed the sheave wheel to be serviced.

6. Chimneys: None present.

7. Openings:

    a. Doorways and Doors: The only exterior doorway known to have been present in the tipple was located on the northeast corner of headhouse and allowed access to the exterior walkway present here. This doorway appears in an historic photograph (see Supplemental Materials Figures JA-2003-1-S1 and JA-2003-1-S2), though not in sufficient detail to know its exact character. It may have been of steel-frame construction.

    b. Windows and Shutters: Historic photographs illustrate a number of windows in the headhouse of the tipple (see Supplemental Materials Figures JA-2003-1-S2 and JA-2003-1-S6). There appears to have been three windows on the east and west sides, one window on the north, and possibly an eighth window on the south. They seem to have been steel-frame awning windows that pivoted outward.

8. Roof:

    a. Shape, Covering: The roof over the headhouse was gabled on its south end but was half-hipped on the north. The coal chutes and hoppers were covered with a shed roof. Both roofs were of steel-frame construction and were covered with steel roofing.

    b. Cornice, Eaves: The roofs had close eaves and no cornice.

    c. Dormers, Cupolas, Towers: None of the above-mentioned architectural features were associated with the Kathleen Mine Tipple, in the traditional sense. Of course, the headframe itself represented a type of tower.

C. Description of Interior:

1. Floor Plans: The Kathleen Mine Tipple does not have a typical floor plan that can be described in terms of "first floor," "second floor," etc. It is better to describe the interior layout of the structure in terms of levels. At grade level, men and materials could enter the mine cage on the north (or open) side of the headframe. Also on this level, railroad cars could be filled with coal beneath the tipple. The coal was stored in hoppers located on a platform located nearly 23' above the ground surface. A series of screens extended up from the hopper level to the headhouse, which was located another 17' or so higher. The headhouse spanned both sections of the structure (headframe and tipple proper), and it was here that the coal brought up from the mine was dumped. After the cage was raised to the headhouse level (being locked into place by an automatic brake), the coal car was rolled off the cage via a short section of track onto a rotary dump, which flipped the car over and spilled its coal down a chute to the screens below. The uppermost level of the structure was the platform surrounding the sheaves at the top of the headframe. This platform presumably was used only when the sheaves required servicing.

   For more detail on the interior layout of the Kathleen Mine see the attached floor plans.

2. Stairways: The upper floor of the tipple was accessed by means of the cable-driven cage (or elevator) positioned over the hoist shaft. The cage could be entered at grade on the north side of the tipple. Two steel ladders also were present on the upper floor, which extended to the top of the headframe; one of these had a safety cage around it.

3. Flooring: Like the main structural elements, the floors in the tipple were constructed of reinforced concrete. There may also have been steel or frame walkways in some sections of the tipple; if so, however, these had been removed (or deteriorated) prior to the field investigation.

4. Wall and Ceiling Finish: The wall and ceiling finishes consisted of exposed concrete and steel (angle iron and corrugated sheet metal). When originally constructed, the steel probably was painted to prevent rusting.

5. Openings:

   a. Doorways and Doors: See section II.B.7.a.

   b. Windows: See section II.B.7.b.

6. Decorative Features and Trim: The Kathleen Tipple was constructed as an industrial structure and lacked decorative detail and ornamentation. The principal "decorative" treatment present—and this was a functional detail—was the

chamfering of the corners of all the concrete posts and girders. In addition, the eaves of the platform supporting the headhouse were flared. Nonetheless, this structure had a distinctive simplicity to its design that gave it a unique look—a look that one pair of engineers described in 1920 as "peculiarly attractive."[112]

7. Hardware: No hardware has survived. See discussion below for the mining equipment that was present in this structure.

8. Mechanical Equipment:

   a. Heating, Air Conditioning, Ventilation: Except for natural ventilation (supplied by the windows and doors), this structure had no heating or air conditioning systems.

   b. Lighting: The structure was supplied with electric lighting.

   c. Plumbing: No plumbing was associated with this structure.

   d. Mining Equipment: The mechanical equipment once present in the tipple primarily concerned the hoisting and screening/processing of coal. The 1918 *Annual Coal Report* indicates the following equipment having been installed in the tipple and adjacent fan and hoist engine houses:

   > A Wellman Seaver Moran electric hoist has been installed and equipped with a 250 horsepower a.c. motor, a rotary dump in the tipple, screen and mine run chute, so mine run, lump and screening coal can be loaded from this shaft…. A 12 foot by 5 foot high speed reversible Jeffery fan is being installed, having a 200 horsepower motor drive and steam engine for an auxiliary drive. The fan house will be of brick and reinforced concrete.[113]

   Herbert and Young indicate that the "air-shaft hoist is operated by a geared slip-ring induction motor operating on 2200-volt, 60-cycle, three-phase current, and having Cutler-Hammer reversible magnetic control."[114]

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[112] Herbert and Young (1920).

[113] Department of Mines and Minerals (1918).

[114] Herbert and Young give a more detailed account of the equipment in the main hoist tipple:

> At the Kathleen mine, the combined cylindrical and conical drum is driven through a Francke flexible coupling by a 600-kw., direct-current motor, with full voltage speed of 235 r.p.m. Current will be supplied to this hoist motor at 500 volt by a flywheel motor-generator set having a 500-hp., alternating-current induction motor, taking current at 2200 volt and running at 900 r.p.m. The direct-current 500-kw. Generator is separately excited. The flywheel weighs 20,000 lb. (9071 kg.). This set is equipped with a speed-limit switch. The hoist is equipped with air-operated

Much of the hoisting system of the Kathleen Mine tipple remains intact, including the cage, shaft, cage guides, and a locking mechanism at the top of the shaft. However, the steel-frame superstructure formerly attached to the top of the concrete section of the tipple—by which the hoist pulley, or sheave, was suspended—has been removed. All of the mechanical features associated with the screening system have been removed, as has the superstructure in which the screen was conducted. Even so, the method by which the coal was dumped, screened, and then sorted by size into different hoppers can be discerned from the placement of concrete girders. The outlines of walls also can be discerned from the stumps of I-beams left behind after scrapping.

D. Site:

1. General Setting and Orientation: The Kathleen Mine is located in north-central Jackson County, less than one mile south of the line separating Jackson from Perry County to the north. The mine site lies on the east side of U.S. Route 51, directly opposite the town of Dowell. A spur line formerly connected the mine site with the Illinois Central Railroad, which passes through Dowell. The air shaft tipple is centrally located with the surface workings of the Kathleen Mine.

2. Historic Landscape Design: No formal landscape design was included with the development of the Kathleen Mine. The industrial process of coal mining dictated the layout of the site. Having said this, much thought went into the design of the top yard, in that the flat topography made it difficult to develop the site for gravity car movement. See previous discussions.

3. Outbuildings: The Kathleen Mine served as an industrial complex with multiple buildings functioning together for the extraction and processing of coal. The buildings present at this site included the two tipples and

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> brake, a Royer & Zweibel over-winding device and mechanical slow-down. Herbert and Young (1920), 820.

In discussing the tipple arrangement within the main shaft, Herbert and Young further note that

> At this mine the demand will be variable, as part of the coal will go to the St. Louis and Milwaukee plants of the North American Co., which consumes 500,000 tons of screenings per year. The remainder of the coal is to be marketed and the tipple is equipped for making lump, 3 by 6-in. (7.6 by 15-cm.) egg, 2 by 3-in. nut, and 2-in. screenings. There are picking tables for the nut, egg, and lump coal, with loading booms for lowering the coal into the cars. Provision has also been made for the installation of crushers so that either the lump or the egg coal may be crushed to screenings if the market conditions make this desirable. Shaker screens are used with pendulum suspension. At this mine and at Valier, the crushers are so placed that the coal may be discharged into them by elevating the loading boom. Herbert and Young (1920), 823.

related machinery and hoist-engine houses, a fan house, boiler house, shower house, blacksmith and machine shop, a combination office and store room, and water tower. A variety of smaller outbuildings were, no doubt, present as well. The two buildings most closely connected to the air shaft tipple were the fan house, which was located directly west of it, and the hoist engine house to the east. The site is well illustrated in a panoramic photograph taken in 1939 (see Supplemental Materials Figure JA-2003-1-S1).

PART III. SOURCES OF INFORMATION

A. Original Architectural Drawings: There are no known original plans for the tipple or the other buildings once present at the Kathleen Mine.

B. Early Views: Several early images of the Kathleen Mine, and specifically the air-shaft tipple, have survived. Besides a large format panoramic view of the mine complex (which shows the air-shaft tipple in the far background), several circa 1918-1920 photographs of the air-shaft tipple were published in professional engineering journals to illustrate the unique use of concrete in mining construction (see Supplemental Materials). Additionally, a post card of the Kathleen Mine was published in the early years of the twentieth century.

C. Interviews: The surveyor (Stratton) spoke with James Cobin who is the current landowner. Ann Stepson a lifelong resident of Dowell, and employee of Cobin's Salvage Yard, also provided details about the town.

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E. Likely Sources Not Yet Investigated:

Further research is needed to determine if archival records associated with the coal company (Union Colliery Company of St. Louis) and the engineering company (Allen and Garcia of Chicago and Birmingham) are available. The attempts to date to find materials from these two firms have been illusive. Presently, only a limited amount of information has been found regarding the engineering firm of Allen and Garcia—such as reference to the firm in the Bernard H. Cantor Collection Papers (1959-1978), which are located at the Archives of Appalachia, East Tennessee State University, Tennessee (http://cass.etsu.edu/archives/afindaid/ a26.html).

Additionally, the 1930 Federal population census materials are currently available and a similar analysis of Dowell for the year 1930 could be prepared. The 1930 Federal census returns would document the growth and maturation of the community between that circa 1920 establishment of the village and the circa 1930 peak in population of the community.

Part IV. METHODOLOGY OF RESEARCH

A. Research Strategy:

The research strategy for this project included both a field and an archival component. The field component consisted of the photographic documentation of the building and preparation of sketch plans and elevations. The archival component associated with the IL HAER documentation of the Kathleen Mine Tipple consisted of the search for primary source materials related to the history of this property. As part of this latter goal, the research team consulted various local and regional archival repositories (such as the Illinois State Historical Library, the Illinois State Library, the Illinois State Archives, and the University of Illinois Library) in order to find general historical materials to develop a site history and context for these buildings.

B. Actual Research Process:

Based on the results of a Phase I archaeological reconnaissance survey conducted by Fever River Research in 2002, the Kathleen Mine Tipple was determined eligible to the National Register of Historic Places by the Illinois Historic Preservation Agency. The subsequent field investigation was aimed at the documentation of building remains, rather than the collection of artifacts and/or more traditional archaeological excavations. The documentary research involved the compilation of historic plats, atlases, and photographs depicting the project area and the preparation of a short historical context for the Kathleen Mine. Site-specific research was conducted at the Illinois State Library as well as the University of Illinois' Engineering Library (Grainger Library), and the library of the Illinois State Geological Survey. Other primary sources that were utilized included the *Annual Coal Reports*, and the Illinois Division of Mines and Minerals Abandoned Mine Maps.

C. Archives and Repositories Used:

A number of public (both local and state) and private repositories were utilized as part of this project. In Springfield, the Illinois State Historical Library, the Illinois State Library and the Illinois State Archives were visited. As noted above, the Engineering Library at the University of Illinois, Urbana also was consulted.

D. Research Staff:

1. Primary Preparer:

The written IL HAER outline presented here was prepared by Christopher Stratton, Floyd Mansberger, and Heather Stanley, all of Fever River Research, Springfield, Illinois. Mansberger and Stratton conducted the architectural field recording; the field drawings were digitized by Stratton who also conducted the preliminary archival research, and prepared the initial statement of significance. Both Mansberger and Stanley researched and authored the multiple context statements presented in the IL HAER report. All aspects of this project were coordinated by, and under the direct supervision of Floyd Mansberger, principal investigator, Fever River Research, P. O. Box 5234, Springfield, Illinois, 62705.

2. Photographer:

No large format photographs were taken for this project. Christopher Stratton and Floyd Mansberger took 35mm prints and slides of the site, concentrating predominately on the tipple structure.

3. Delineator:

Christopher Stratton of Fever River Research prepared the floor plan drawings and site plan that are included in this report. These floor plan drawings were digitized using Design-CAD software.

Part V. PROJECT INFORMATION

In 1998, the Abandoned Mine Division of the Illinois Department of Natural Resources proposed the cleanup of the Kathleen Mine. The reclamation work at that time called for the complete demolition of the then extant buildings (six buildings were then located around the two shafts), the filling and capping of the two partially open shafts, the treatment and filling of the acid ponds, and the consolidation of mine refuse, site grading and seeding.[115] The entirety of the project was not completed under the 1998 grant proposal, and in June 1999, the Illinois Department of Natural Resources again proposed to demolish the concrete tipple associated with the air shaft at the Kathleen Mine. At this time, the Illinois Historic Preservation Agency reviewed new documentation regarding the proposed demolition of the tipple and stated that "this structure (main hoist shaft/tipple building) is eligible for listing on the National Register of Historic Places

[115] Illinois Department of Natural Resources, *Environmental Narrative Coal and Kathleen Mine, Dowell, Illinois* (Springfield: author, 1998).

under criterion "A" because of its association with the coal mining history in [the] town of Dowell and Jackson County."[116]

In March 2000, Illinois Department of Natural Resources representatives responded to the IHPA's June 1999 letter by noting the severely deteriorated, unsafe condition of the tipple and the landowner's desire to demolish the structure.[117] In July 2000, the Illinois Historic Preservation Agency requested a Phase I archaeological survey of the Kathleen Mine in order to locate, identify, and record all archaeological resources within the proposed project area and to assess the National Register of Historic Places eligibility of those resources. This request was made in accordance with Section 106 of the National Historic Preservation Act of 1966 (16 USC 470), as amended, and its implementing regulations regarding protection of historic properties (36 CFR 800).[118] Under contract with the Illinois Department of Natural Resources, Fever River Research conducted a field investigation of the Kathleen Mine in late September 2002. In early October 2002, Stratton and Mansberger returned to the Kathleen tipple, and with the assistance of a boom truck, took measurements and prepared drawings of the structure. At this time, Stratton also conducted additional archival research. The results of that field investigation and the documentary research that was carried out in conjuncture with this mine were summarized in a short report entitled "Kathleen Mine Tipple, Dowell, Jackson County, Illinois" that was presented to IDNR in early November 2002.[119] On November 8, 2002, Floyd Mansberger and Christopher Stratton (both of Fever River Research) and Dr. Harold Hassen (Illinois Department of Natural Resources) met with Anne Haaker (Illinois Historic Preservation Agency) to review the documentation prepared by Fever River Research pertaining to the Kathleen tipple. At this meeting, it was determined that an IL HAER document for this structure would be prepared, but that 1) no additional fieldwork would be required, and 2) no large scale photographs would be required (that the 35mm photographs previously taken would suffice).

On November 13, 2002, Anne Haaker advised the IDNR (Dr. Hassen) that the structure was eligible for listing on the National Register of Historic Places, and that an MOA (outlining the need for an IL HAER document prior to demolition) would be required. On November 15, 2002 the IDNR notified the IHPA that, based on previous meetings and discussions 1) the IDNR accepted that the tipple was eligible for listing on the National Register of Historic Places, 2) no additional field work was necessary prior to the demolition of the structure, and 3) an MOA would be developed to address the level

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[116] Letter from Anne Haaker (Deputy State Historic Preservation Officer) to J. Gregory Pinto (Illinois Department of Natural Resources), June 8, 1999.

[117] Letter from Thor Lindquist (Illinois Department of Natural Resources, Project Manager) to Cody Wright (Illinois Historic Preservation Agency, Cultural Resource Manager), dated March 6, 2000.

[118] Letter from Anne Haaker (Deputy State Historic Preservation Officer) to J. Gregory Pinto (Illinois Department of Natural Resources), dated July 14, 2000.

[119] Christopher Stratton, "Kathleen Mine Tipple, Dowell, Jackson County, Illinois," (report prepared by Fever River Research [Springfield, Illinois] for the Illinois Department of Natural Resources, 2002).

of IL HAER documentation necessary. In that letter, the IDNR requested the concurrence of the State Historic Preservation Officer that the adverse effect associated with the proposed demolition of the Kathleen tipple could be mitigated through appropriate IL HAER documentation which would be established through a Memorandum of Agreement between IDNR and the IHPA. On December 13, 2002, the Illinois Historic Preservation Agency concurred with the IDNR statement/letter.[120]

With this in mind, the IDNR contracted with Fever River Research to prepare the necessary IL HAER documentation package. The goals of the documentation package were to record the physical structure of the Kathleen Mine Tipple, document the site-specific history, and provide appropriate historical contexts for the building. This IL HAER documentation is the result of that work.

[120] Letter from Harold Hassen (Illinois Department of Natural Resources) to Anne Haaker (Deputy State Historic Preservation Officer) dated November 15, 2002. Dated CONCUR stamp signed by Anne Haaker, Deputy State Historic Preservation Officer, December 13, 2002.

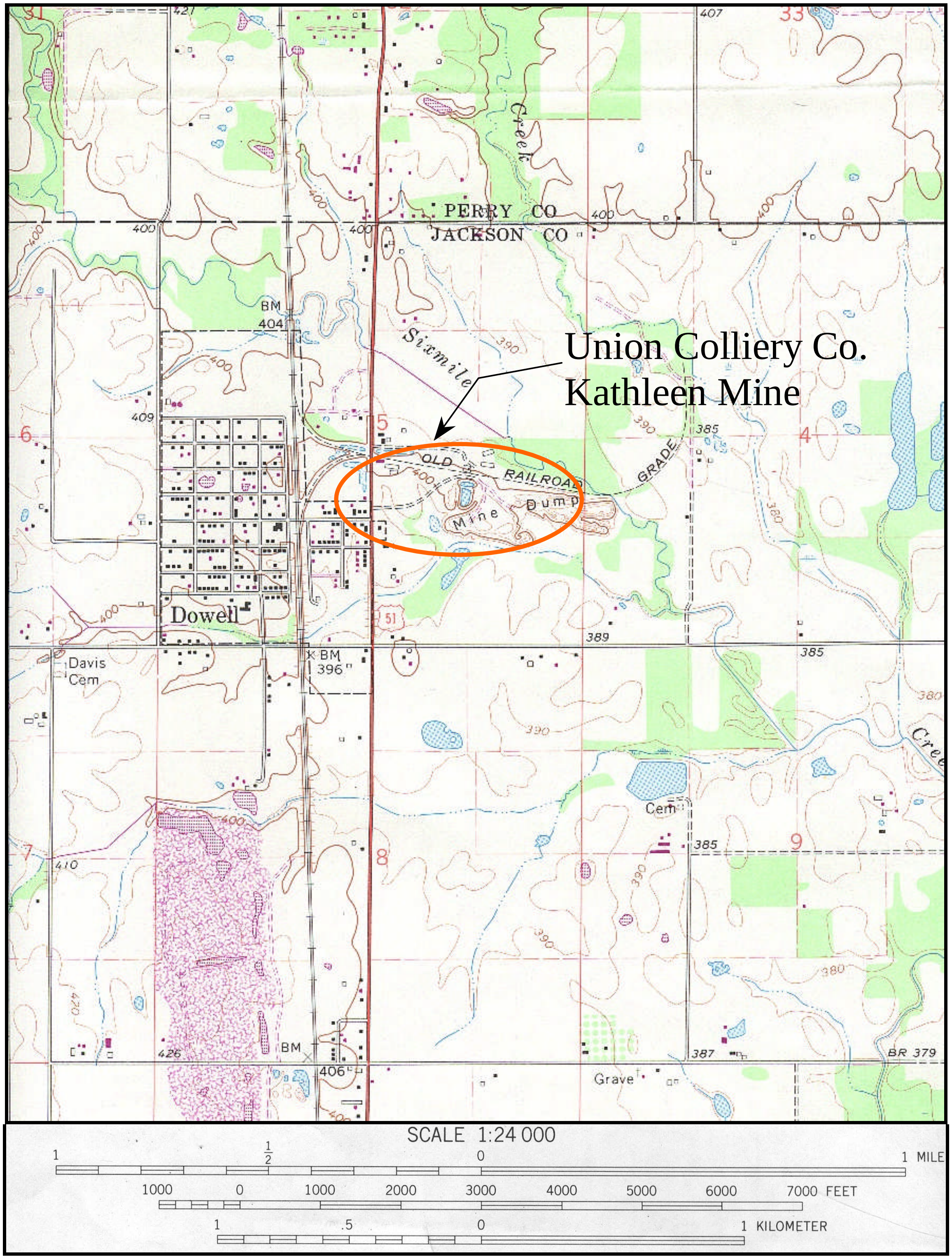


Figure 1. United States Geological Survey topographic map showing the location of the town of Dowell and the Kathleen Mine. (USGS Elkville Quadrangle, 1978).

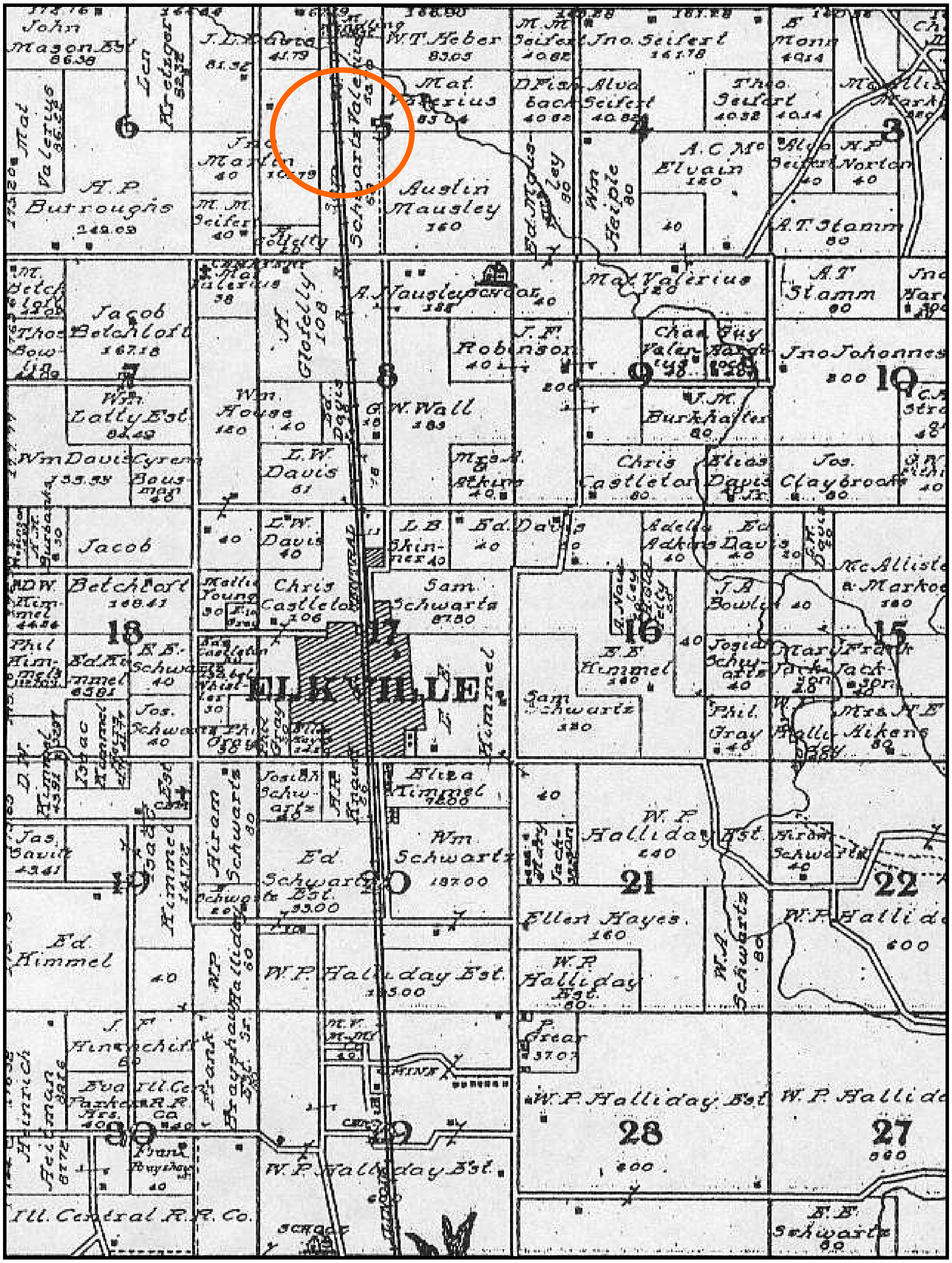


Figure 2. Map of Elk Township as illustrated in the *Standard Atlas of Jackson County, Illinois* (Ogle and Company, 1907). The future site of Dowell is outlined in red.

INDEX TO SUPPLEMENTAL MATERIALS

Kathleen Mine Tipple IL HAER No. JA-2003-1
SE1/4, NW1/2, Section 5
Township 7 South, Range 1 West of 3th P.M.
Elkville Quadrangle
Jackson County
Illinois

JA-2003-1-S1	Panoramic view of the Kathleen Mine in 1939 (James Cobin, personal collection).
JA-2003-1-S2	Detail view of the Kathleen tipple and screening complex (James Cobin, personal collection).
JA-2003-1-S3	Postcard of the Kathleen Mine at Dowell, with caption, "Where the Clean, Clinkerless Southern Illinois Coal Comes From." The concrete tipple appears in the background (Curt Teich and Company, Lake County Discovery Museum).
JA-2003-1-S4	(TOP) Temporary sinking headframe and trestles at the Kathleen mine, main shaft (*Coal Age* 1918:1186). (BOTTOM) Kathleen airshaft tipple with hoist and boiler house (*Coal Age* 1918:1187).
JA-2003-1-S5	Southwest view of the Kathleen concrete tipple (*Coal Age* 1918:1188).
JA-2003-1-S6	View of the Kathleen mine air shaft headframe and tipple complex (Herbert and Young 1920:821).
JA-2003-1-S7	Advertisement (*Coal Age* 1918:1122).

The following 35mm photographic images were taken by Christopher Stratton and Floyd Mansberger during the Phase I survey (September 2002). Negatives are on file at Fever River Research, Springfield, Illinois.

JA-2003-1-S8	Contemporary views of the Kathleen headframe and tipple complex. (TOP) Tipple, looking southeast. (BOTTOM) View looking south, showing the hoist shaft. The north face of the hoist shaft appears to have always been open-sided (such was the case with the other tipple at the site) (FRR 2002).
JA-2003-1-S9	Contemporary views of the Kathleen headframe and tipple complex. (TOP) View of the tipple looking west. (BOTTOM) View of the

"headhouse." Note the cage track, ladder, and steel railing that are still intact. The Allen and Garcia nameplate appears to the right (FRR 2002).

JA-2003-1-S10 Contemporary views of the Kathleen headframe and tipple complex. Detail of the headframe illustrating the Allen and Garcia nameplate affixed to the tipple (FRR 2002).

The following line drawings were prepared by Christopher Stratton and Floyd Mansberger during a field visit to the project area in October 2002. The field drawings were digitized by Christopher Stratton.

JA-2003-1-S11 Sectional view of the Kathleen Mine Tipple, looking east through the structure, showing existing conditions (FRR 2002).

JA-2003-1-S12 View of the north elevation of the Kathleen Mine Tipple, showing existing conditions (FRR 2002).

JA-2003-1-S13 Floor plan of the Kathleen Mine Tipple, showing conditions at grade (FRR 2002).

JA-2003-1-S14 Floor plan of the Kathleen Mine Tipple, showing hopper/screen and headhouse levels (FRR 2002).

The following illustrations were copied from various sources to illustrate the variation in tipple design.

JA-2003-1-S15 This simplest method of raising ore from a vertical shaft was with the use of a windlass. Such devices were generally handpowered and required little investment of materials or time to construct (ITC 1906). The windlass is a simple mechanical devise that has been in use for many hundreds of years.

JA-2003-1-S16 Line drawing of a mechanized windlass in use in England and identified as a "cog and rung for raising coal" (Boyd 1895: Figure 3). This horse-powered system operated a pair of balanced ore buckets attached to rope wound around a vertical drum located directly over the shaft.

JA-2003-1-S17 Line drawing of a horse-powered "gin for raising coal" (Boyd 1895: Figure 4). This large horizontal drum, which was offset from the shaft, also operated a balanced pair of ore buckets, except that the rope passed over a set of sheaves supported by a headframe prior to being wound around the drum. The headframe for this mine consists of two sheaves attached to two horizontal beams that are supported by a pair of bents each side of these beams (one bent each side of the shaft). Each bent consist of two upright posts with a set of diagonal struts extending in the direction of the stresses created by the large horizontal drum. These horse-powered gins (with simple timber headframes) were common in early Illinois prior to the adoption of steam power to this task.

JA-2003-1-S18 Mule-powered gin operating a simple headframe over a vertical shaft (ITC 1906). This simple headframe has two counterbalanced ore buckets. Although the knee braces incorporated into the frame would have given this headframe some added strength, the lack of an inclined strut between the winding drum and the sheaves would have made this a rather unstable frame.

JA-2003-1-S19 This is the coal mine located on the farm of D. B. Boyd, rural Randolph County, Illinois. This simple mine marketed coal via wagon (note the gravity ore cart on tracks leading to a dump over a wagon in the foreground) and rail car (note the ore cart on the low tramway preparing to dump into the waiting rail car), and thus operated as both a Local and Shipping Mine. The mine, which was operated by a horse gin, had a simple headframe with a small attached building. A separate shed-roofed structure was nearby (Brink and Company 1875:78). This is an excellent example of an early, non-mechanized shaft mine typical of Illinois.

JA-2003-1-S20 Headframes generally consist of upright vertical posts and an inclined strut. Two common designs of wooden headframes include the two-post (right) and four-post (left) design. The inclined strut is in compression and located between the sheave and the winding drum, and are most efficient when placed parallel "to the resultant determined by the parallelogram of forces" created by the stress of the winding drum and the ore bucket. The vertical posts are generally parallel to the vertical pull of the rope in the shaft (ITC 1906:34).

JA-2003-1-S21 Sketch of an early English coal mine or "colliery" from the 1840s (Boyd 1895:93, Figure 18). This illustration depicts a relatively sophisticated, industrialized mine of the period. Distinctive features of this mine include the engine house (E), the "upcast shaft" with its tall chimney or "furnace" (A), and the two headframes (D and F). The main shaft headframe (D) is simply identified as "Head Gear," whereas the second shaft headframe (F) is identified as the "counterpoise." Presumably, the engine house (with its large vertical drum) was steam powered (note the chimney on the building). All buildings were constructed of stone, and suggest an element of permanence—unlike many of the nineteenth century mines constructed in Illinois. The two headframes are of similar construction, and consist of a sheave attached to a horizontal beam supported by two upright posts located directly beneath the center of the sheave. A single set of diagonal braces or struts extend off one side of the main upright posts. A set of steps are incorporated into the top surface of the diagonal brace. The shaft appears to have been fenced for safety. This simple headframe design is often referred to as an "A-frame."

JA-2003-1-S22	Detail of the simple two-post headframe common during the early nineteenth century (Boyd 1895:93).
JA-2003-1-S23	Simple headframes adapted to slope mines and illustrated by Peele (1918). These A-type headframes incorporated simple ore bins into their design, and were often associated with simple prospecting ventures (Mentzel 1912).
JA-2003-1-S24	This is an example of an A-type headframe with two central posts beneath the sheaves. These were in common use for small mines at the turn-of-the-century (ITC 1906:37).
JA-2003-1-S25	Local mine headframes with horse powered gins. The upper image is from Cartlidge (1933) which illustrates Brophy's mine in Shelby County. Although the gin is well illustrated, the location of the shaft is not clear. The lower image is an unidentified local mine illustrated by Andros (1915). This simple four-post headframe with inclined braces has an extremely simple tipple consisting of a single chute or screen for sorting coal.
JA-2003-1-S26	In its simplest form, the timber headframe persisted into the twentieth century with small local mines. The upper image is from Vermilion County (Stratton 2002: Bunsenville Report); the lower image is from (Russell 1990).
JA-2003-1-S27	Miller Place Randolph County. This is a representative 1860s four-post headframe with inclined braces (Brink and Company 1875:69).
JA-2003-1-S28	An 1875 lithograph showing the residence, tenant houses, and coal mine buildings located on the property of W. B. Squires in Catlin Township, Vermilion County. Another example of a simple four-post headframe with inclined braces. The cage for this early shaft mine was raised and lowered by means of a horse-powered hoist (located the left of the office). Note the wagons hauling away coal from the mine in the lower figure (Brink and Company 1875:105).
JA-2003-1-S29	Temporary sinking headframe and trestles at the site of the prospective main Kathleen tipple (*Coal Age* 1918:1186). This is a simple four-post headframe with incline braces.
JA-2003-1-S30	Typical four-post timber headframes with back brace typical of the later nineteenth century mines of Illinois. The upper image is from Peele (1941), whereas the lower image is from Andros (1914). The four posts of the upper example are battered (or canted) for extra stability.

JA-2003-1-S31 An example of a large four-post timber headframe with secondary canted posts (and lacking an inclined brace). A large frame tipple with screens and loading chutes is attached (ITC 1906).

JA-2003-1-S32 Closeup view of Reinecke's Mine No. 1 (Brink, McDonough and Company 1881: opposite 224). This was a large, industrialized shipping mine located in St. Clair County. This is an excellent example of a large two-post headframe with inclined braces. Note the distinctive form of the tipple, with its two upright tapered posts. The shape of this headframe suggests that it may have been of cast iron construction. If this is indeed a cast iron headframe, it would represent one of the earliest documented non-timber headframes in Illinois. As a material, wood was not well adapted to headframe construction—or at least headframes intended for long continued use. Exposed to the weather, wood deteriorated rapidly and did not hold up to the stresses present in the hoisting operations. Although many headframes were enclosed to protect them from the weather, they also were prone to fire and threatened the safety of the miners below. A middle-nineteenth century alternative was cast iron, which was used sparingly for headframe construction in Illinois. During the 1860s-90s, cast iron headframe construction was often conducted by bridge builders adept with this material. One of the few examples of a cast iron headframe is this suspected example that was in use in the Belleville area at the Reinecke Mine in the early 1880s.

JA-2003-1-S33 By the late nineteenth century, headframe technology was advancing to meet the needs of the deeper, more industrialized mining operations. The simple four-post steel headframe with inclined brace (incorporating a steel tipple into it structure) was one of the more common forms of headframe by the early years of the twentieth century. Slightly larger six-post headframes consist of a similar design with six upright posts arranged around an enlarged rectangular shaft. Others have posts that are canted and/or slope inward towards the top (ITC 1906).

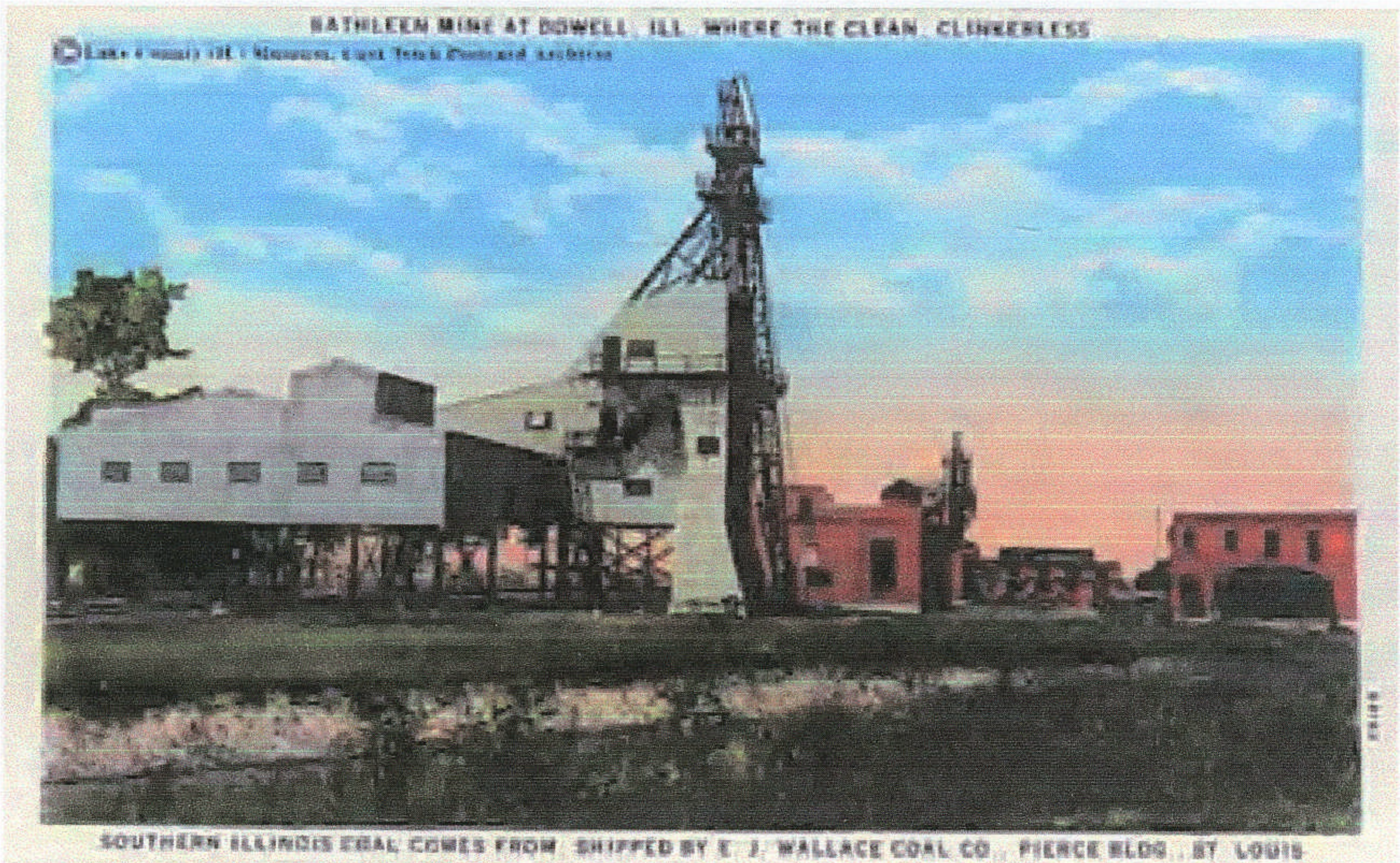
JA-2003-1-S34 By the late nineteenth century, headframe technology was advancing to meet the needs of the deeper, more industrialized mining operations. Cartlidge (1933) illustrates several headframes—contrasting the older wood frames and the more modern steel frames. (TOP) This was the first tipple constructed by Warren Roberts during the 1890s (Mine No. 1, Egyptian Coal Company, Harrisburg, Illinois). Roberts (and his engineering firm of Roberts and Schaeffer of Chicago) went on to design a variety of steel headframes and tipples during the early twentieth century years. (BOTTOM) Steel Tipple erected for the Centralia Coal Company by the Morrow Manufacturing Company.

JA-2003-1-S35	Slope and/or drift mines did not require the same headframe design. These are two examples of early twentieth century headframes at Illinois drift mines. (TOP) A typical drift mine located along the Illinois River illustrating the character of a simple tipple associated with a local drift mine (ISGS). (BOTTOM) A more substantial headframe associated with a larger slope mine (the Crescent Mine) (ISGS).
JA-2003-1-S36	Detail of a headframe and tipple associated with a slope mine (ITC 1906).
JA-2003-1-S37	As steel has both good compression and tensile strength, steel headframes could often be constructed without an inclined strut. In this case, the vertical member "a" acts as an inclined strut experiencing tensile forces.
JA-2003-1-S38	Detail of an early steel four-post headframe with vertical posts slightly canted and acting as both vertical posts and inclined struts (ITC 1906). No inclined struts were included with this headframe.
JA-2003-1-S39	Modern steel four-post tipples with inclined braces. (TOP) Ziegler (Church 1925). (BOTTOM) Joliana Mine ISGS.
JA-2003-1-S40	Front view of a headframe (or hoisting tower) designed by Andrew Allen and John Garcia (of the firm Allen and Garcia, Chicago, Illinois) illustrating the "simplicity of construction" of their patented design (left; Garcia 1913:787). The Allen and Garcia Type tipple illustrated at right was depicted in Peele (1941).
JA-2003-1-S41	Side view of a typical Allen and Garcia steel tipple, as illustrated in Garcia (1913:786).
JA-2003-1-S42	Modern steel tipples of the Allen and Garcia Type. (TOP) Superior Mine No. 4 (Allen and Garcia Type; concrete lined shaft). (BOTTOM) Headframe Andros Steel (Allen and Garcia Type).
JA-2003-1-S43	Two views of the coal and sand "station" constructed along the Norfolk and Western Railway in 1907. By this date, reinforced concrete construction techniques for industrial structures such as a tipple had been established (Atlas Portland Cement Company 1909:111-112).
JA-2003-1-S44	Detail of concrete headframe constructed at the Curry Shaft by the Penn Iron Mining Company at Vulcan, Michigan. This headframe was designed by Floyd Burr and constructed circa 1917-18 (Burr 1917:617; as reprinted in Peele 1941).

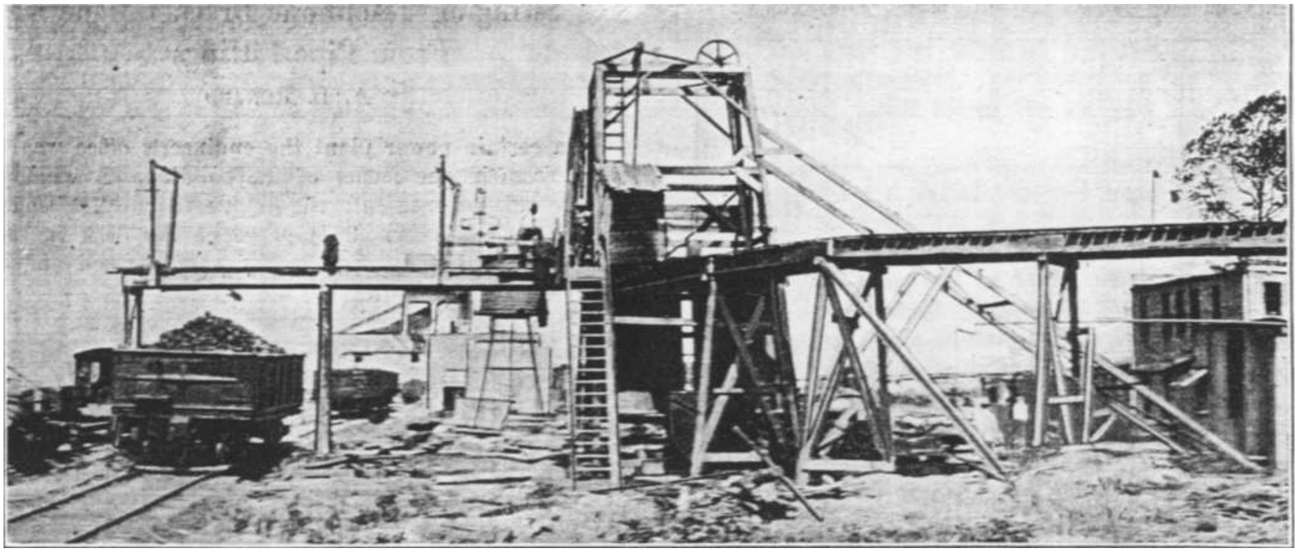
JA-2003-1-S45	Sahara Coal Company's (O'Gara Coal Company) concrete headframe, constructed in 1923 in Muddy, Saline County, Illinois. This headframe has been determined eligible for listing on the National Register of Historic Places.
JA-2003-1-S46	View of the Eden Mine near Sparta, Illinois. A new concrete tipple was constructed at this mine during the early 1920s (*Coal Age* 1925:843).
JA-2003-1-S47	Modern steel shaft tipple and headframe illustrating the self-dumping cage, combination shaking and/or sorting screens, and loading chutes typical of a modern tipple.
JA-2003-1-S48	Two views of the inside of a modern, early twentieth century tipple. The upper illustration depicts the tipple floor. After the coal car exits the cage it enters the tipple floor and is dumped. The checkweighman (BOTTOM) weighs each car prior to dumping of the coal (ITC 1906).
JA-2003-1-S49	View of an automated coal car dumper at the turn-of-the-century (ITC 1906).
JA-2003-1-S50	Detail of shaking screens at the turn-of-the-century (ITC 1906).
JA-2003-1-S51	Arrangement of shaking screens installed in a tipple, sorting coal into three distinct size classes, and loading directly into rail cars (ITC 1906).
JA-2003-1-S52	Headframe typology devised by Floyd Burr in 1917 (Burr 1917).

Panoramic view of the Kathleen Mine in 1939 (James Corbin, personal collection). The air shaft with the concrete tipple is circled in red.

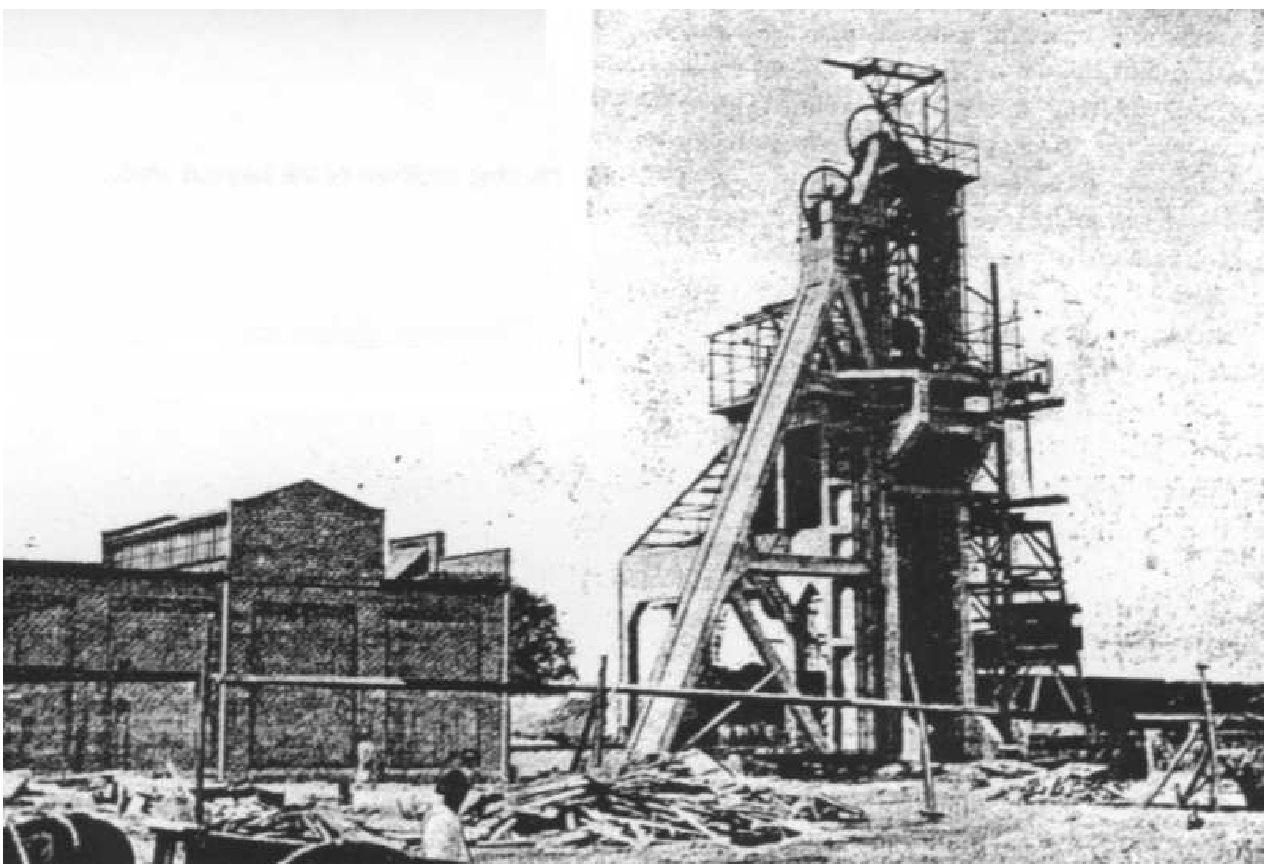
Detail view of the Kathleen airshaft headframe and tipple (James Cobin, personal collection).



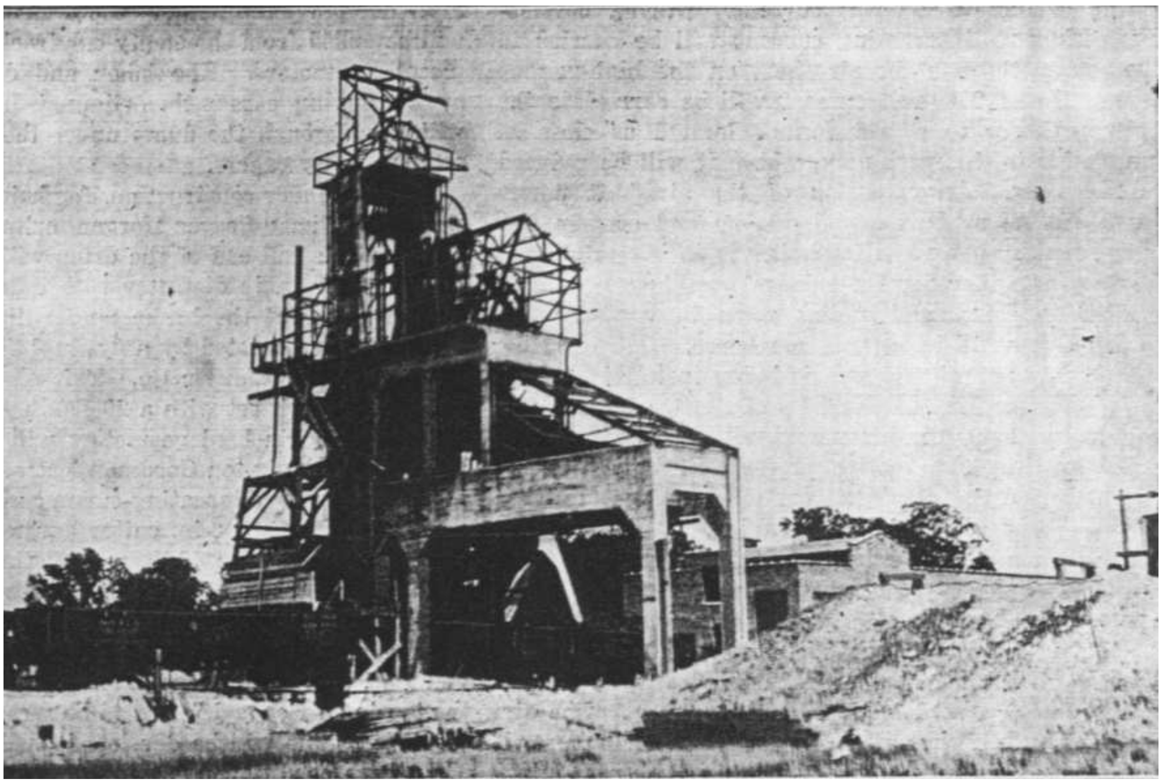
Postcard of the Kathleen Mine at Dowell (Curt Teich and Company, circa 1922)



Temporary sinking headframe and trestles Kathleen, main shaft (*Coal Age* 1918:1186).



Kathleen airshaft tipple with hoist and boiler house on the left (*Coal Age* 1918:1187).



Southwest view of Kathleen concrete tipple (*Coal Age* 1918:1188).

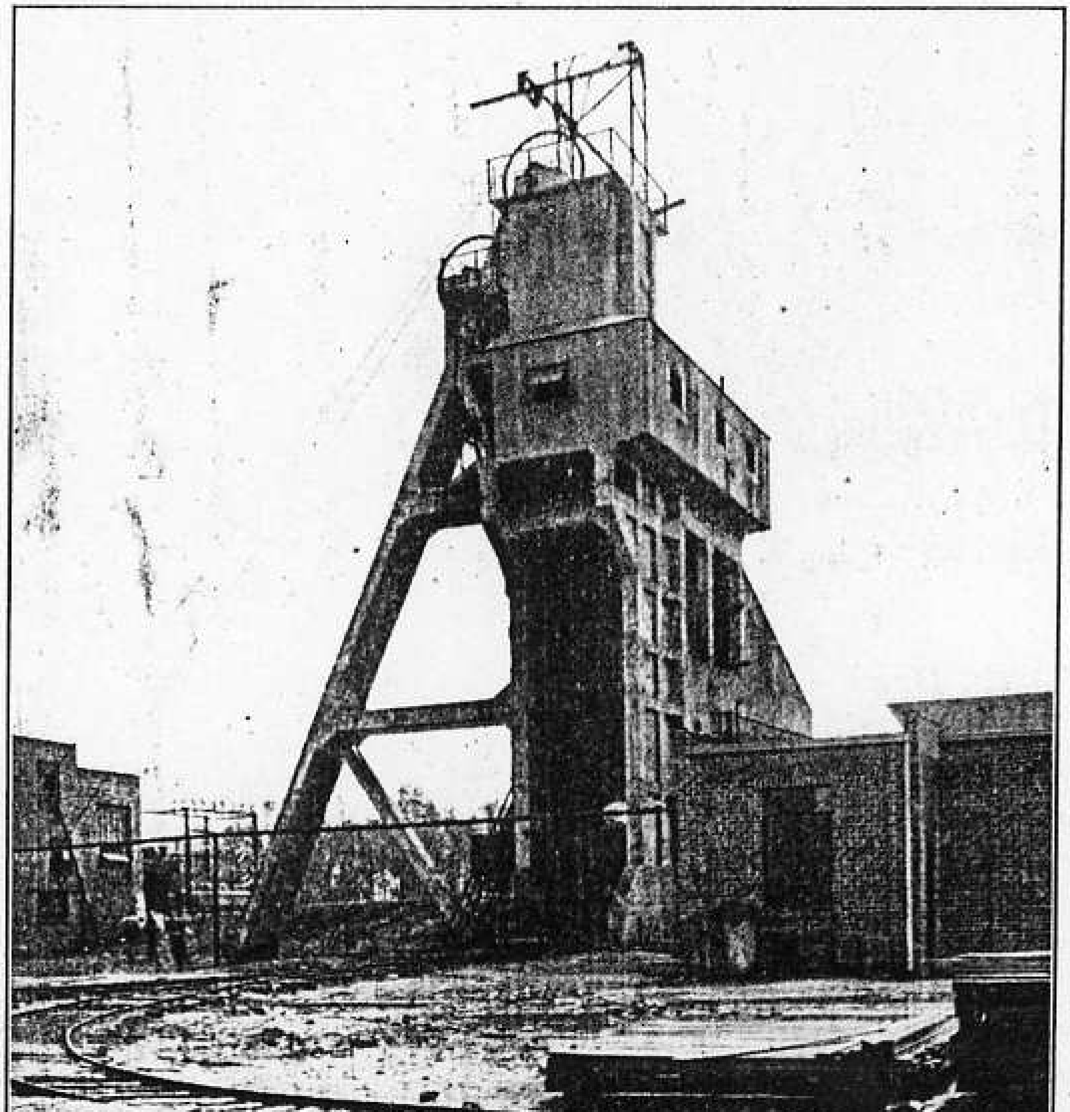


FIG. 3.—CONCRETE TIPPLE AT AIR SHAFT, KATHLEEN MINE.

View of the Kathleen air shaft headframe and tipple complex (Herbert and Young 1920:821).

Uncle Sam is Commandeering Steel

UNCLE SAM TO THE STEEL PRODUCTS CIVILIANS:
"Some of you will have to fall in behind the boys at the camp, so get busy!"

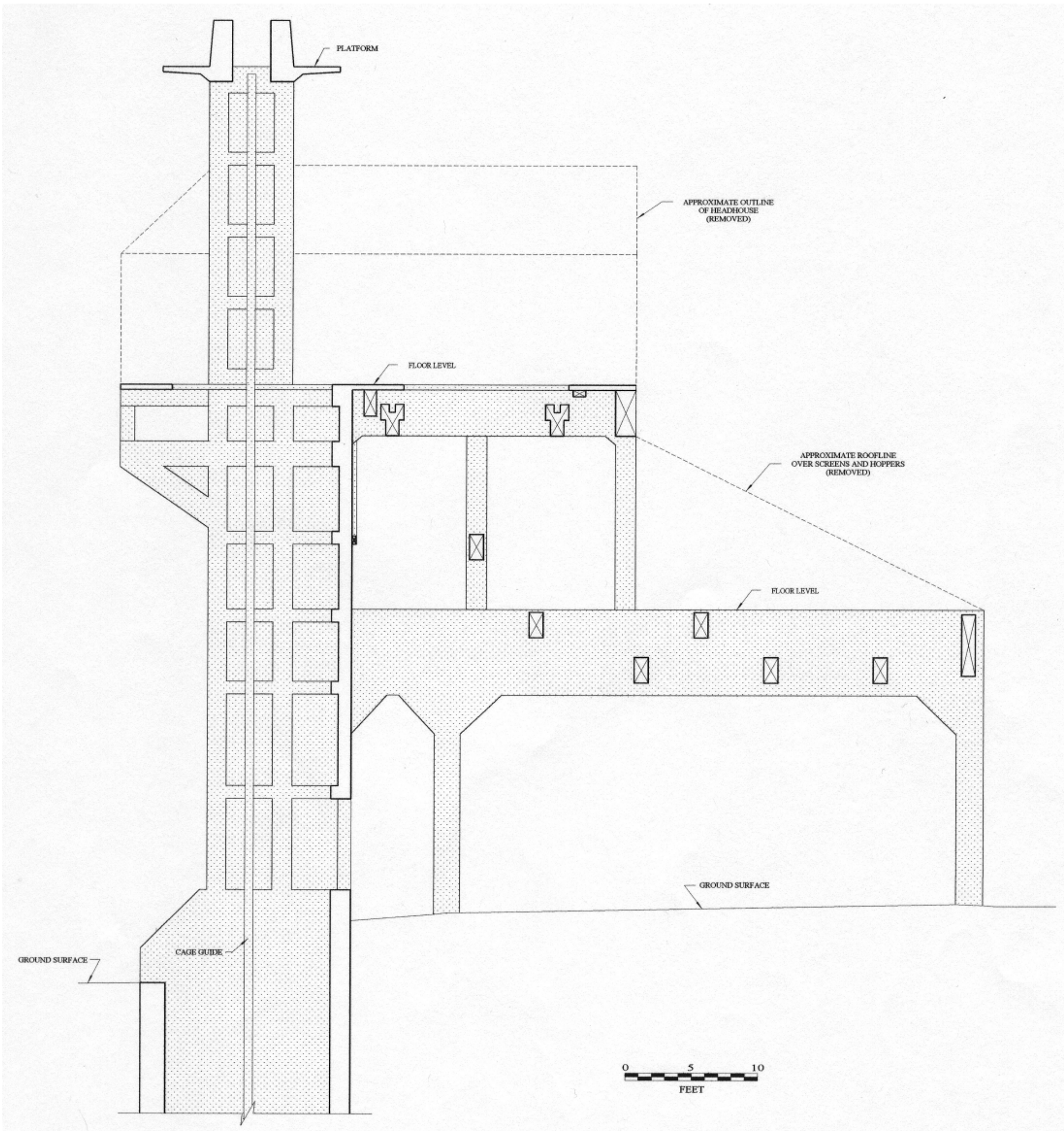
If we don't want to use wood rails and wood ties, we must take good care of the steel rails, steel ties and steel spikes now around the mine. Keep them out of sulphur water and lift them before the roof falls on them.

Advertisement (*Coal Age* 1918: 1122).

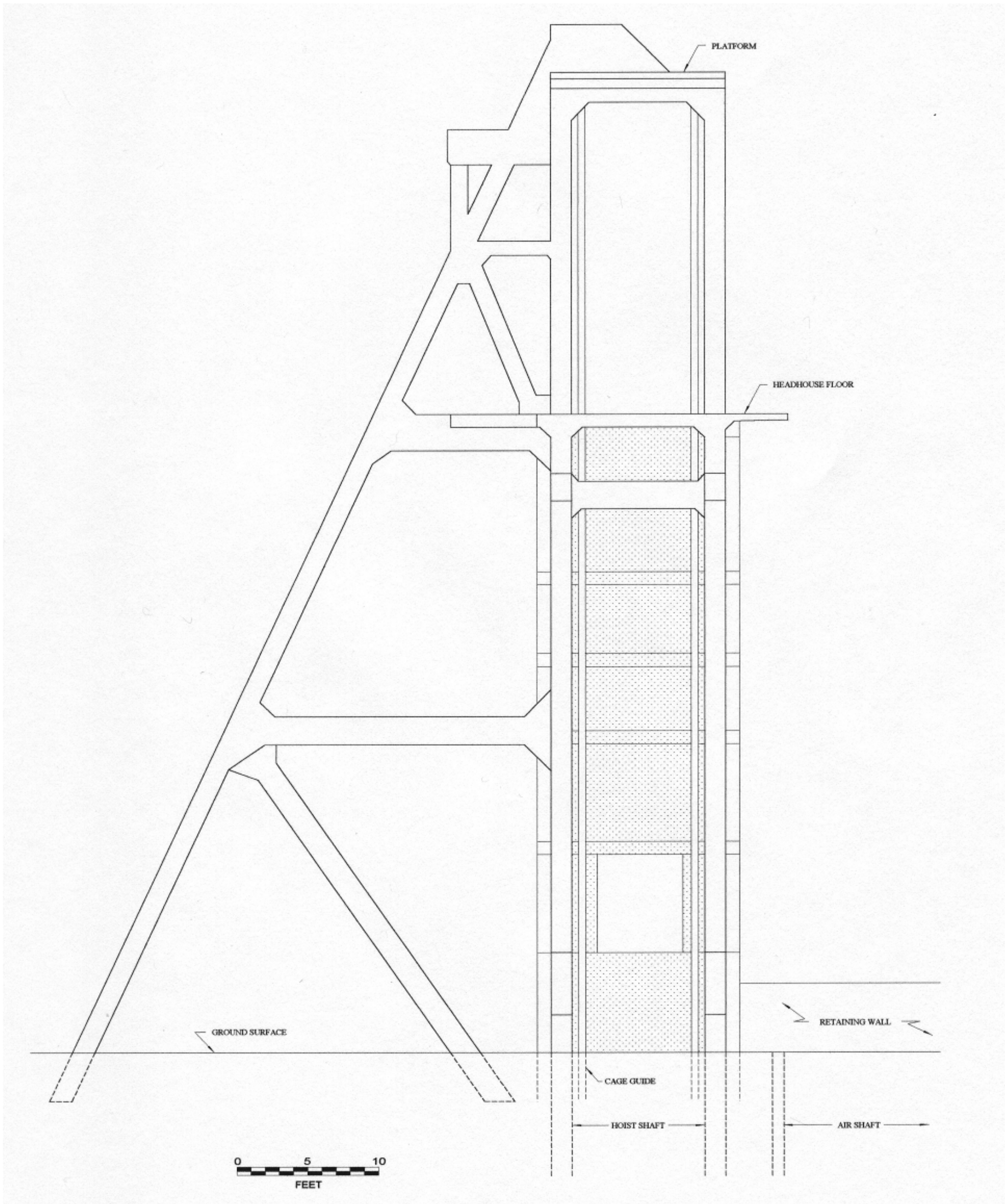
Contemporary views of the Kathleen headframe and tipple complex. (TOP) Tipple, looking southeast. (BOTTOM) View looking south, showing the hoist shaft. The north face of the hoist shaft appears to have always been open-sided (such was the case with the other tipple at the site) (FRR 2002).

Contemporary views of the Kathleen headframe and tipple complex. (TOP) View of the tipple looking west. (BOTTOM) View of the "headhouse." Note the cage track, ladder, and steel railing that are still intact. The Allen and Garcia nameplate appears to the right (FRR 2002).

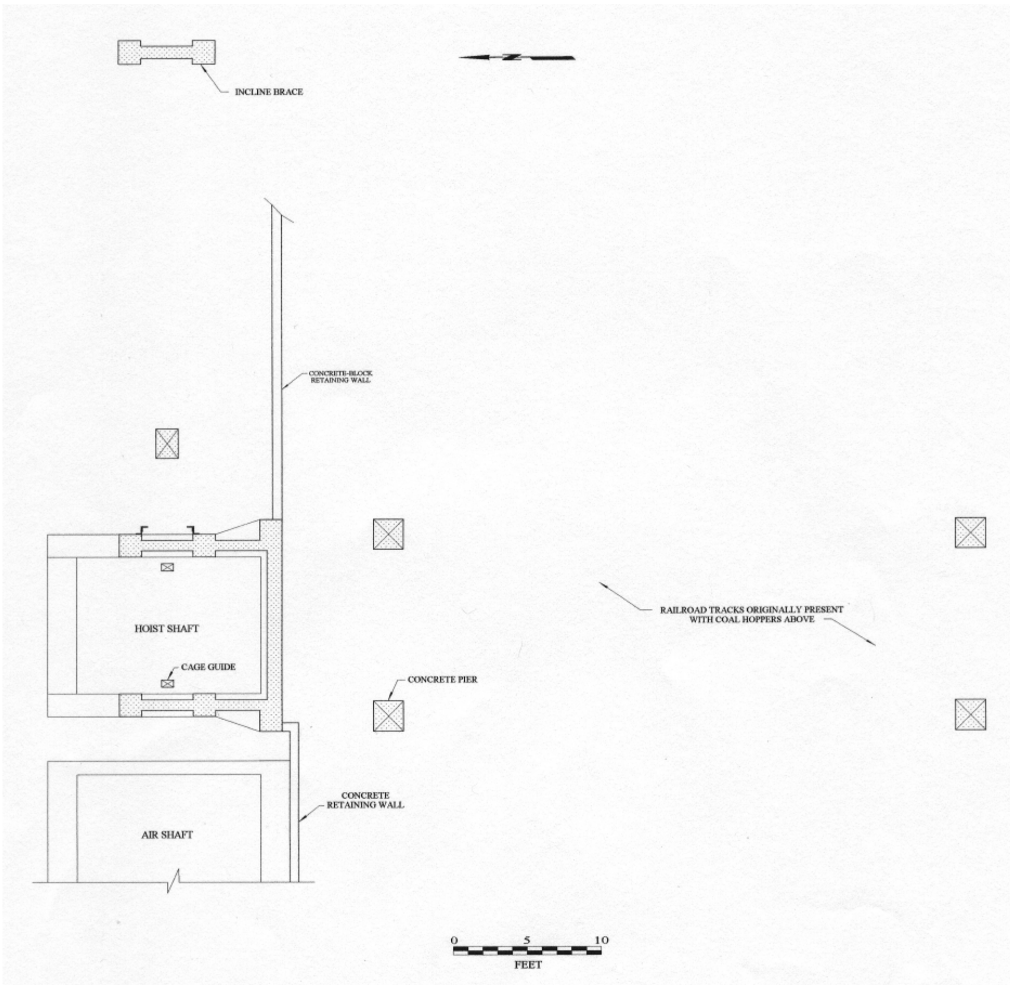
Contemporary views of the Kathleen headframe and tipple complex. Detail of the headframe illustrating the Allen and Garcia nameplate affixed to the tipple (FRR 2002).



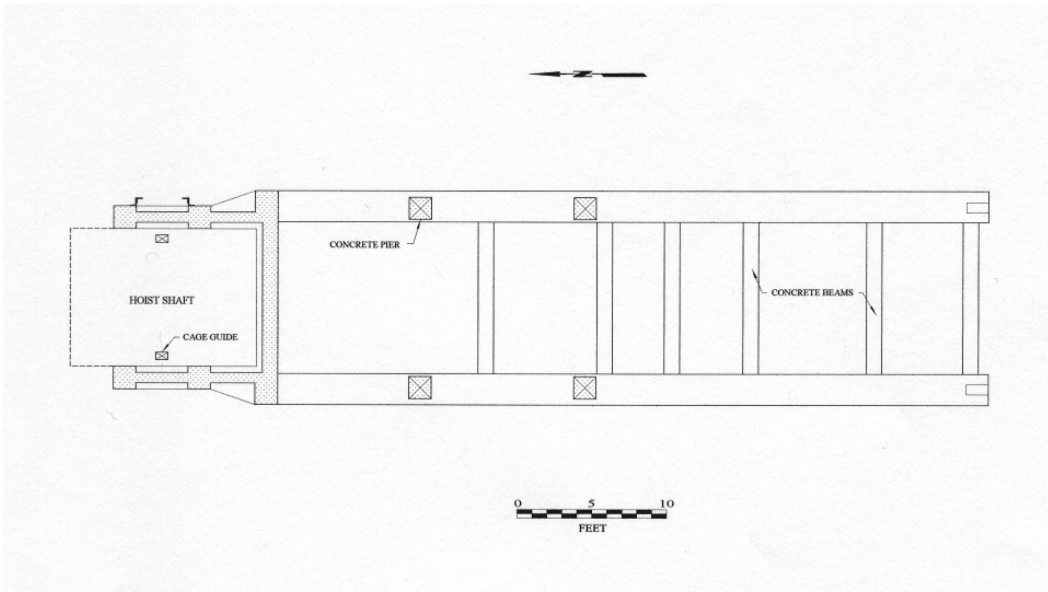
Sectional view of the Kathleen Mine Tipple, looking east through the structure, showing existing conditions (FRR 2002).



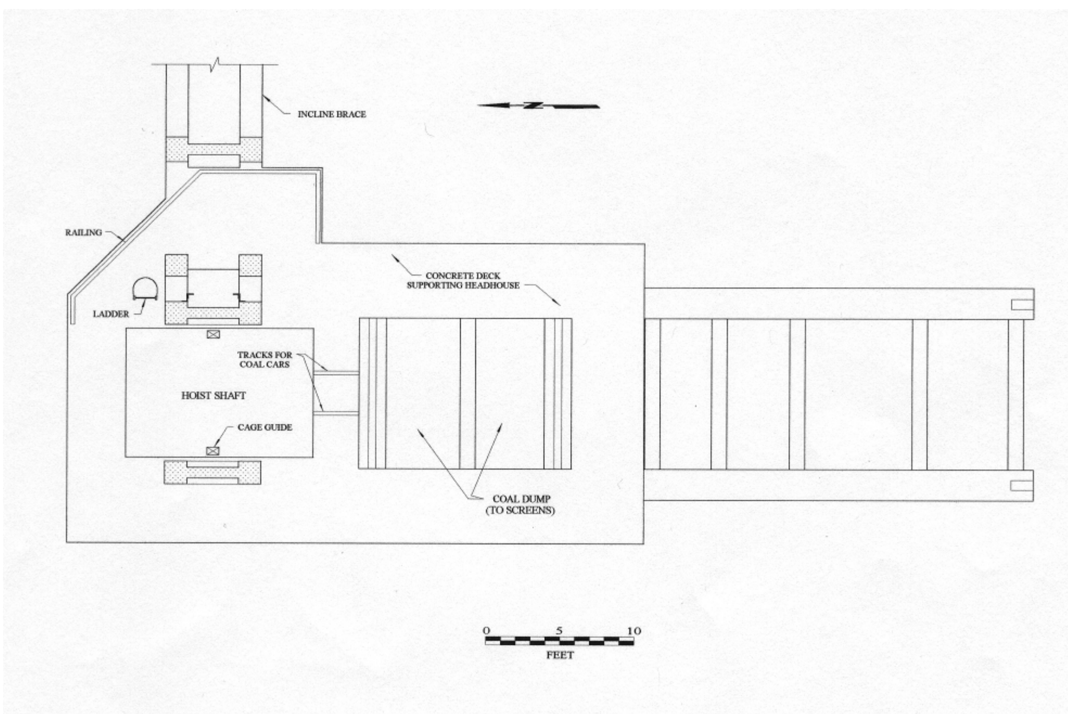
View of the north elevation of the Kathleen Mine Tipple, showing existing conditions (FRR 2002).



Floor plan of the Kathleen Mine Tipple, showing conditions at grade (FRR 2002).



Floor plan of the Kathleen Mine Tipple, showing coal screen/hopper level (FRR 2002).



Floor plan of the Kathleen Mine Tipple, showing headhouse level (FRR 2002).

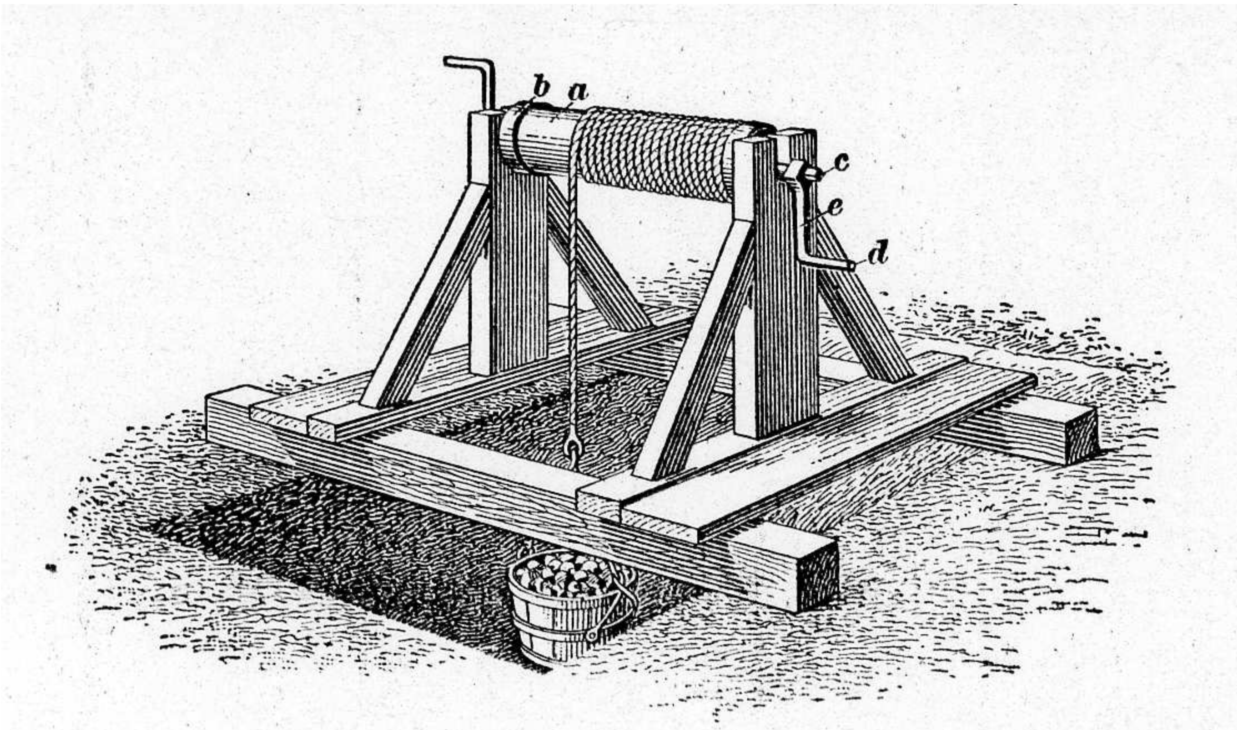
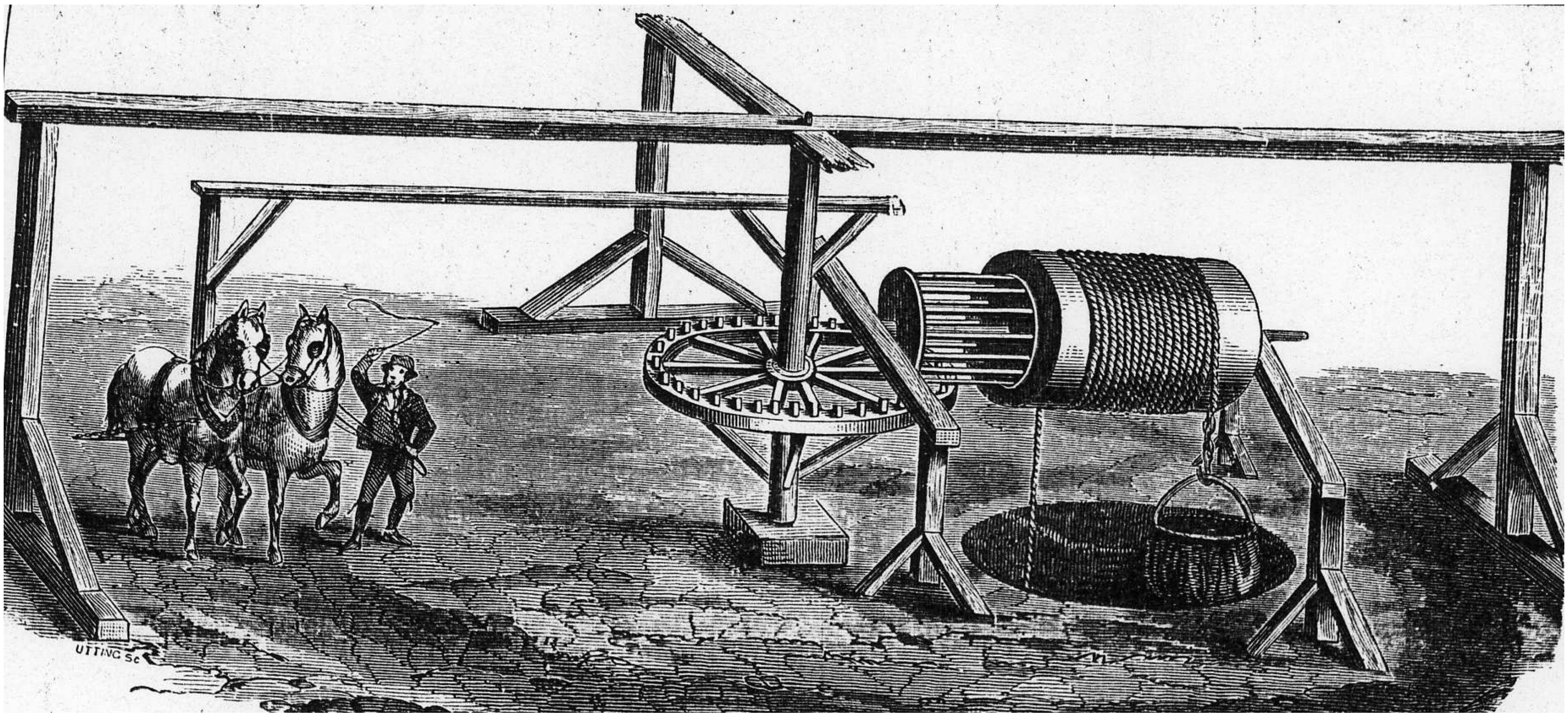
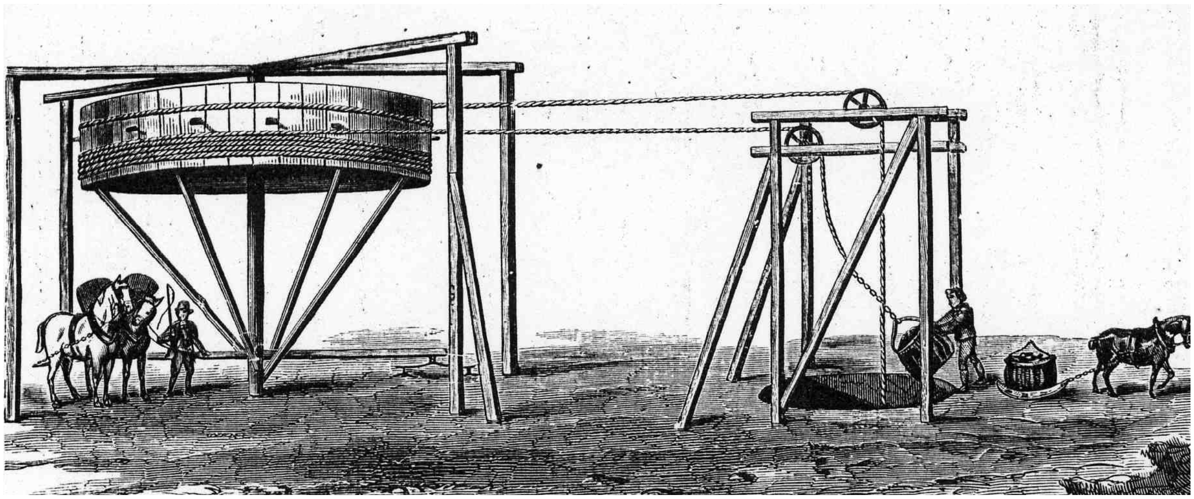


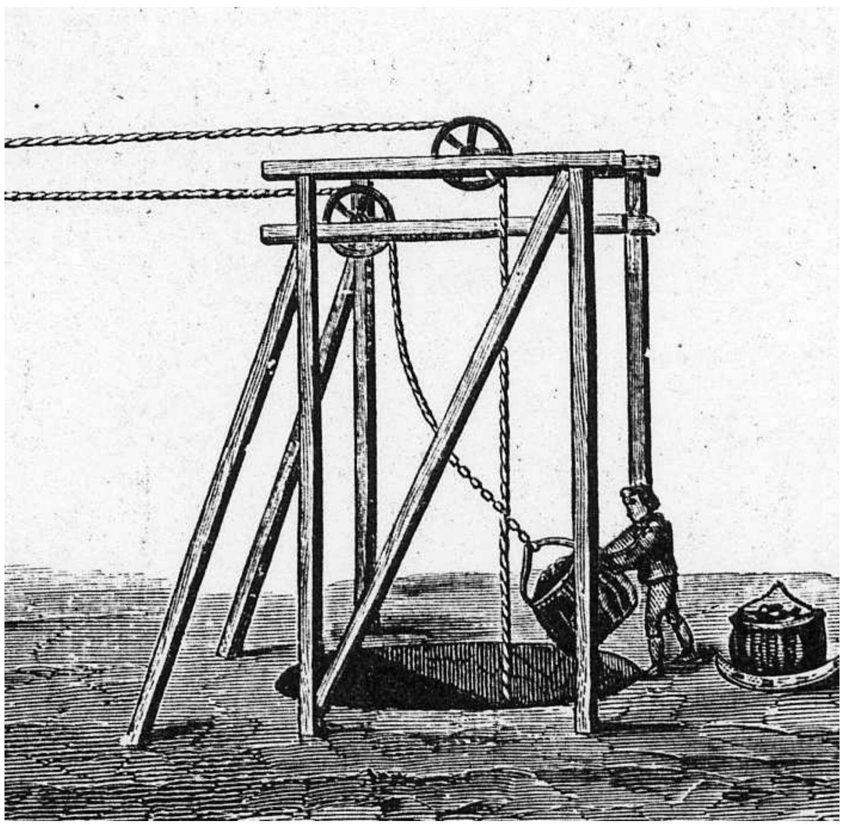
FIG. 1

This simplest method of raising ore from a vertical shaft was with the use of a windlass. Such devices were generally handpowered and required little investment of materials or time to construct (ITC 1906). The windlass is a simple mechanical devise that has been in use for many hundreds of years.

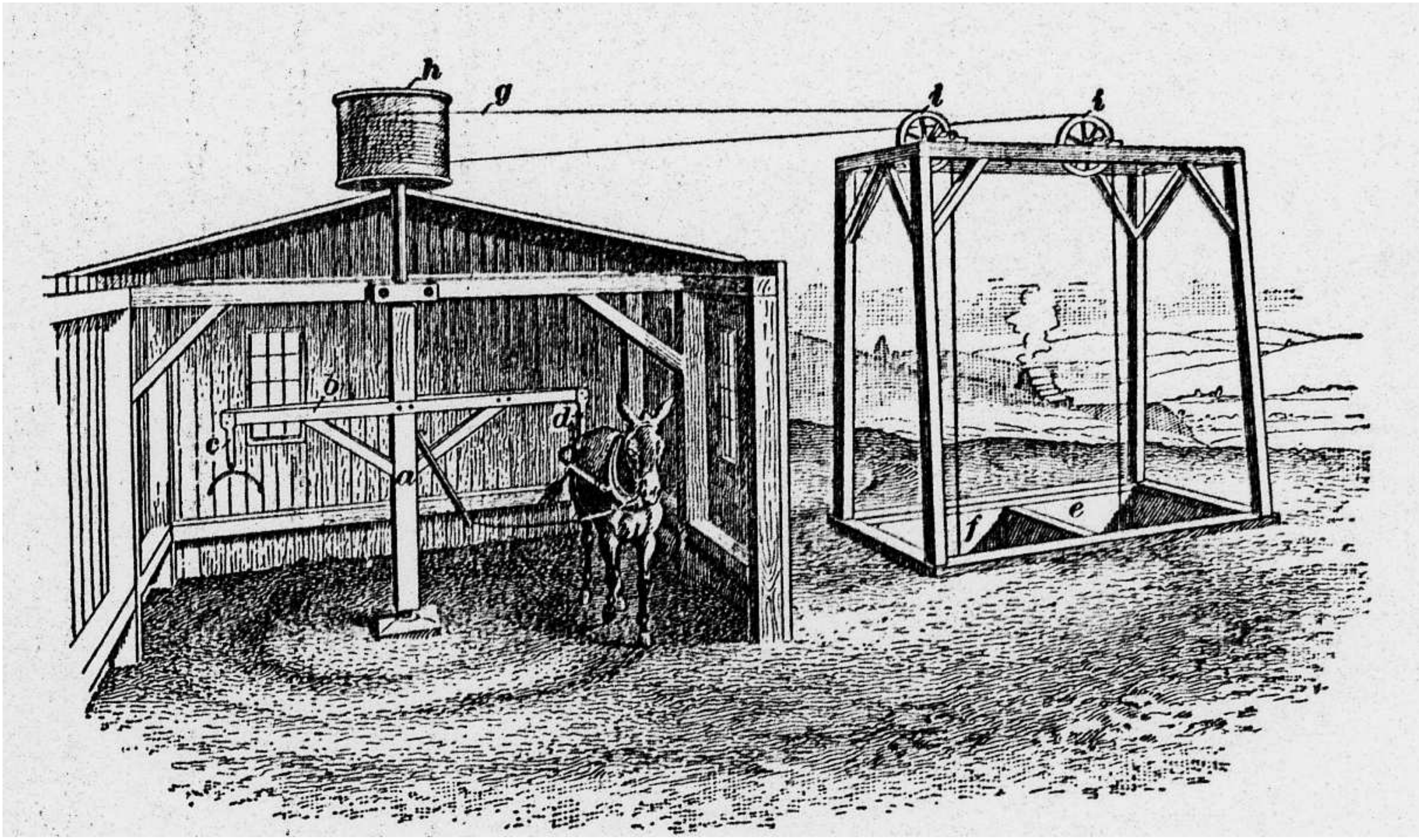


Line drawing of a mechanized windlass in use in England and identified as a "cog and rung for raising coal" (Boyd 1895: Figure 3). This horse-powered system operated a pair of balanced ore buckets attached to rope wound around a vertical drum located directly over the shaft.

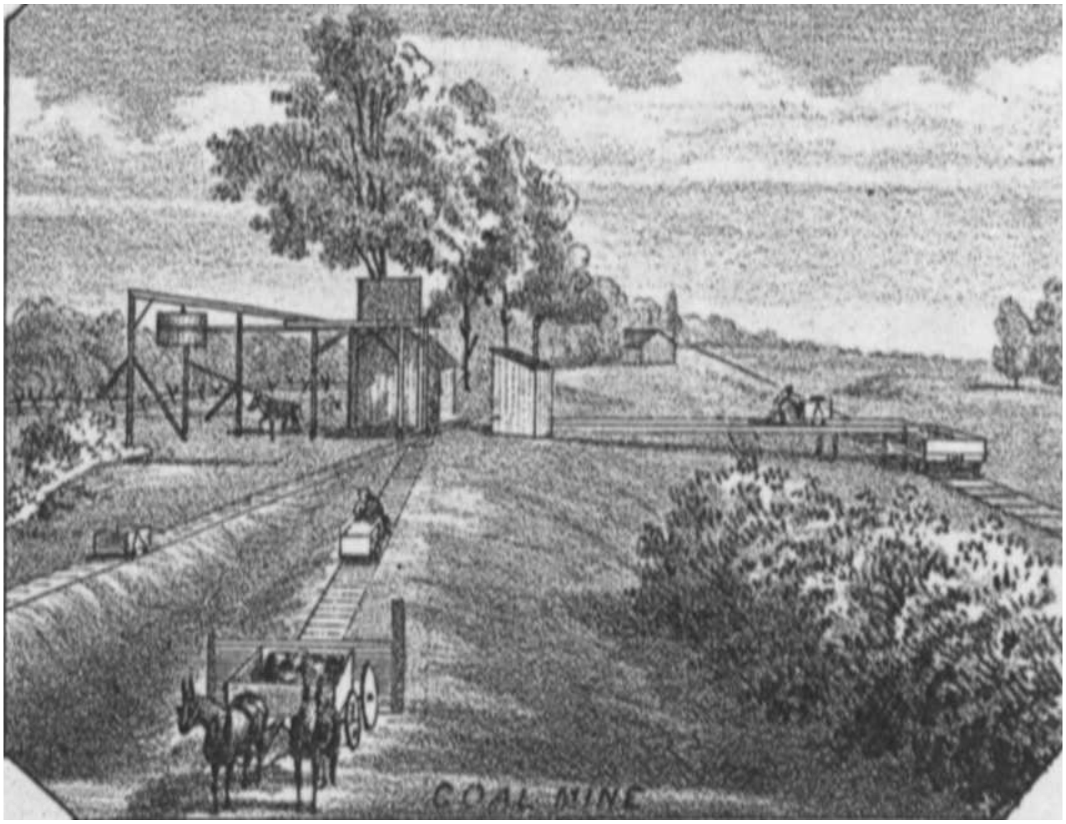




Line drawing of a horse-powered "gin for raising coal" (Boyd 1895: Figure 4). This large horizontal drum, which was offset from the shaft, also operated a balanced pair of ore buckets, except that the rope passed over a set of sheaves supported by a headframe prior to being wound around the drum. The headframe for this mine consists of two sheaves attached to two horizontal beams that are supported by a pair of bents each side of these beams (one bent each side of the shaft). Each bent consist of two upright posts with a set of diagonal struts extending in the direction of the stresses created by the large horizontal drum. These horse-powered gins (with simple timber headframes) were common in early Illinois prior to the adoption of steam power to this task.



Mule-powered gin operating a simple headframe over a vertical shaft (ITC 1906). This simple headframe has two counterbalanced ore buckets. Although the knee braces incorporated into the frame would have given this headframe some added strength, the lack of an inclined strut between the winding drum and the sheaves would have made this a rather unstable frame.



This is the coal mine located on the farm of D. B. Boyd, rural Randolph County, Illinois. This simple mine marketed coal via wagon (note the gravity ore cart on tracks leading to a dump over a wagon in the foreground) and rail car (note the ore cart on the low tramway preparing to dump into the waiting rail car), and thus operated as both a Local and Shipping Mine. The mine, which was operated by a horse gin, had a simple headframe with small attached building. A separate shed-roofed structure was nearby (Brink and Company 1875:78). This is an excellent example of an early, non-mechanized shaft mine typical of Illinois.

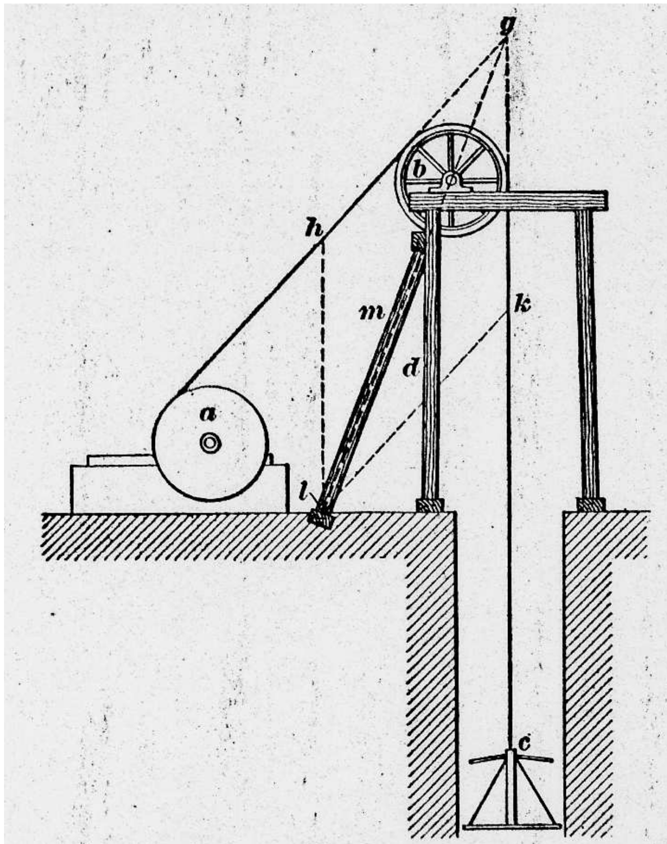


FIG. 29

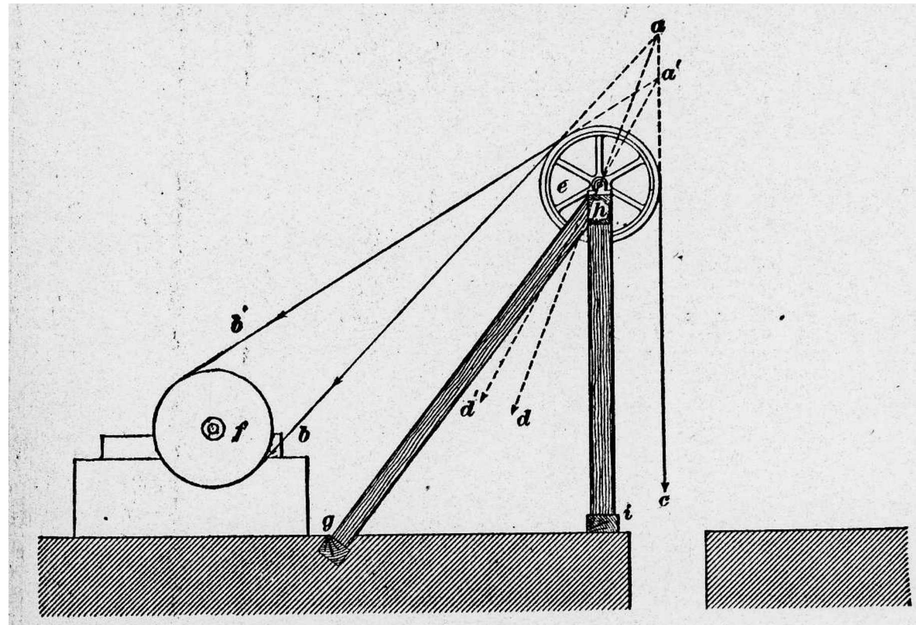
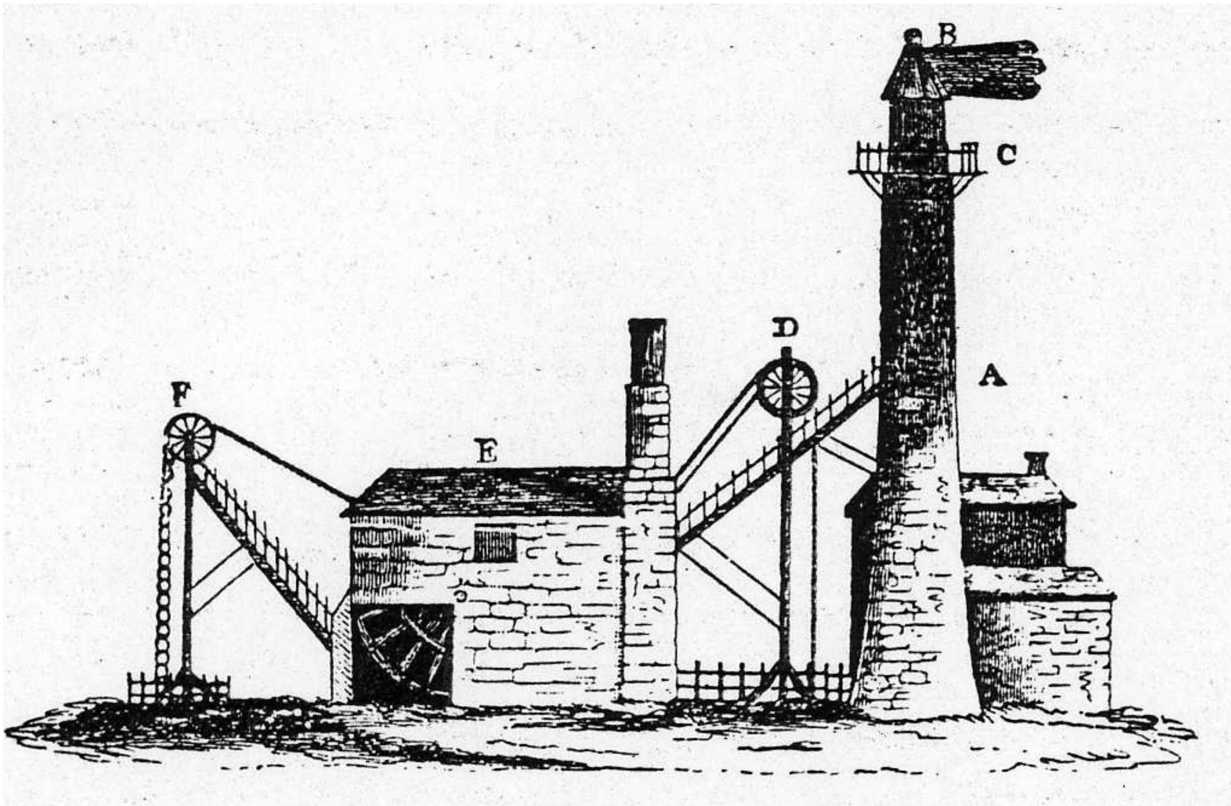
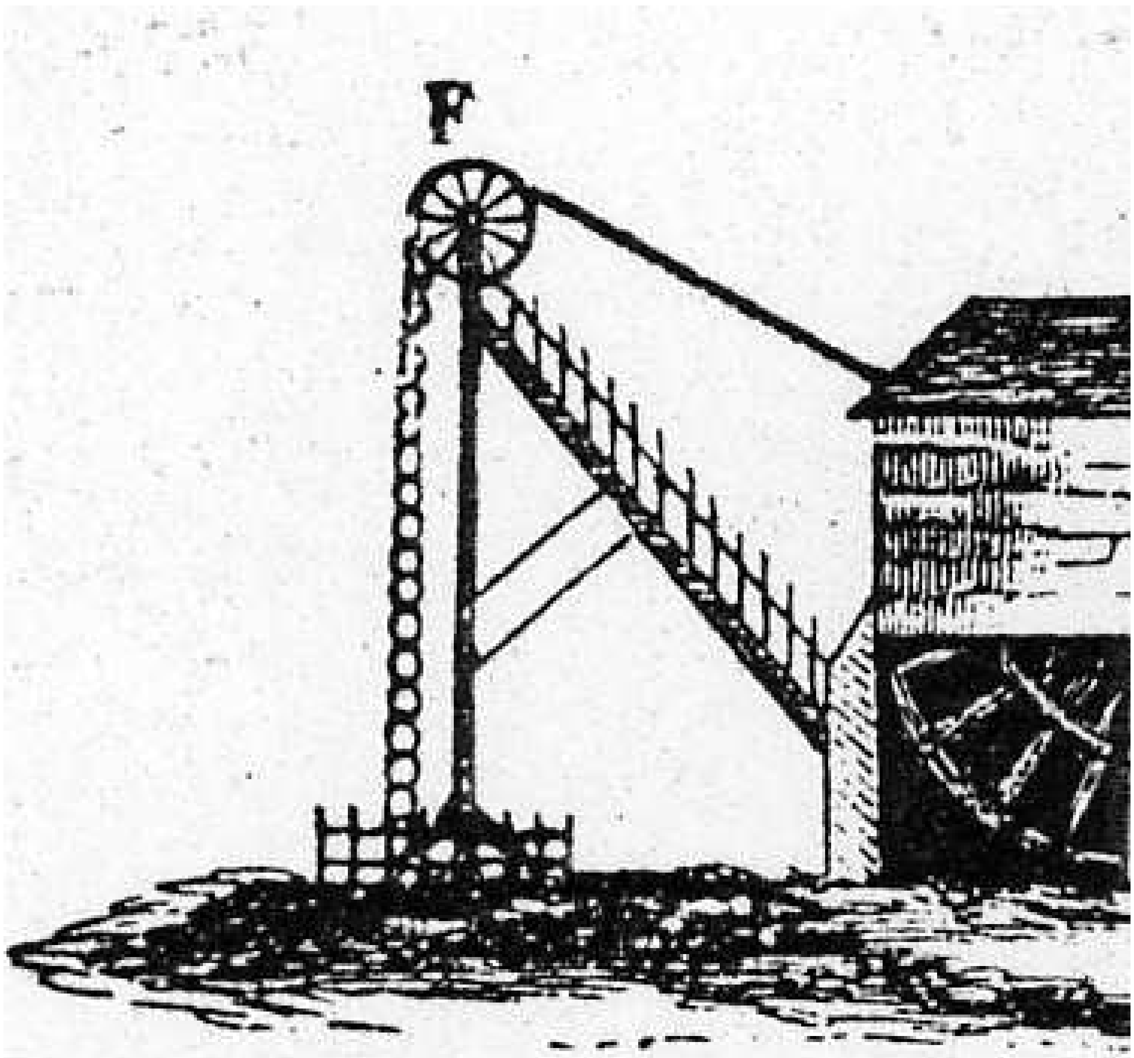


FIG. 30

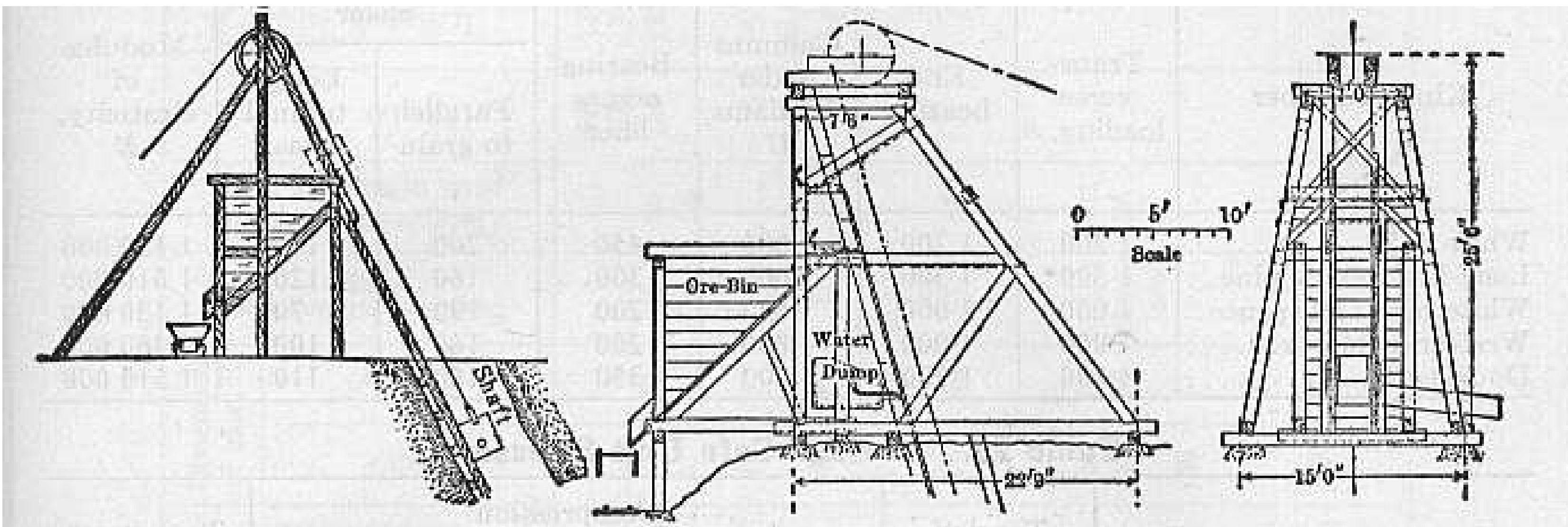
Headframes generally consist of upright vertical posts and an inclined strut. Two common designs of wooden headframes include the two-post (right) and four-post (left) design. The inclined strut is in compression and located between the sheave and the winding drum, and are most efficient when placed parallel "to the resultant determined by the parallelogram of forces" created by the stress of the winding drum and the ore bucket. The vertical posts are generally parallel to the vertical pull of the rope in the shaft (ITC 1906:34).



Sketch of an early English coal mine or "colliery" from the 1840s (Boyd 1895:93, Figure 18). This illustration depicts a relatively sophisticated, industrialized mine of the period. Distinctive features of this mine include the engine house (E), the "upcast shaft" with its tall chimney or "furnace" (A), and the two headframes (D and F). The main shaft headframe (D) is simply identified as "Head Gear," whereas the second shaft headframe (F) is identified as the "counterpoise." Presumably, the engine house (with its large vertical drum) was steam powered (note the chimney on the building). All buildings were constructed of stone, and suggest an element of permanence—unlike many of the nineteenth century mines constructed in Illinois. The two headframes are of similar construction, and consist of a sheave attached to a horizontal beam supported by two upright posts located directly beneath the center of the sheave. A single set of diagonal braces or struts extend off one side of the main upright posts. A set of steps are incorporated into the top surface of the diagonal brace. The shaft appears to have been fenced for safety. This simple headframe design is often referred to as an "A-frame."



Detail of the simple two-post headframe common during the early nineteenth century (Boyd 1895:93).



Simple headframes adapted to slope mines and illustrated by Peele (1918). These A-Type headframes incorporated simple ore bins into their design, and were often associated with simple prospecting ventures (Mentzel 1912).

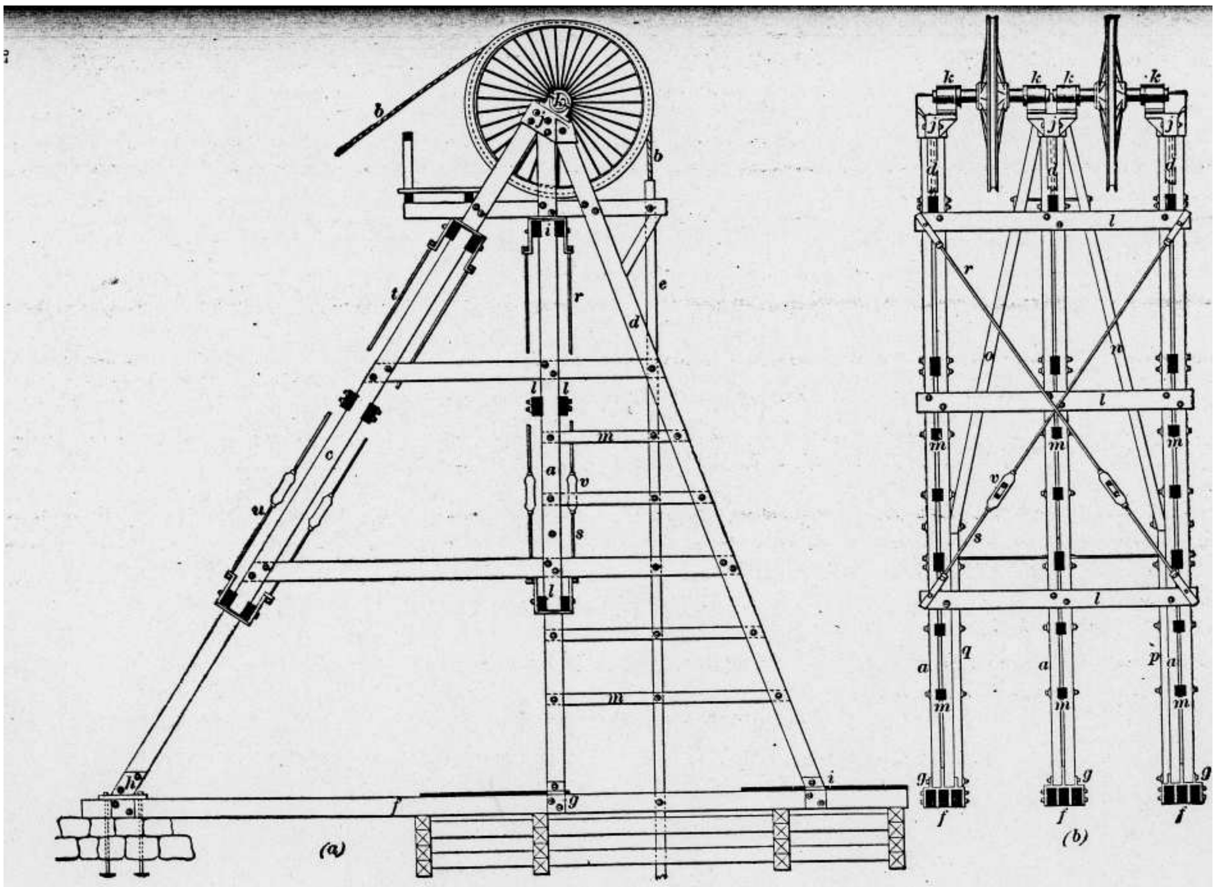
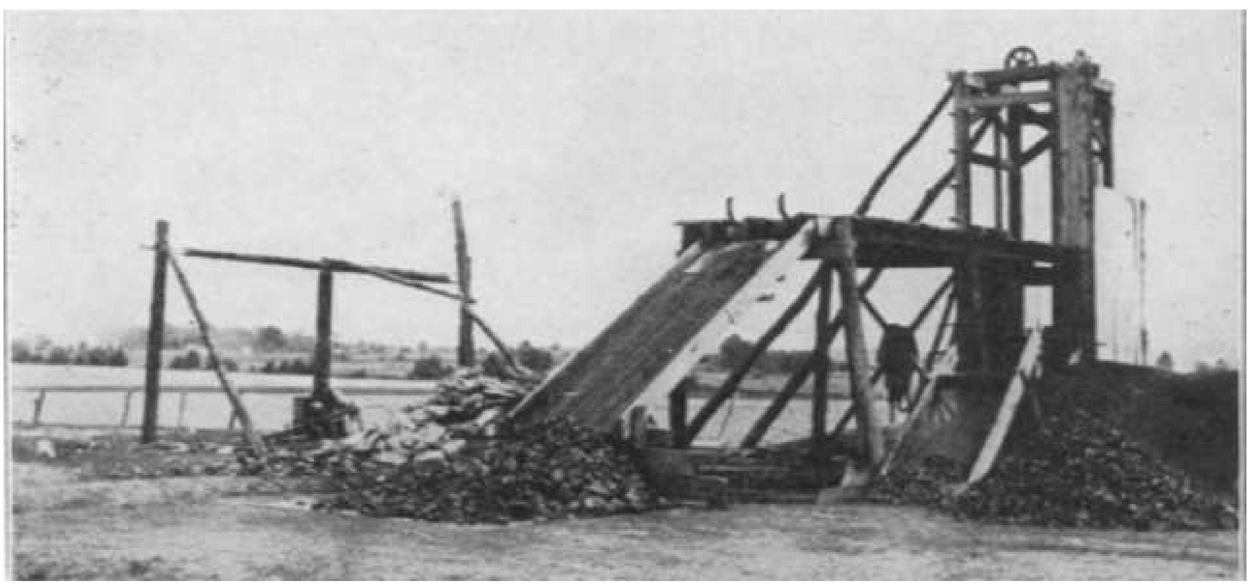
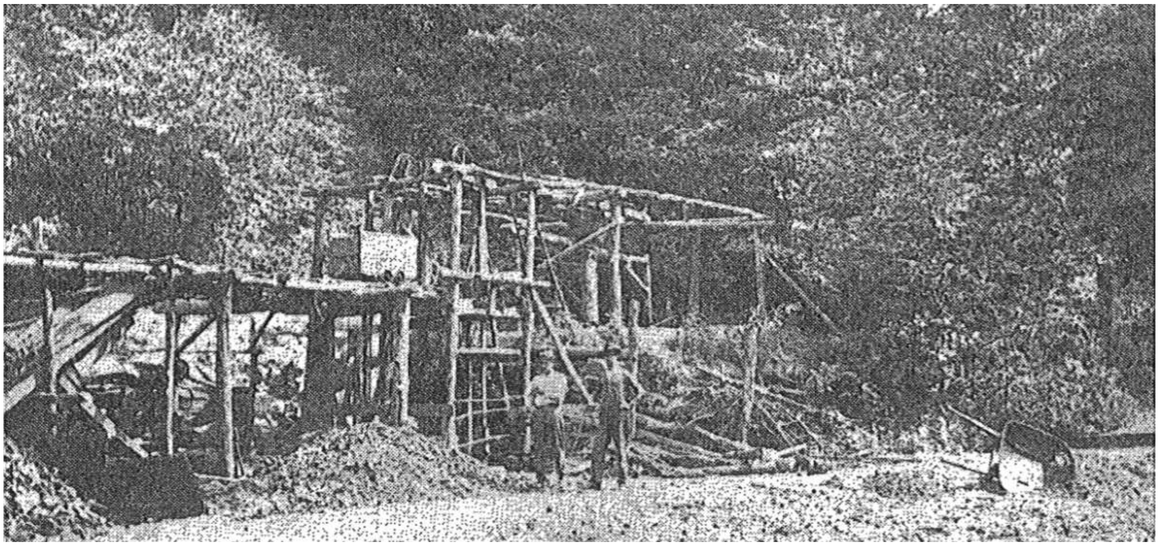


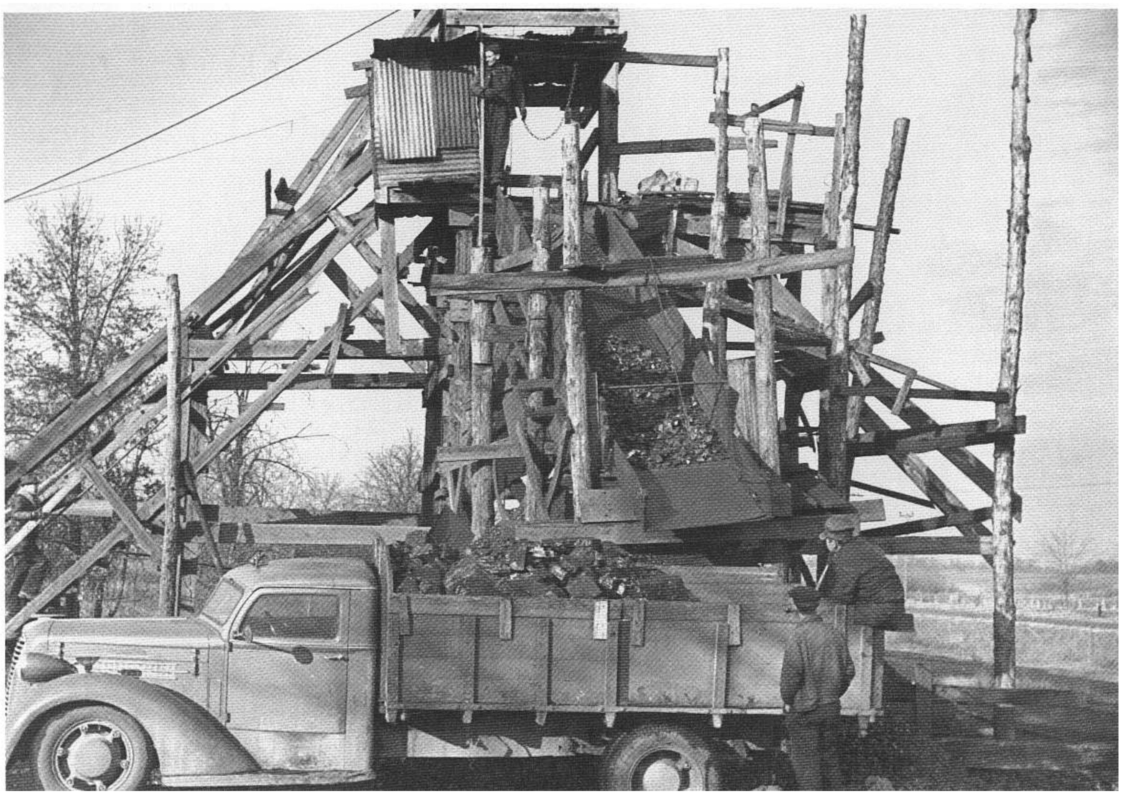
FIG. 32

This is an example of an A-type headframe with two central posts beneath the sheaves. These were in common use for small mines at the turn-of-the-century (ITC 1906:37).

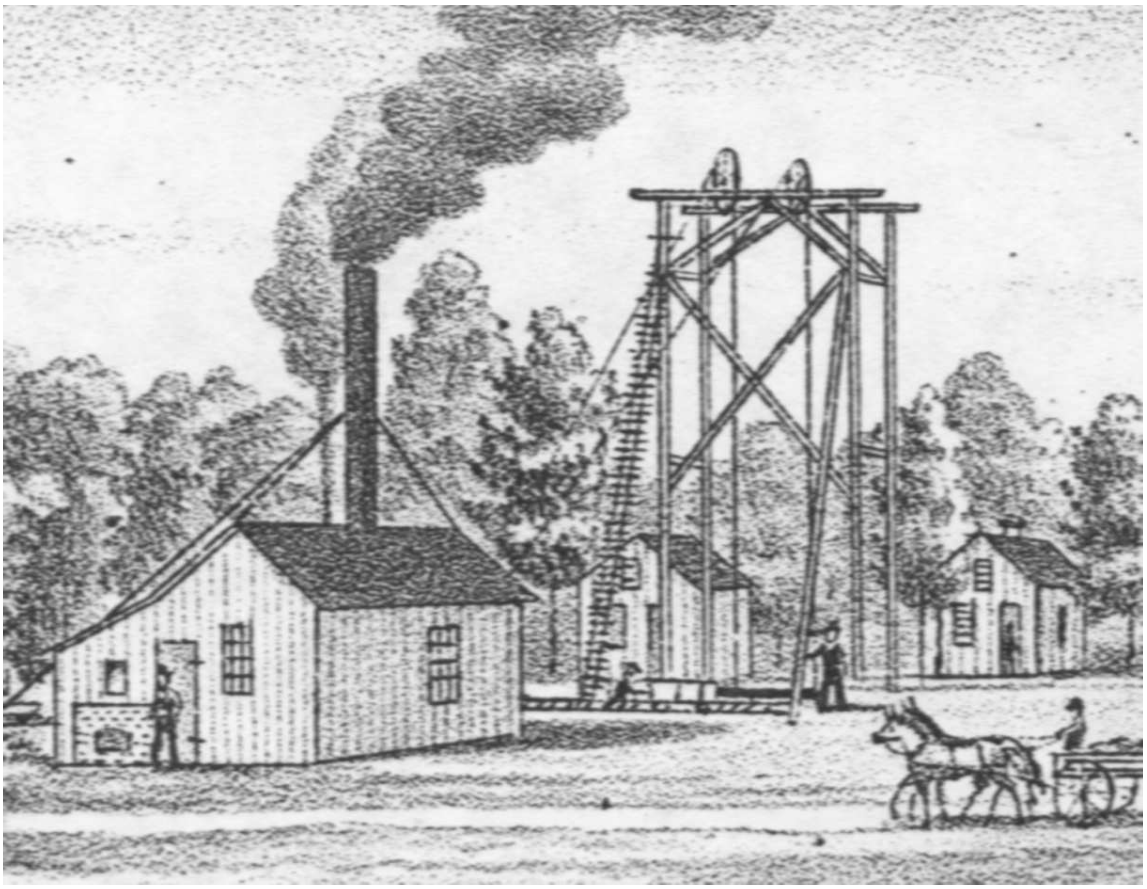


Local mine headframes with horse powered gins. The upper image is from Cartlidge (1933) which illustrates Brophy's mine in Shelby County. Although the gin is well illustrated, the location of the shaft is not clear. The lower image is an unidentified local mine illustrated by Andros (1915). This simple four-post headframe with inclined braces has an extremely simple tipple consisting of a single chute or screen for sorting coal.

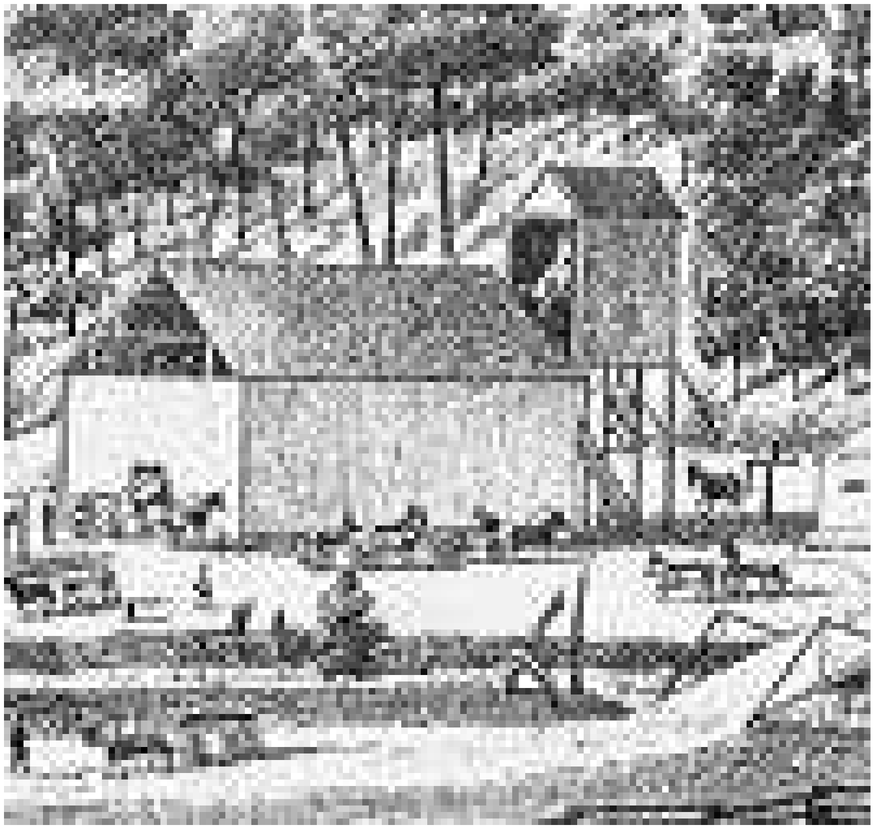




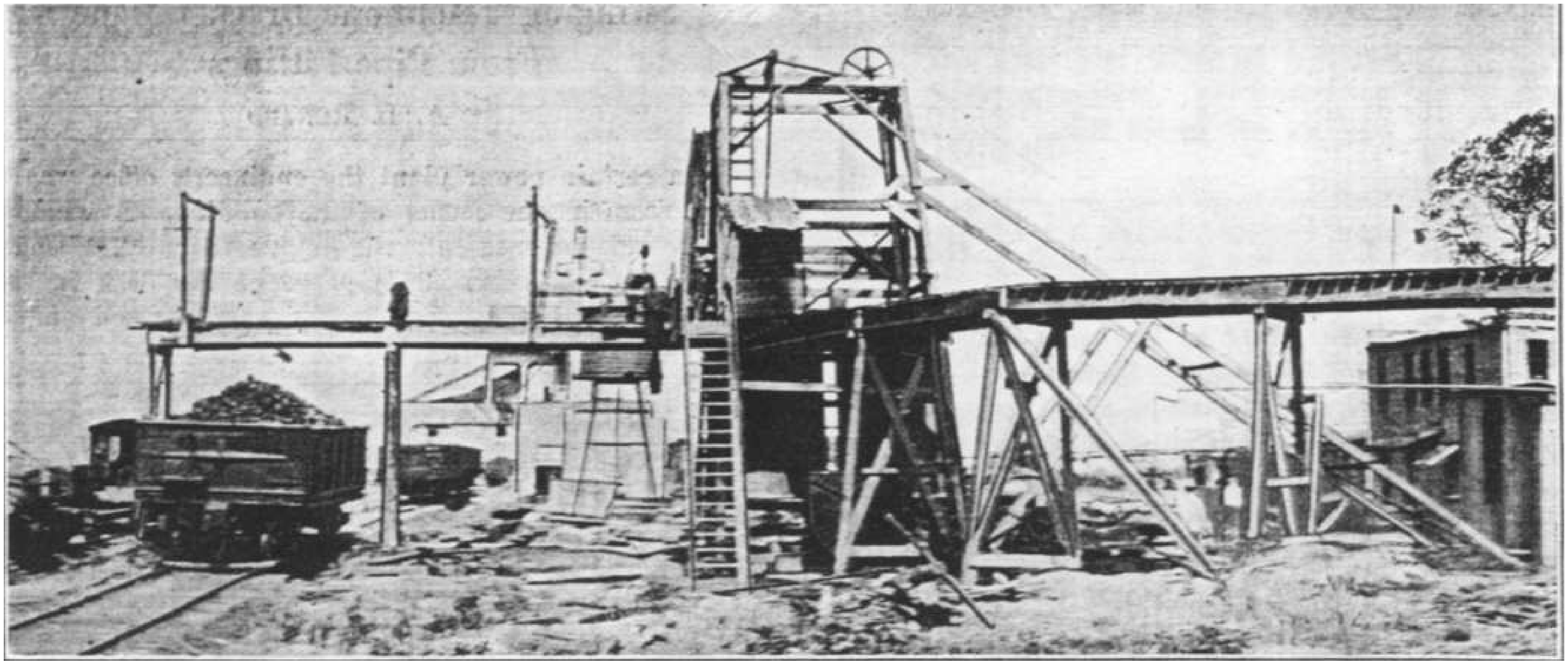
In its simplest form, the timber headframe persisted into the twentieth century with small local mines. The upper image is from Vermilion County (Stratton 2002: Bunsenville Report); the lower image is from (Russell 1990).



Miller Place Randolph County. What may have been a representative 1860s four-post headframe with inclined braces.



An 1875 lithograph showing the residence, tenant houses, and coal mine buildings located on the property of W. B. Squires in Catlin Township, Vermilion County. Another example of a simple four-post headframe with inclined braces. The cage for this early shaft mine was raised and lowered by means of a horse-powered hoist (located the left of the office). Note the wagons hauling away coal from the mine in the lower figure (Brink and Company 1875:105).



Temporary sinking headframe and trestles at the site of the prospective main Kathleen tipple (*Coal Age* 1918:1186). This is a simple four-post headframe with incline braces.

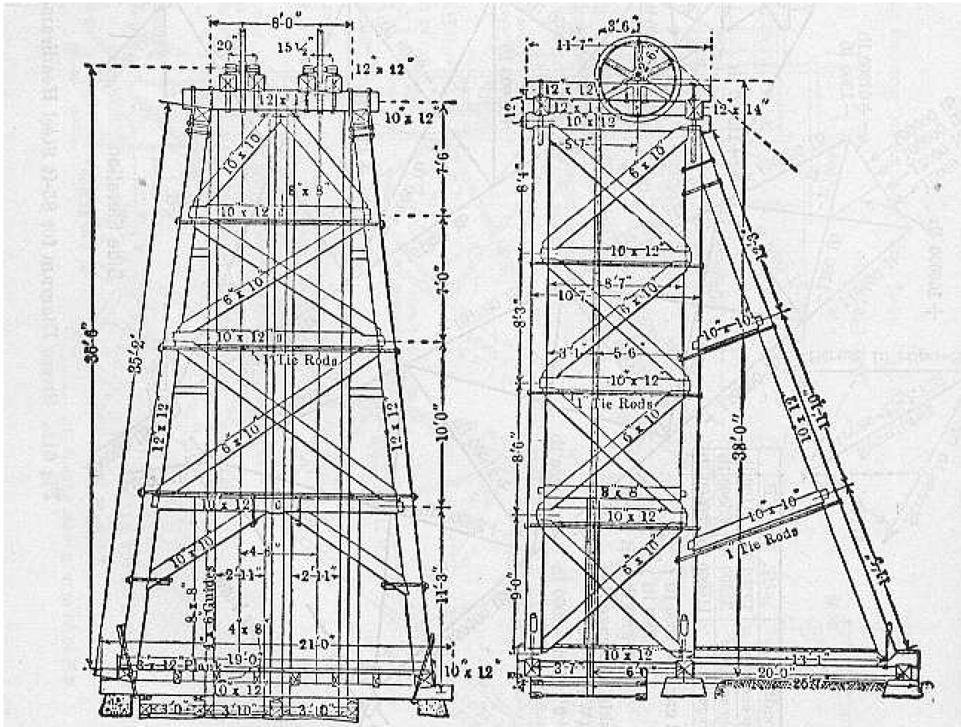
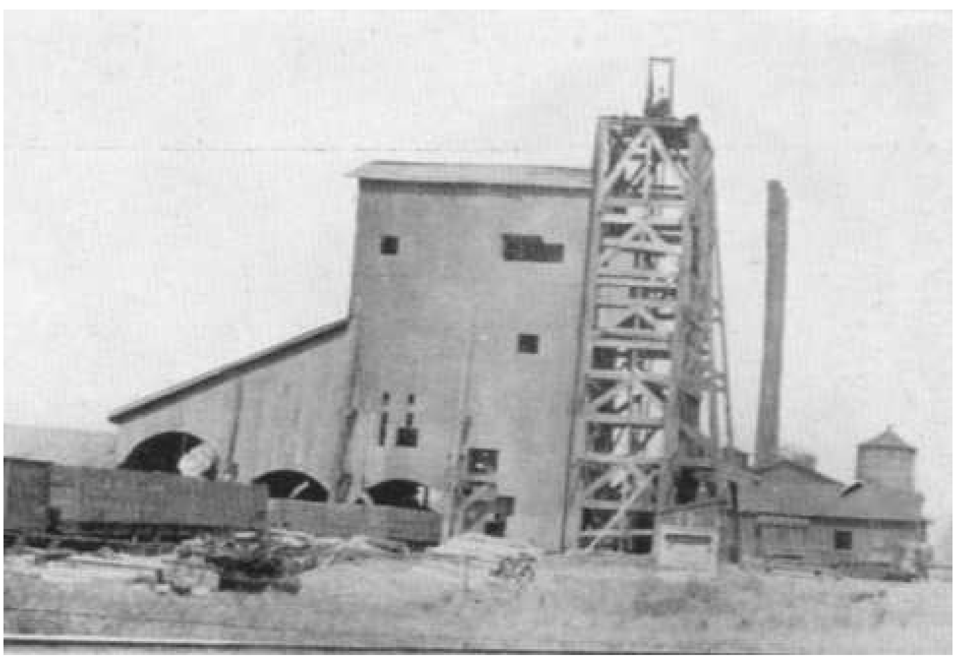
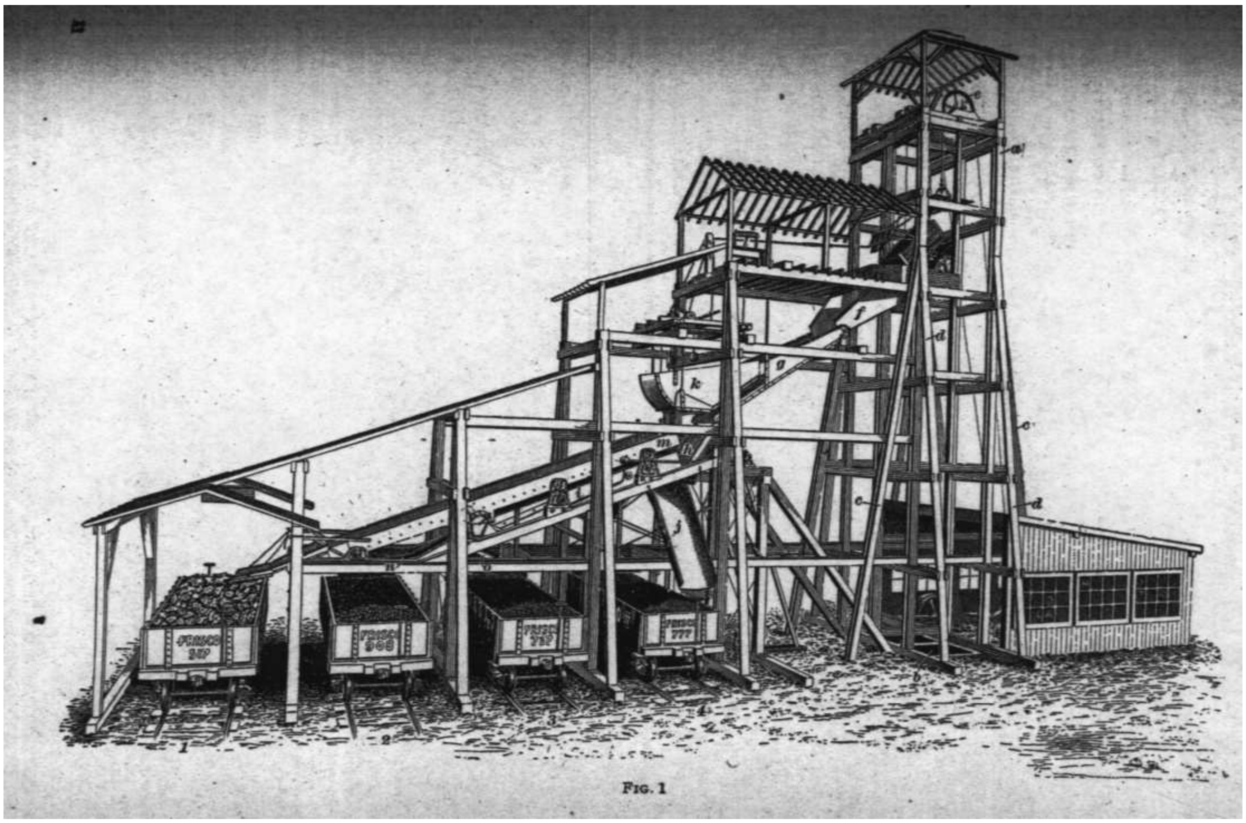


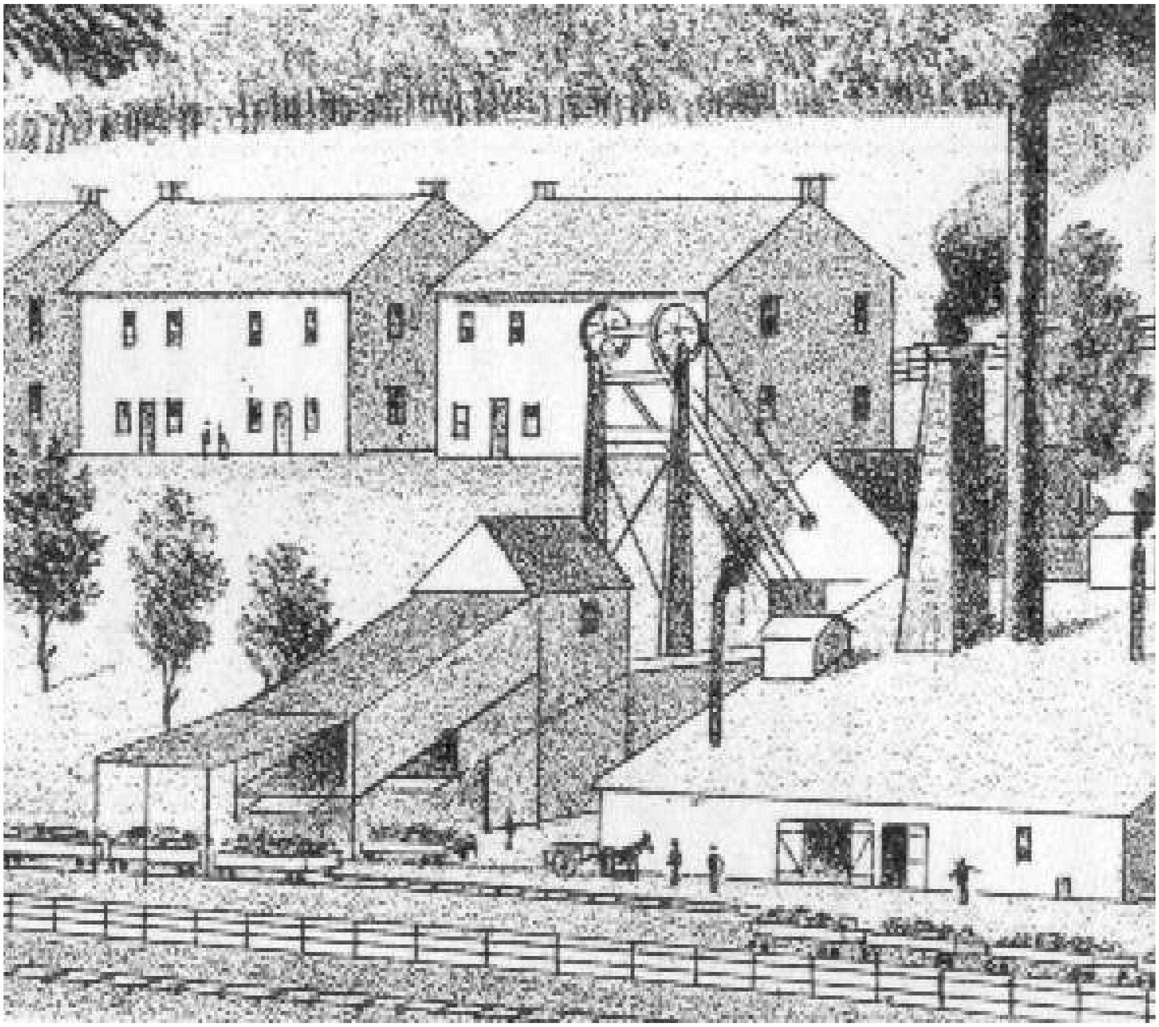
Fig 64. Four-post Frame, with Back Brace



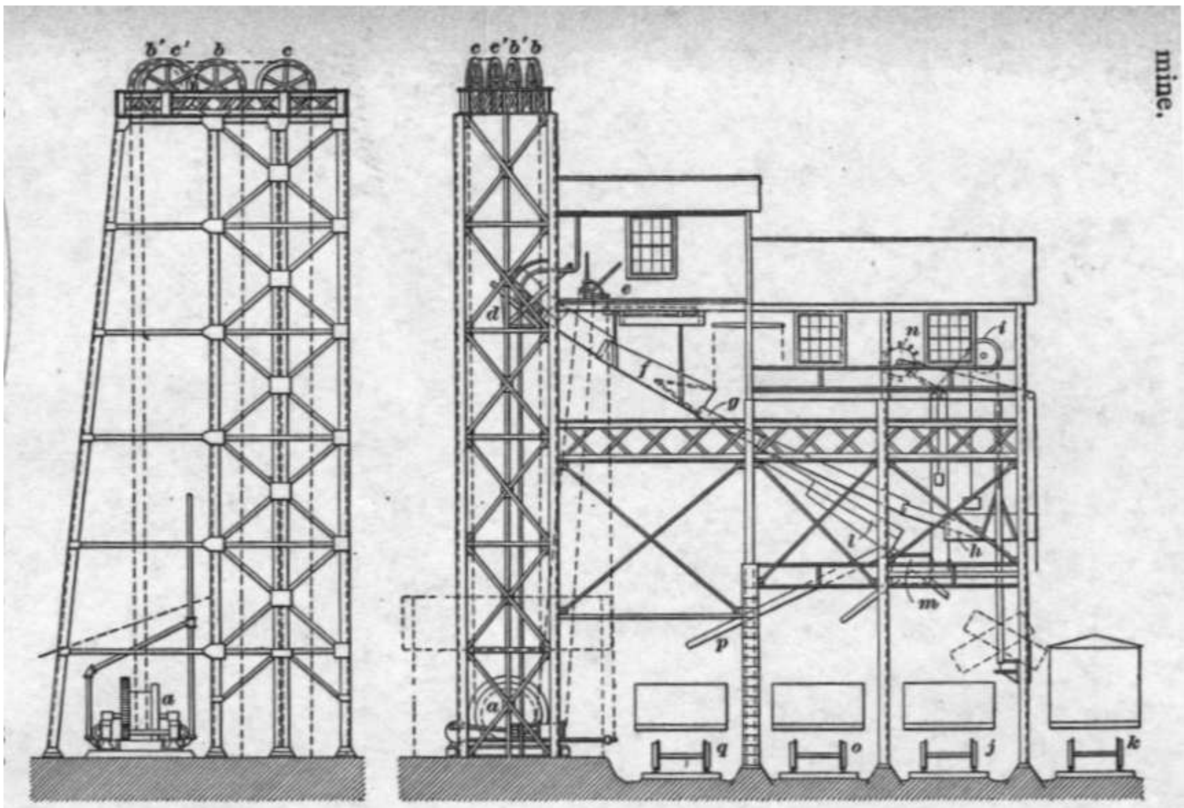
Typical four-post timber headframes with back brace typical of the later nineteenth century mines of Illinois. The upper image is from Peele (1941), whereas the lower image is from Andros (1914). The four posts of the upper example are battered (or canted) for extra stability.



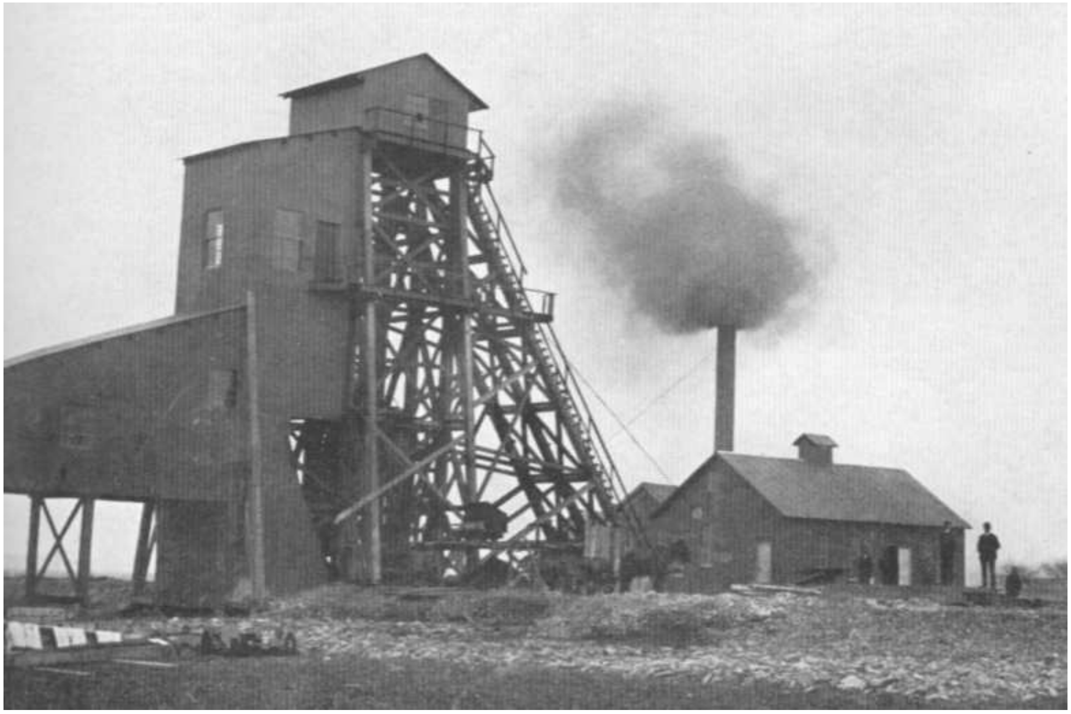
An example of a large four-post timber headframe with secondary canted posts (and lacking an inclined brace). A large frame tipple with screens and loading chutes is attached (ITC 1906).



Closeup view of Reinecke's Mine No. 1 (Brink, McDonough and Company 1881: opposite 224). This was a large, industrialized shipping mine located in St. Clair County. This is an excellent example of a large two-post headframe with inclined braces. Note the distinctive form of the tipple, with its two upright tapered posts. The shape of this headframe suggests that it may have been of cast iron construction. If this is indeed a cast iron headframe, it would represent one of the earliest documented non-timber headframes in Illinois. As a material, wood was not well adapted to headframe construction—or at least headframes intended for long continued use. Exposed to the weather, wood deteriorated rapidly and did not hold up to the stresses present in the hoisting operations. Although many headframes were enclosed to protect them from the weather, they also were prone to fire and threatened the safety of the miners below. A middle-nineteenth century alternative was cast iron, which was used sparingly for headframe construction in Illinois. During the 1860s-90s, cast iron headframe construction was often conducted by bridge builders adept with this material. One of the few examples of a cast iron headframe is this suspected example that was in use in the Belleville area at the Reinecke Mine in the early 1880s.



By the late nineteenth century, headframe technology was advancing to meet the needs of the deeper, more industrialized mining operations. The simple four-post steel headframe with inclined brace (incorporating a steel tipple into it structure) was one of the more common forms of headframe by the early years of the twentieth century. Slightly larger six-post headframes consist of a similar design with six upright posts arranged around an enlarged rectangular shaft. Others have posts that are canted and/or slope inward towards the top (ITC 1906).



This was the first tipple constructed by Warren Roberts during the 1890s (Mine No. 1, Egyptian Coal Company, Harrisburg, Illinois). Roberts (and his engineering firm of Roberts and Schaeffer of Chicago) went on to design a variety of steel headframes and tipples during the early twentieth century years.

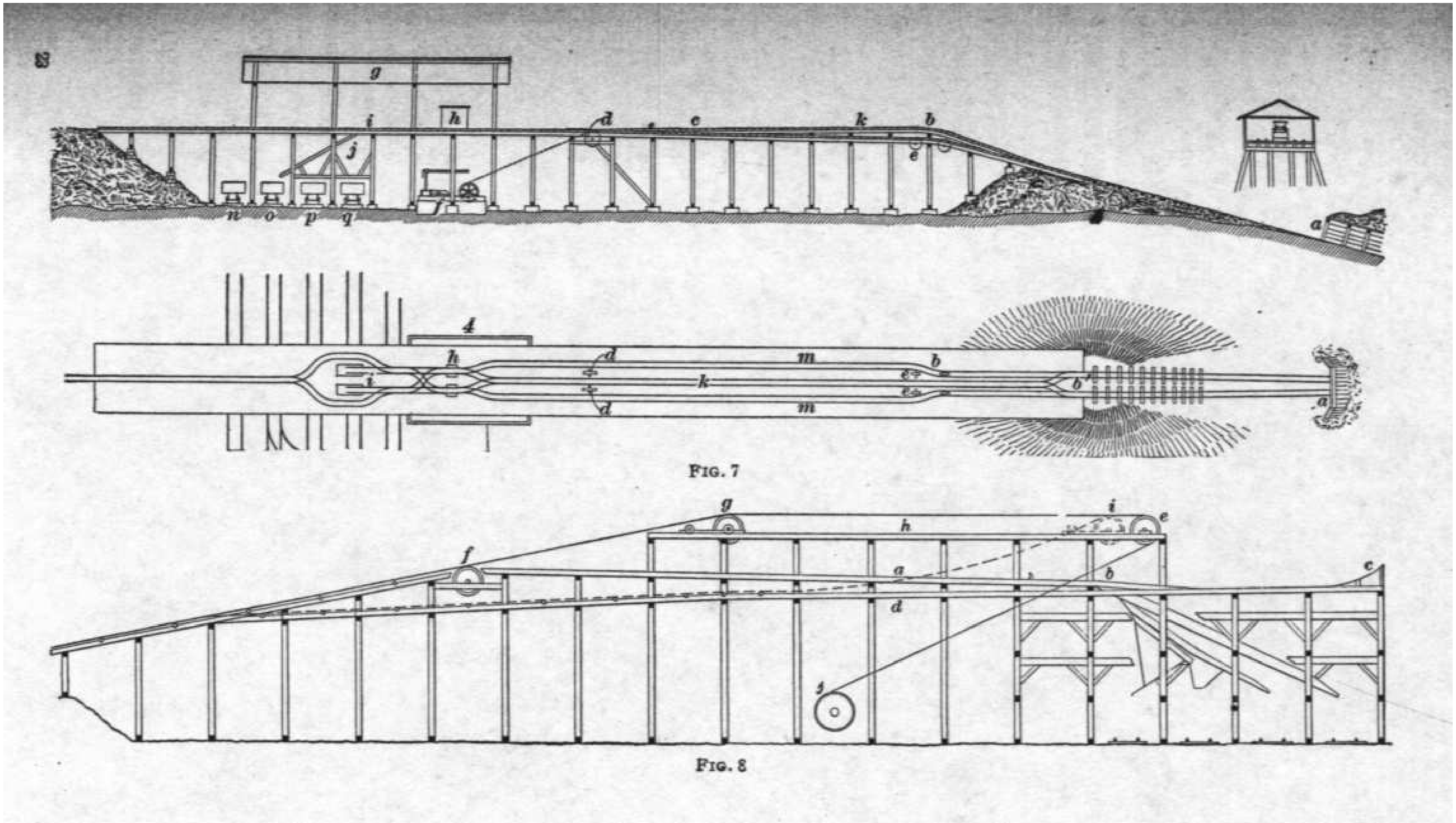
Steel Tipple erected for the Centralia Coal Company by the Morrow Manufacturing Company.

By the late nineteenth century, headframe technology was advancing to meet the needs of the deeper, more industrialized mining operations. Cartlidge (1933) illustrates several headframes—contrasting the older wood frames and the more modern steel frames.

A typical drift mine located along the Illinois River illustrating the character of a simple tipple associated with a local drift mine (ISGS)

A more substantial headframe associated with a larger slope mine (the Crescent Mine) (ISGS)

Slope and/or drift mines did not require the same headframe design. These are two examples of early twentieth century headframes at Illinois drift mines.



Detail of a headframe and tipple associated with a slope mine (ITC 1906).

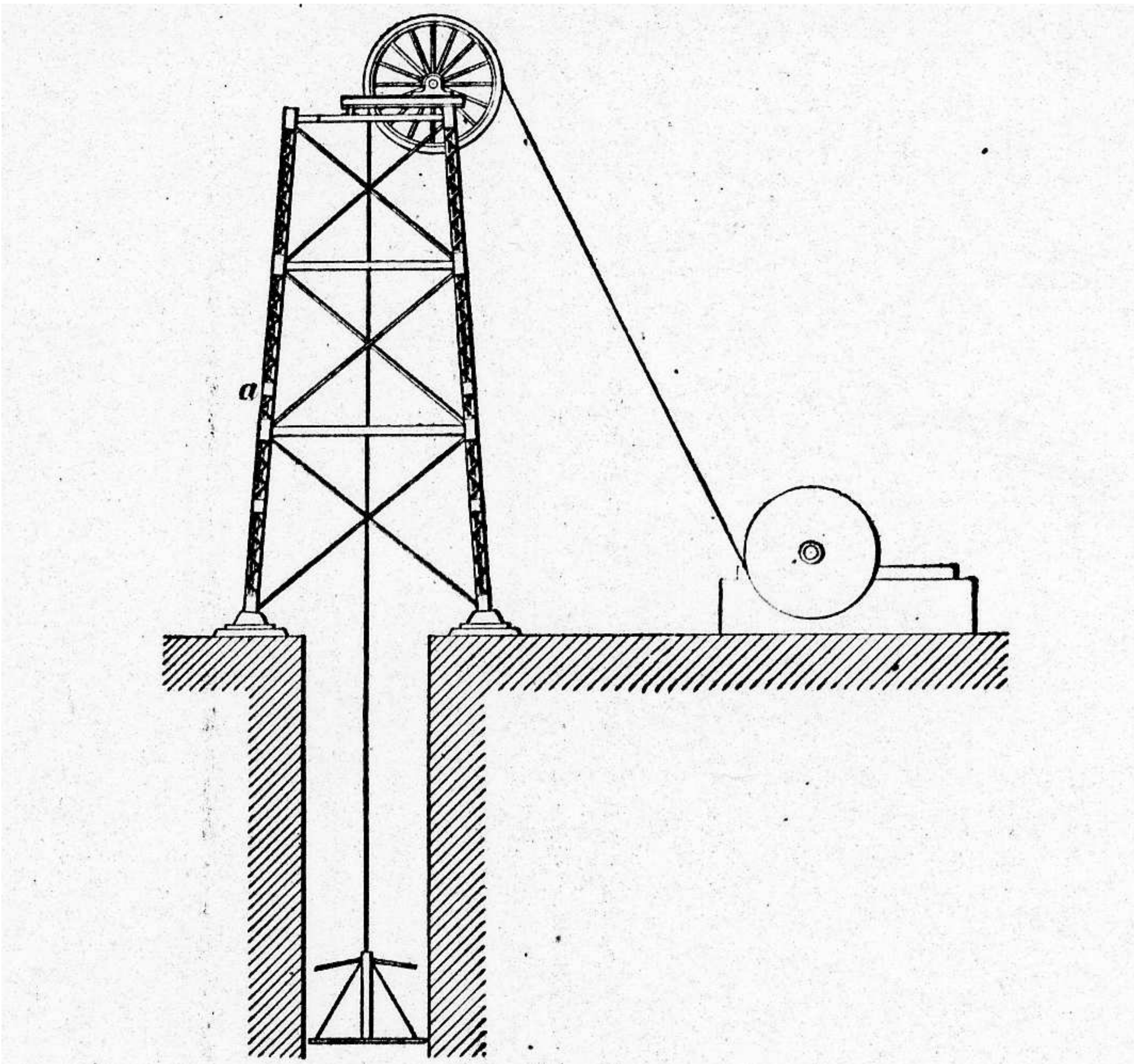
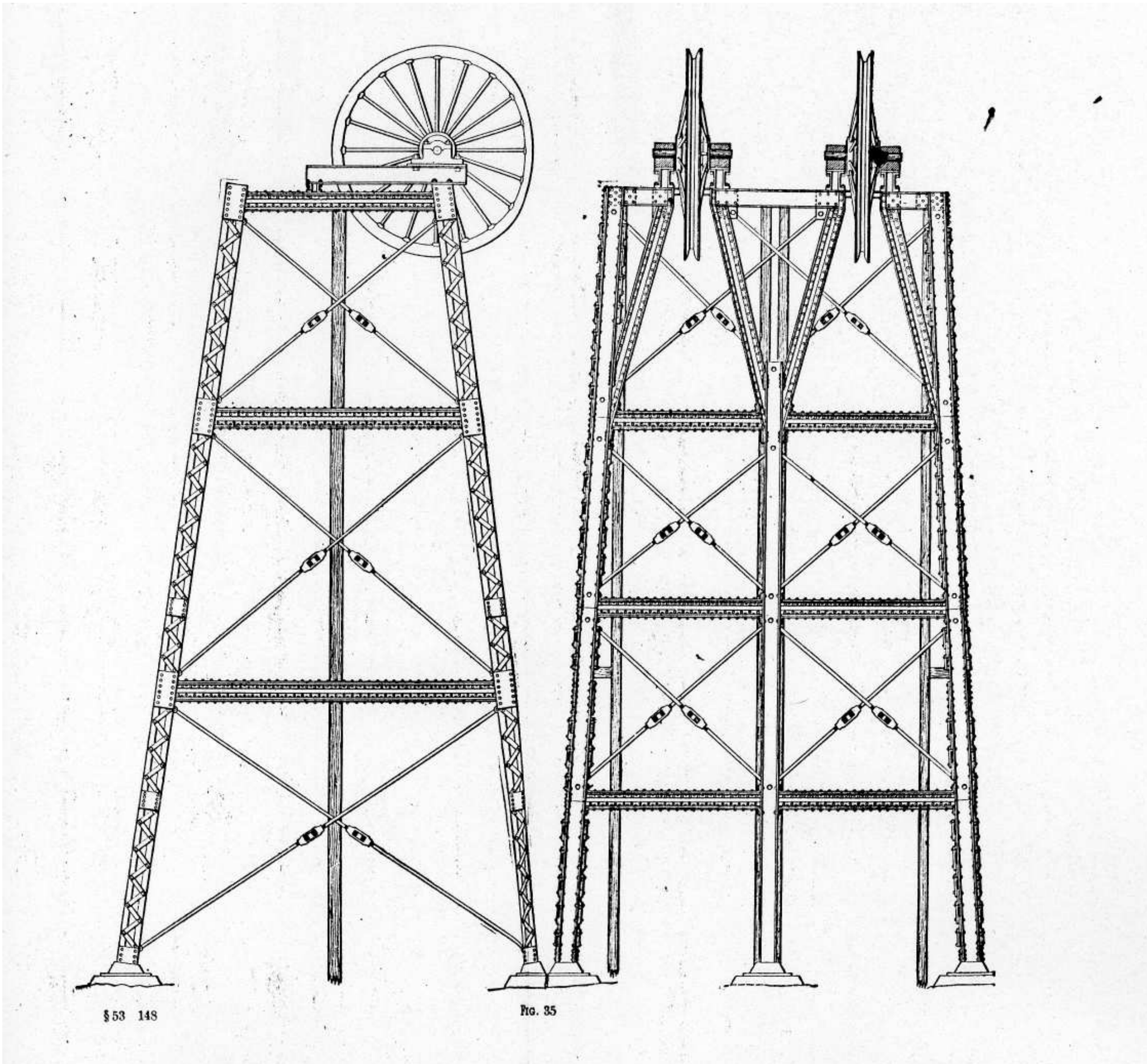


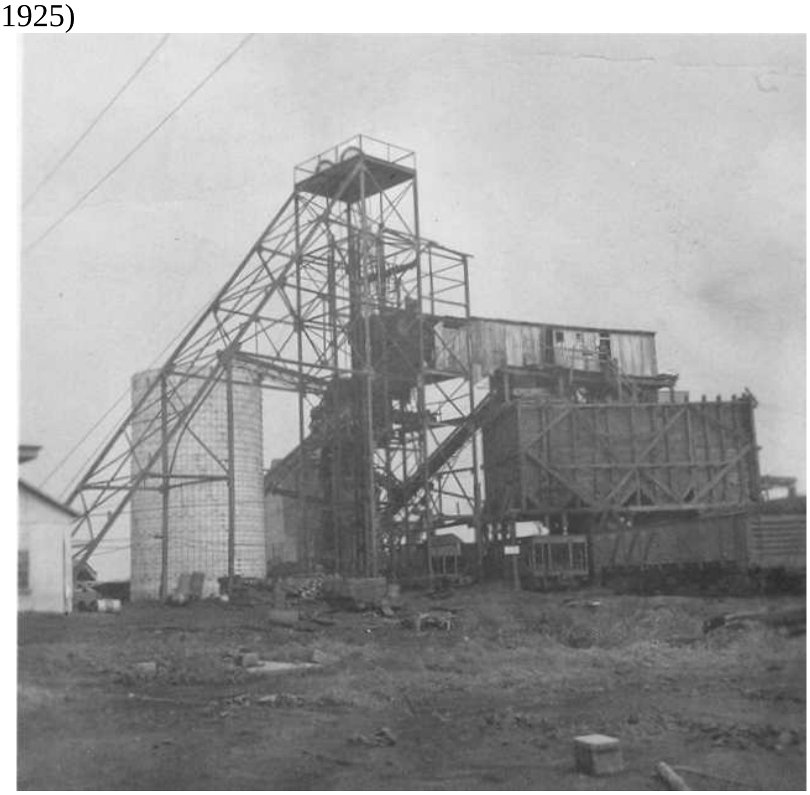
FIG. 31

As steel has both good compression and tensile strength, steel headframes could often be constructed without an inclined strut. In this case, the vertical member "a" acts as an inclined strut experiencing tensile forces.



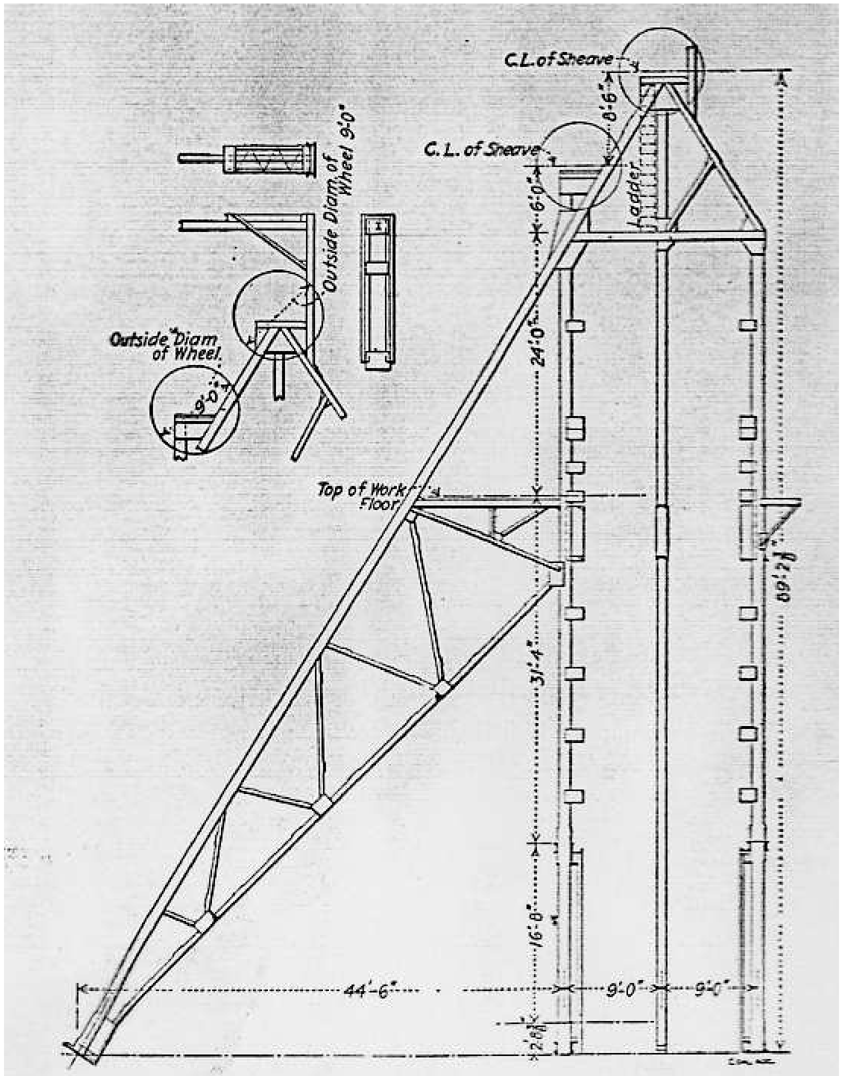
Detail of an early steel four-post headframe with vertical posts slightly canted and acting as both vertical posts and inclined struts (ITC 1906). No inclined struts were included with this headframe.

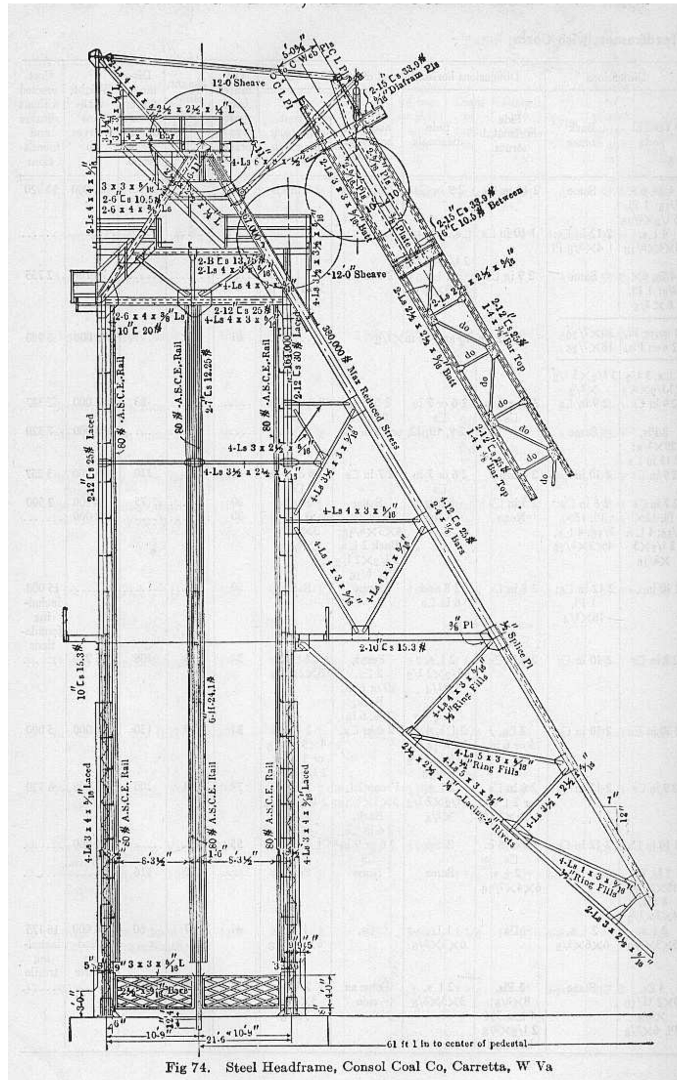
Ziegler (Church 1925)



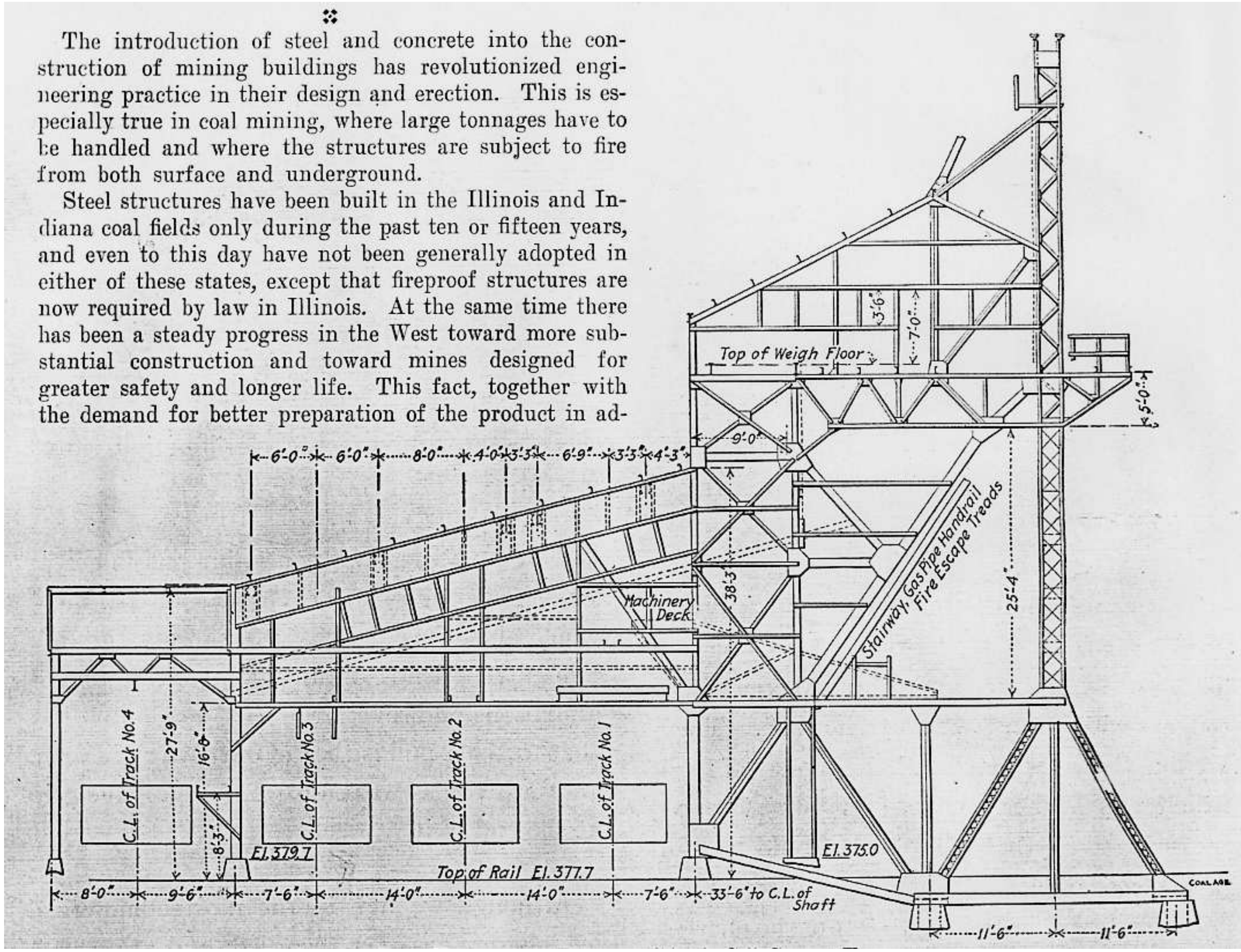
Joliana Mine ISGS

Modern steel four-post tipples with inclined braces.





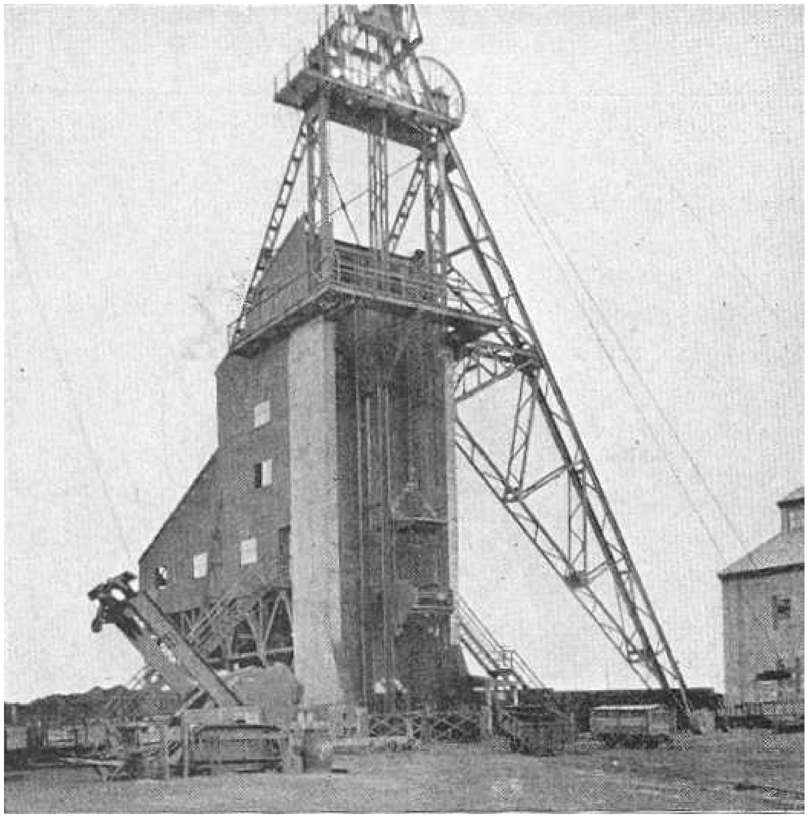
Front view of a headframe (or hoisting tower) designed by Andrew Allen and John Garcia (of the firm Allen and Garcia, Chicago, Illinois) illustrating the "simplicity of construction" of their patented design (left; Garcia 1913:787). The Allen and Garcia Type tipple illustrated at right was depicted in Peele (1941).



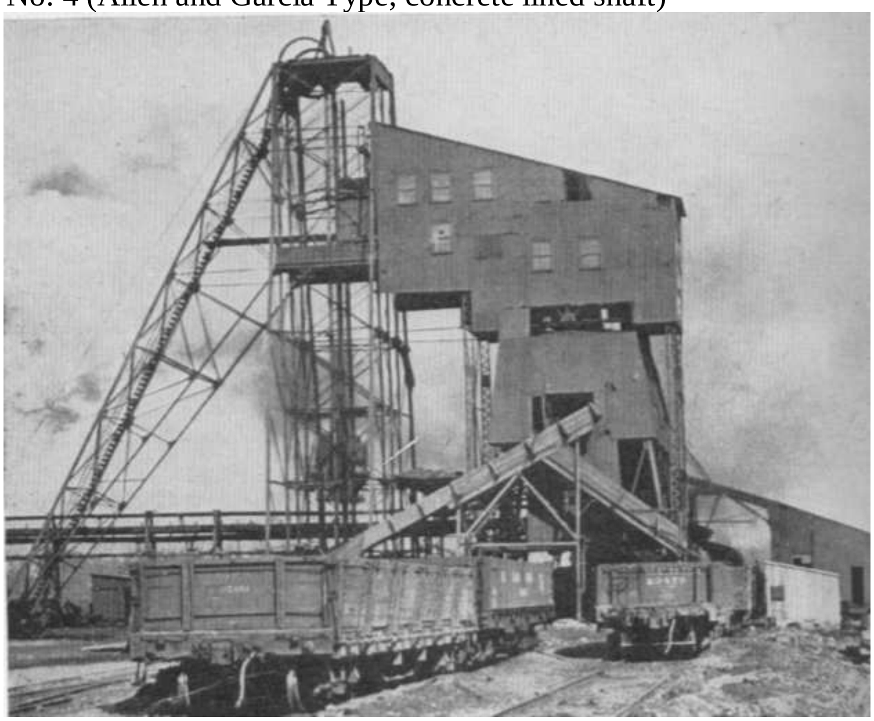
The introduction of steel and concrete into the construction of mining buildings has revolutionized engineering practice in their design and erection. This is especially true in coal mining, where large tonnages have to be handled and where the structures are subject to fire from both surface and underground.

Steel structures have been built in the Illinois and Indiana coal fields only during the past ten or fifteen years, and even to this day have not been generally adopted in either of these states, except that fireproof structures are now required by law in Illinois. At the same time there has been a steady progress in the West toward more substantial construction and toward mines designed for greater safety and longer life. This fact, together with the demand for better preparation of the product in ad-

Side view of a typical Allen and Garcia steel tipple, as illustrated in Garcia (1913:786).

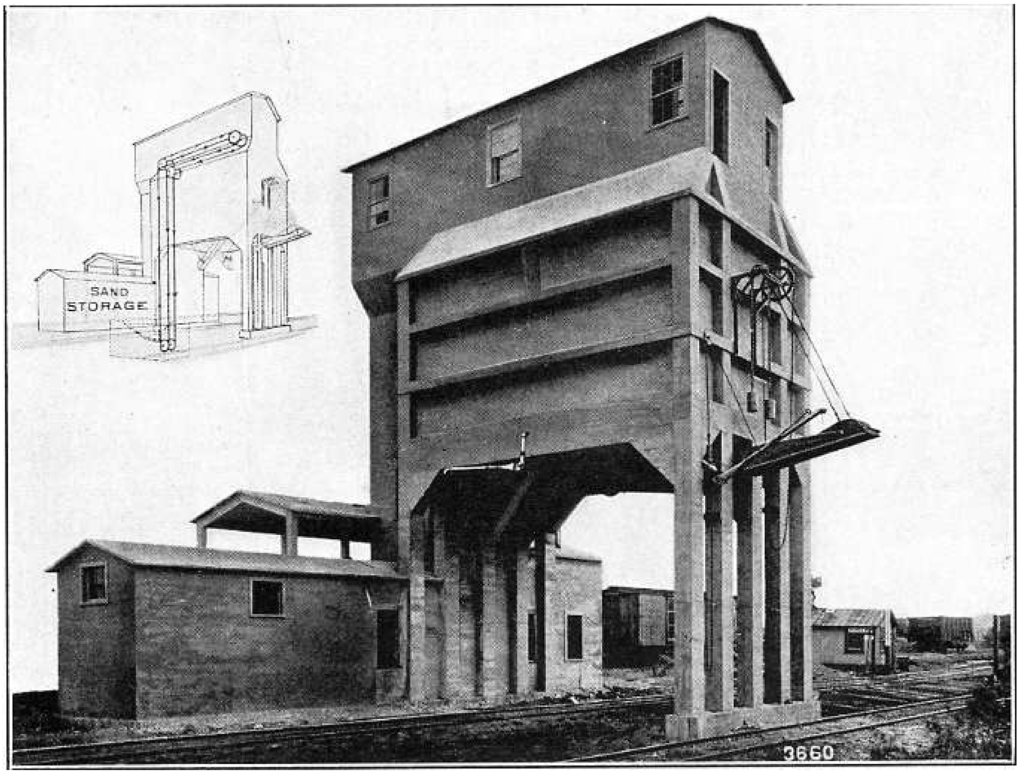


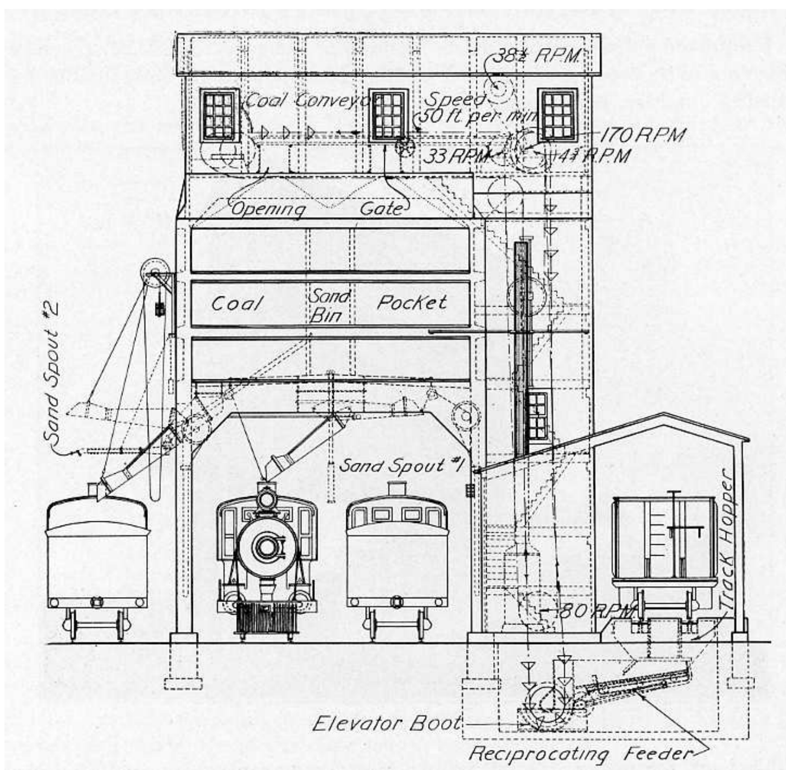
Superior Mine No. 4 (Allen and Garcia Type; concrete lined shaft)



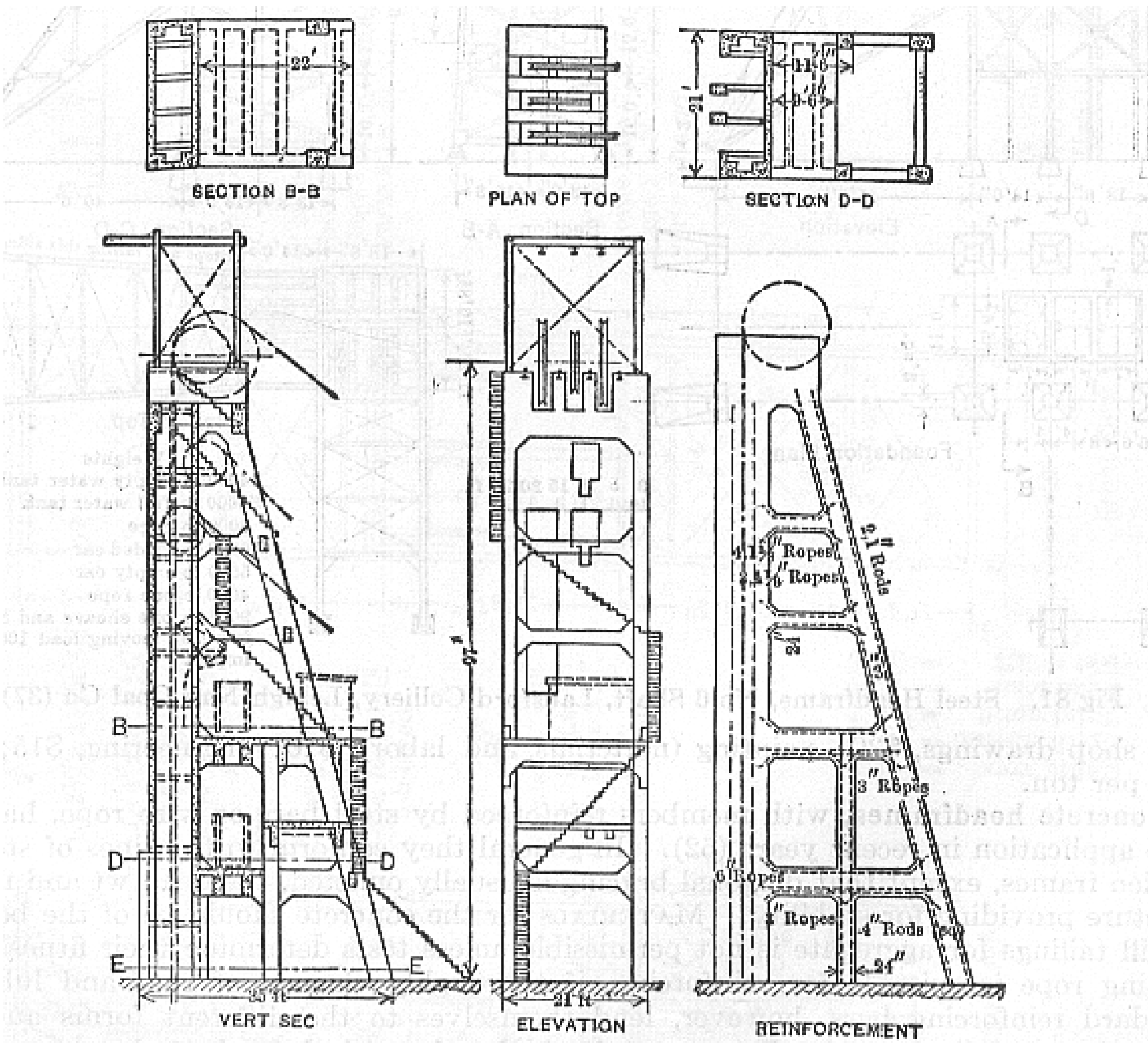
Headframe Andros Steel (Allen and Garcia Type)

Modern steel tipples of the Allen and Garcia Type.

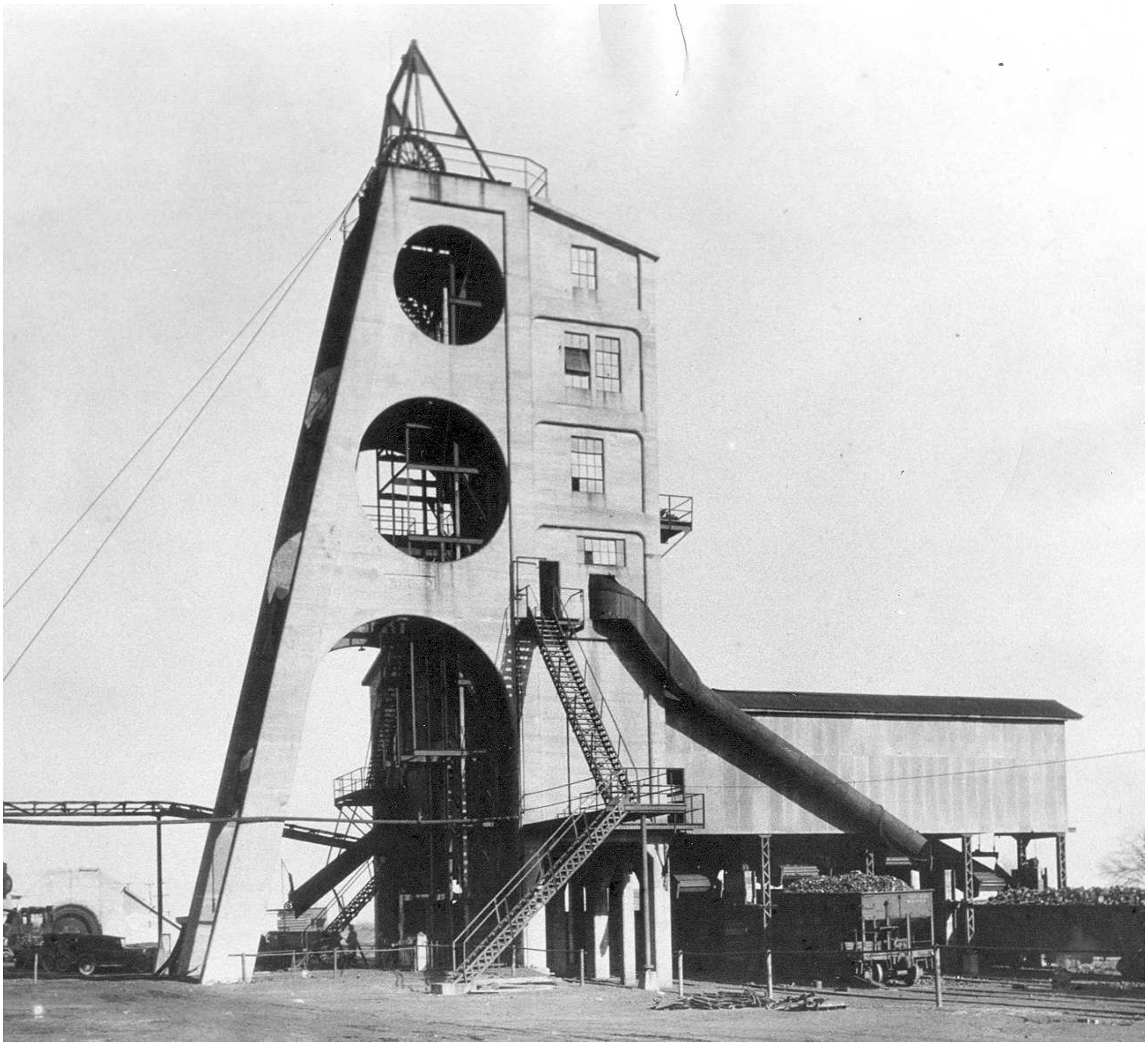




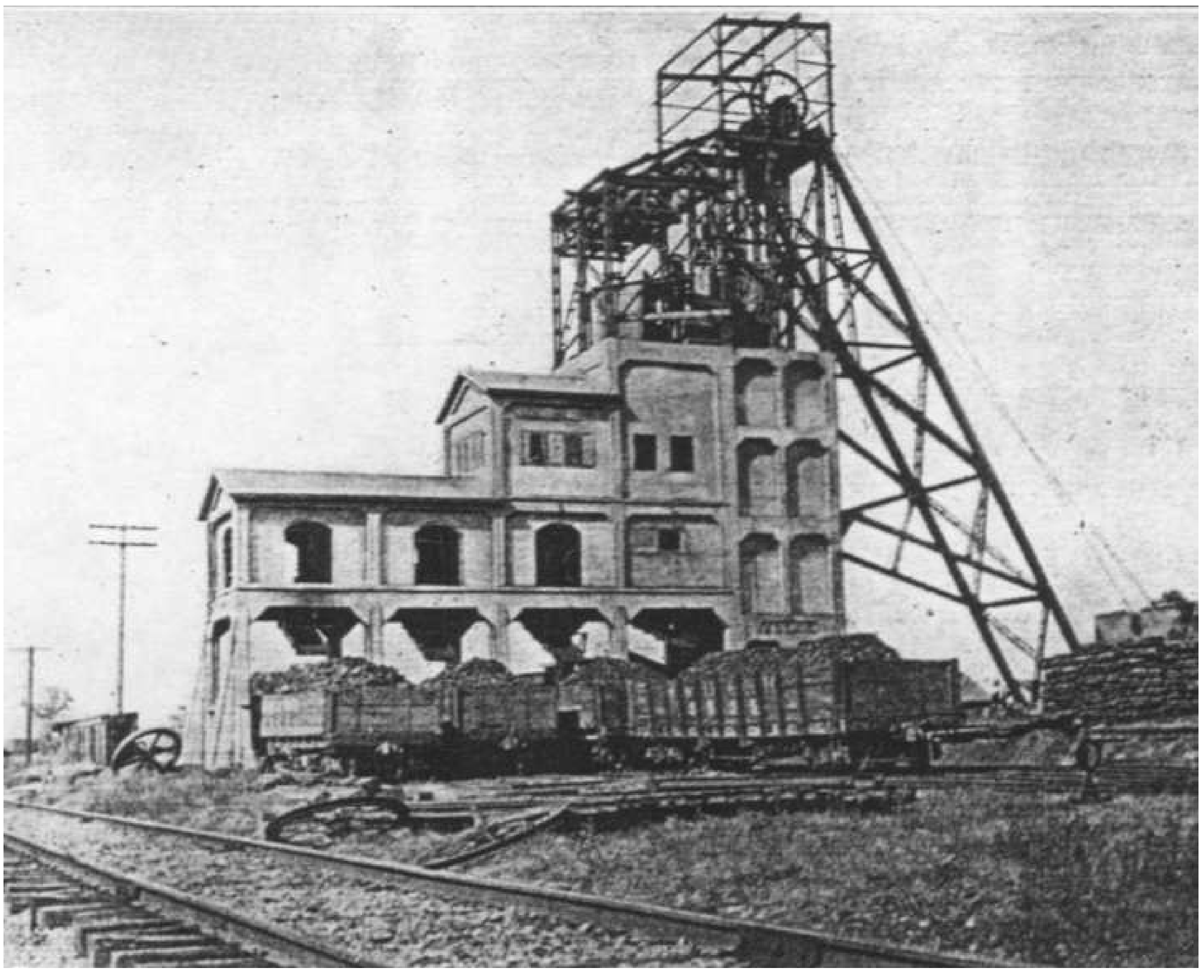
Two views of the coal and sand "station" constructed along the Norfolk and Western Railway in 1907. By this date, reinforced concrete construction techniques for industrial structures such as a tipple had been established (Atlas Portland Cement Company 1909: 111-112).



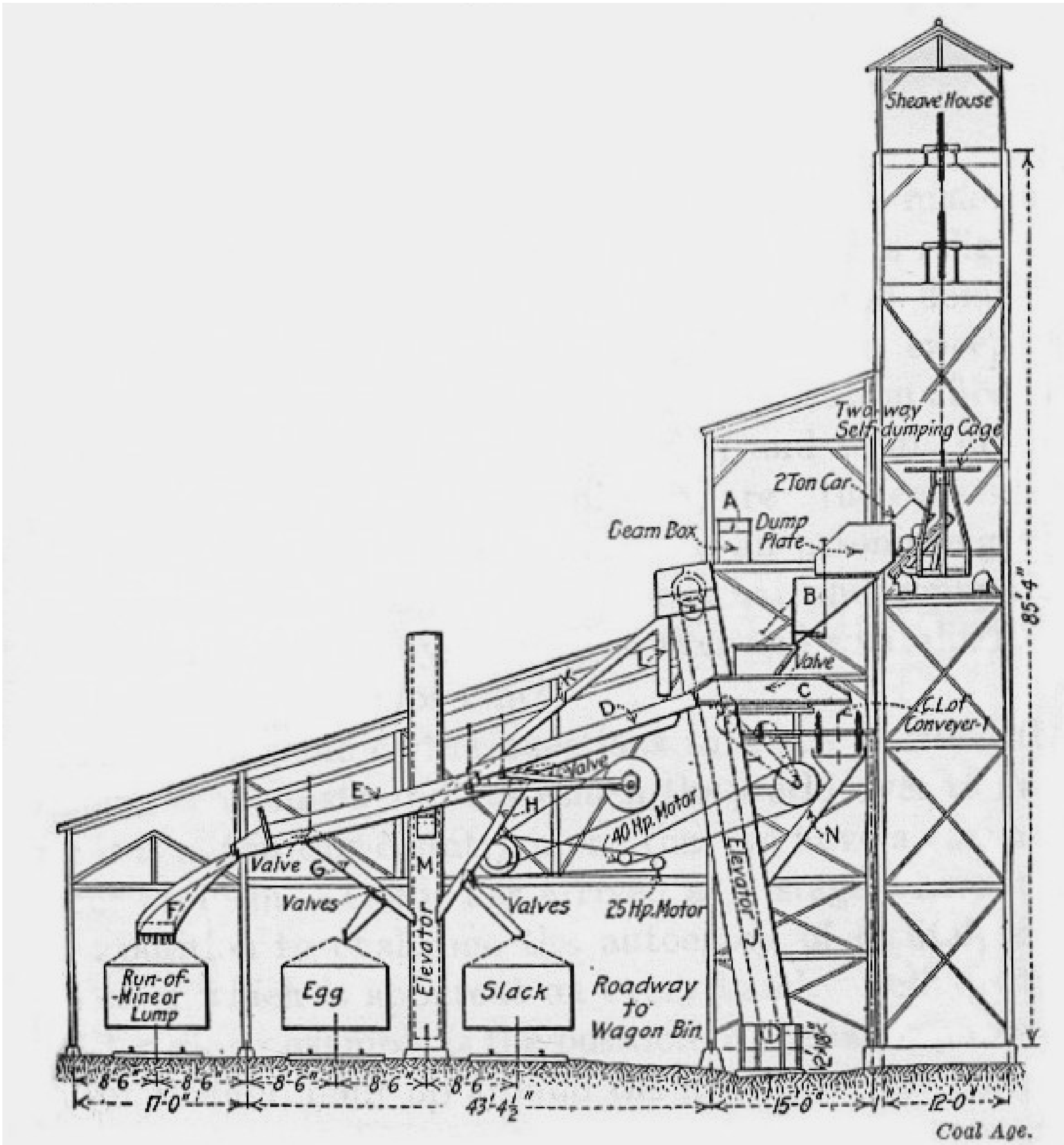
Detail of concrete headframe constructed at the Curry Shaft by the Penn Iron Mining Company at Vulcan, Michigan. This headframe was designed by Floyd Burr and constructed circa 1917-18 (Burr 1917:617; as reprinted in Peele 1941).



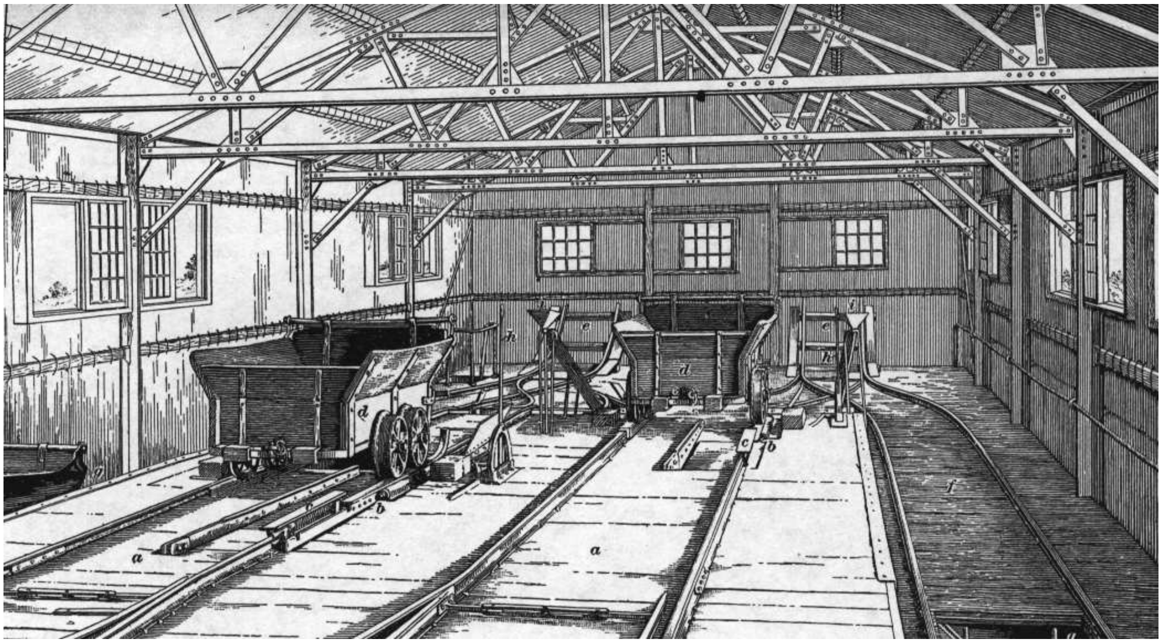
Sahara Coal Company's (O'Gara Coal Company) concrete headframe, constructed in 1923 in Muddy, Saline County, Illinois. This headframe has been determined eligible for listing on the National Register of Historic Places.

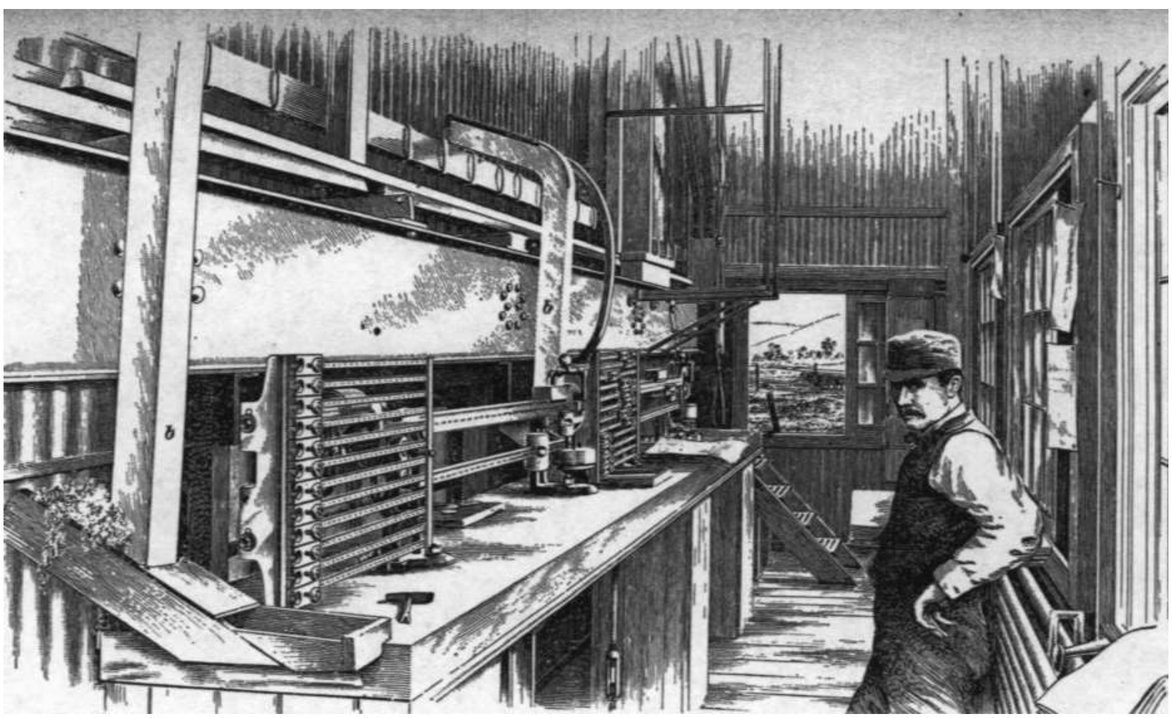


View of the Eden Mine near Sparta, Illinois. A new concrete tipple was constructed at this mine during the early 1920s (*Coal Age* 1925:843).



Modern steel shaft tipple and headframe illustrating the self-dumping cage, combination shaking and/or sorting screens, and loading chutes typical of a modern tipple.





Two views of the inside of a modern, early twentieth century tipple. The upper illustration depicts the tipple floor. After the coal car exits the cage it enters the tipple floor and is dumped. The checkweighman (BOTTOM) weighs each car prior to dumping of the coal (ITC 1906).

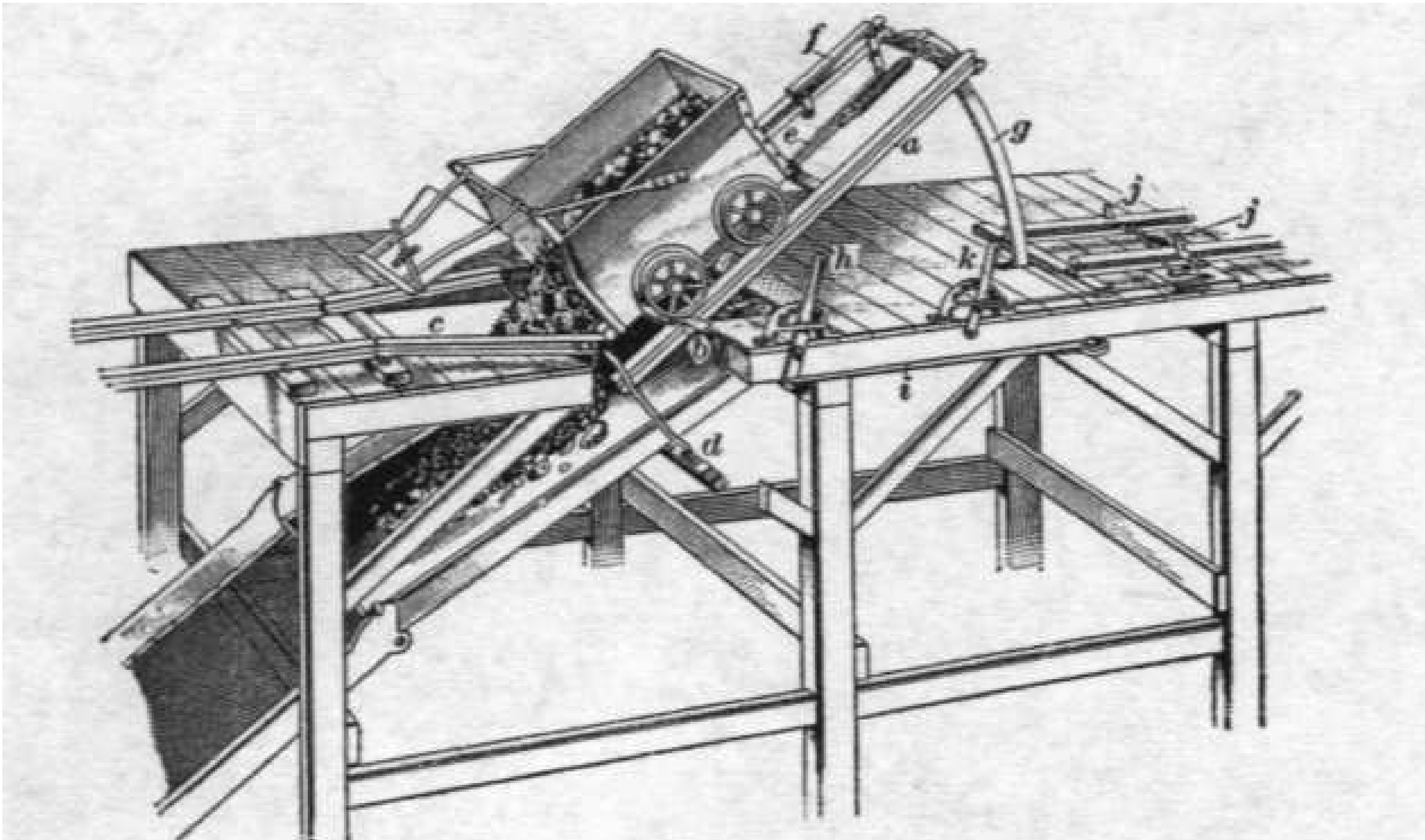


FIG. 5

View of an automated coal car dumper at the turn-of-the-century (ITC 1906).

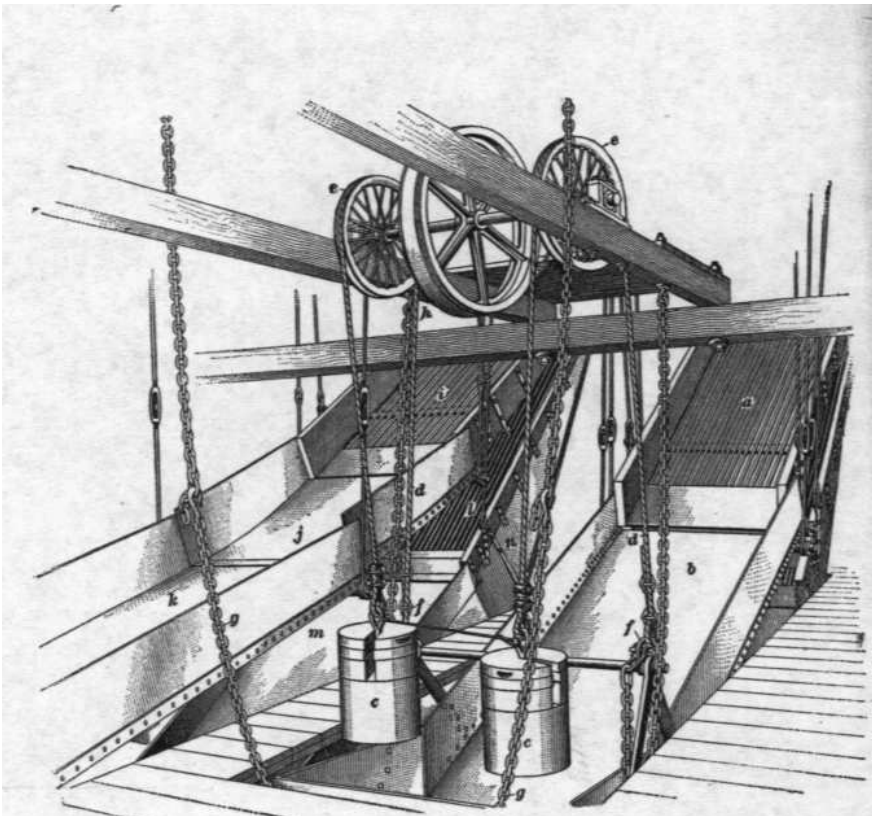


FIG. 14

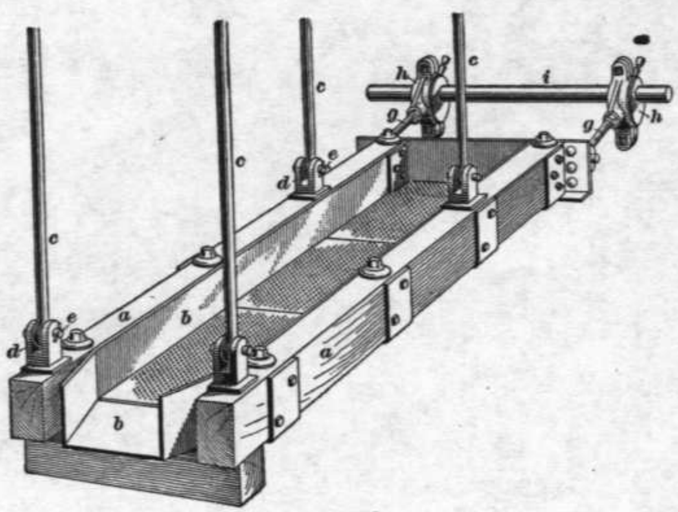
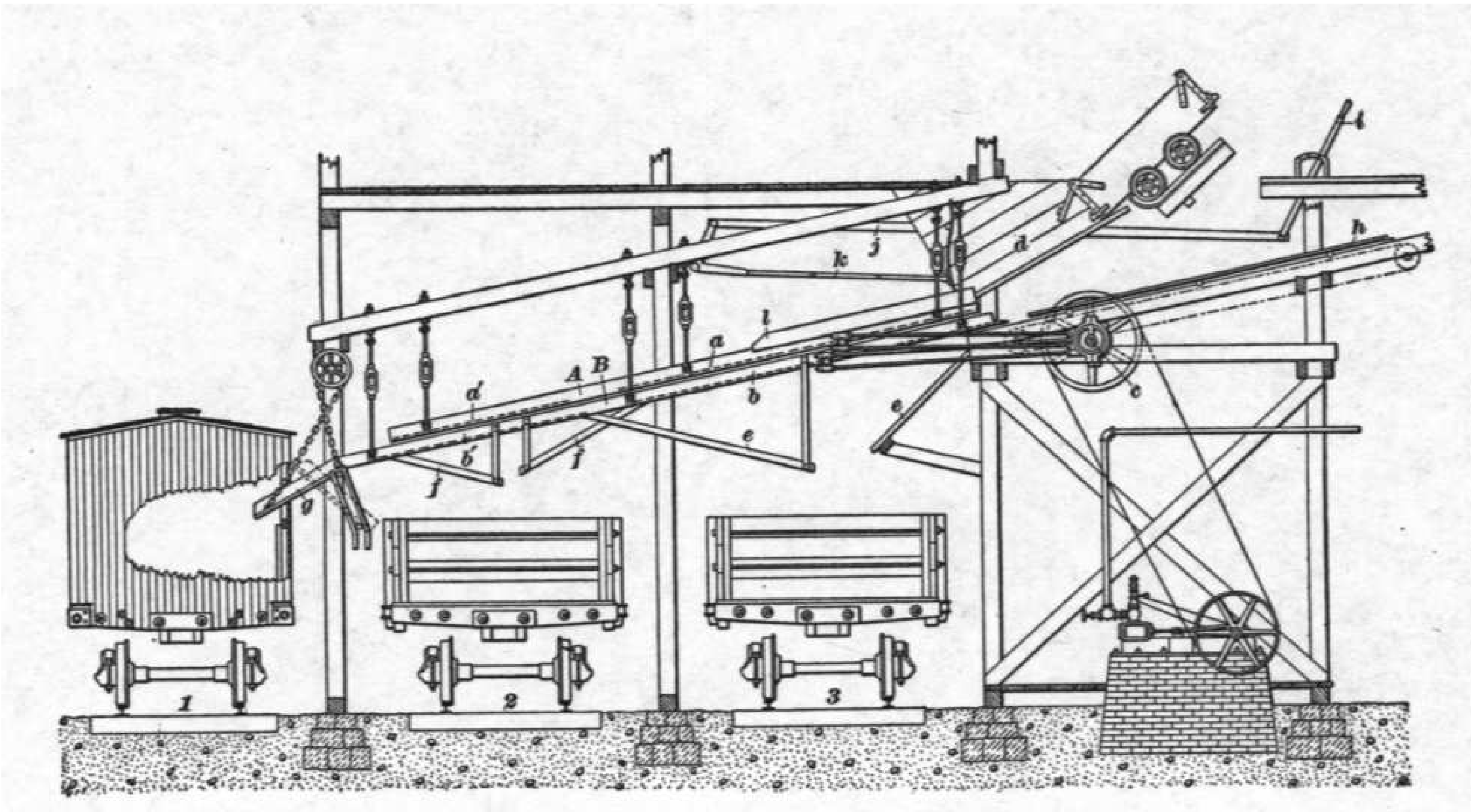
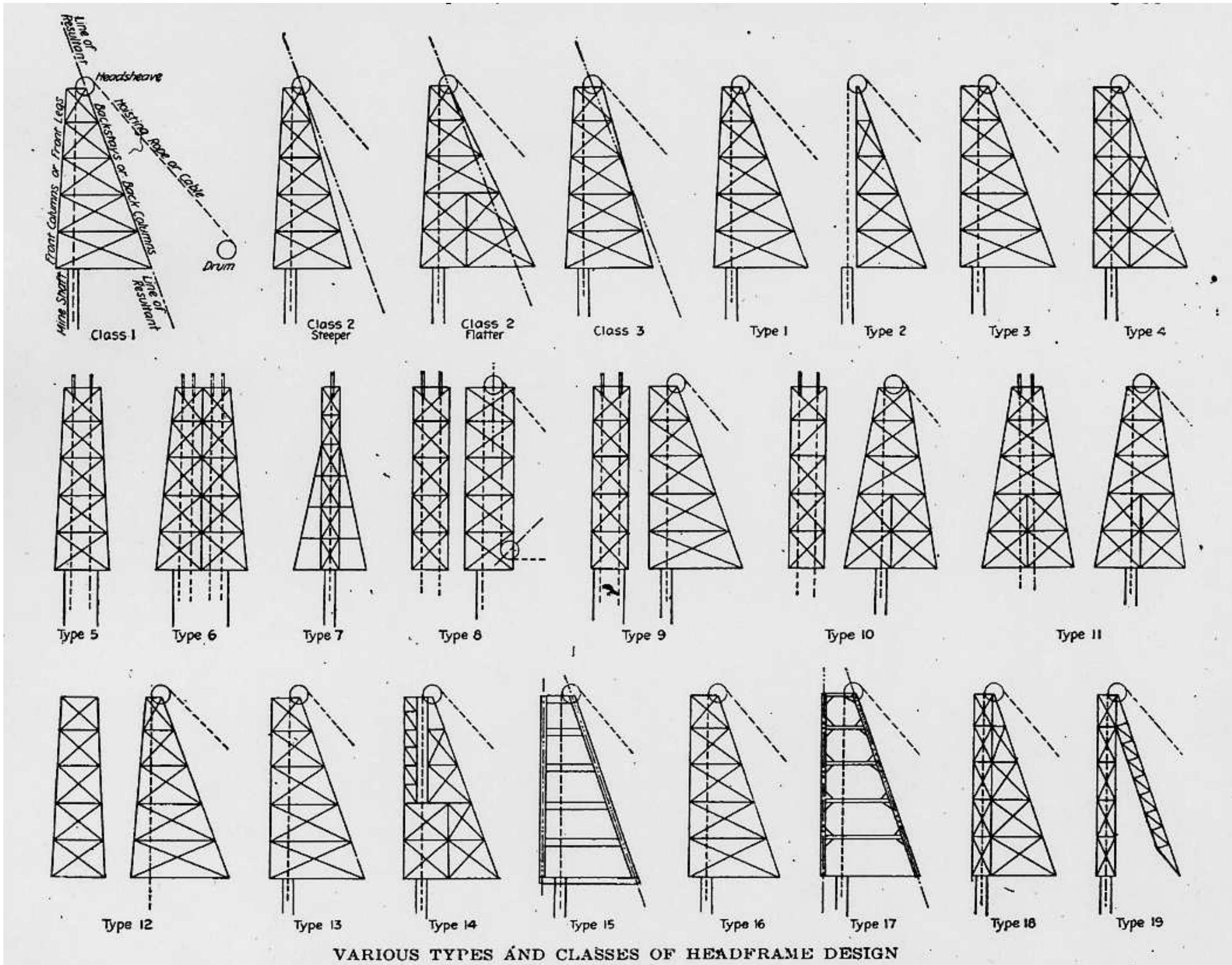


FIG. 15

Detail of shaking screens at the turn-of-the-century (ITC 1906).



Arrangement of shaking screens installed in a tipple, sorting coal into three distinct size classes, and loading directly into rail cars (ITC 1906).



Headframe typology devised by Floyd Burr in 1917 (Burr 1917).