The
Coal Industry in Kentucky

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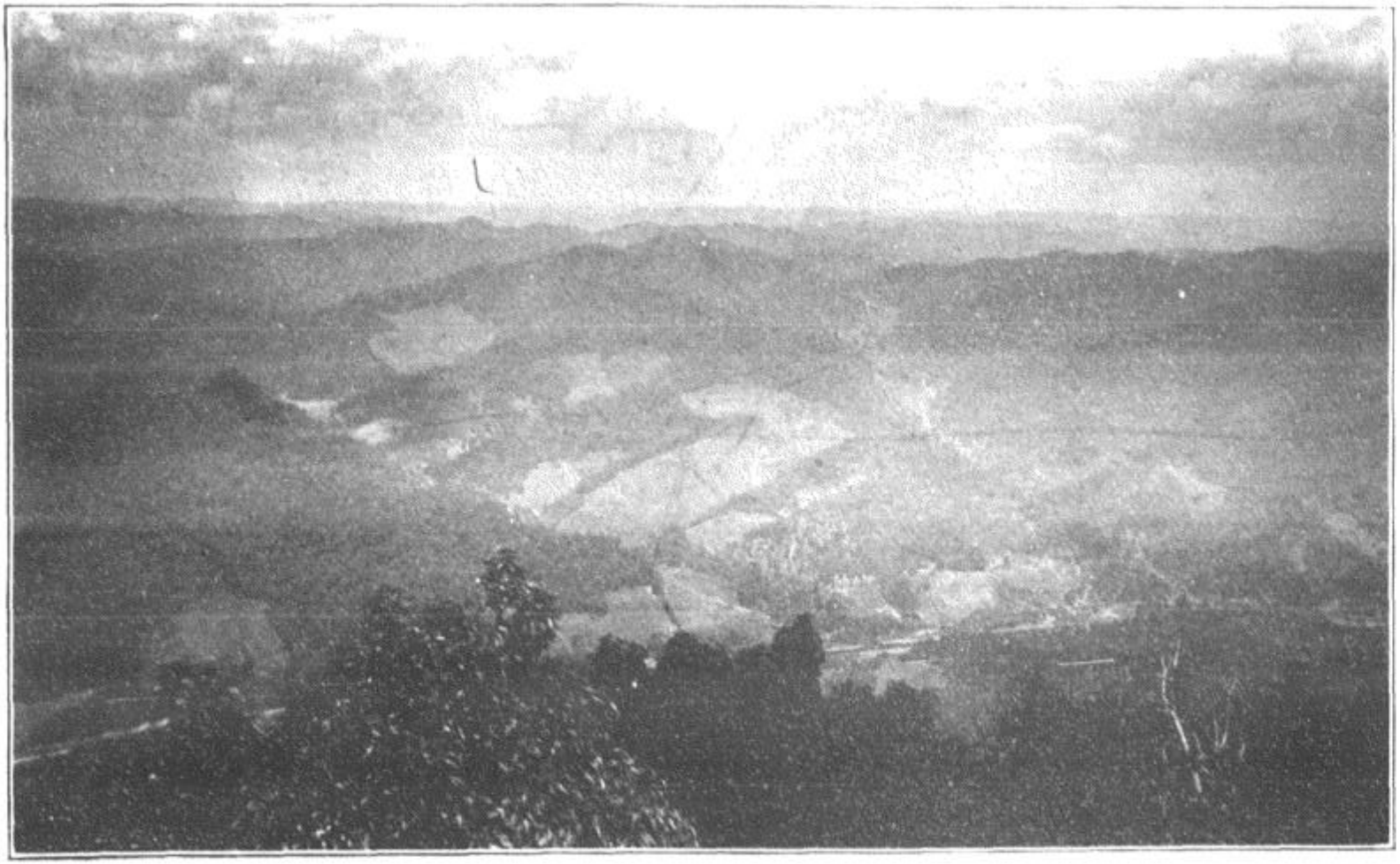

THE ELKHORN COAL FIELD

The panorama is north across Letcher, Floyd, and Pike Counties from Lookout Peak (3,100 feet A. T.) of Pine Mountain, Letcher County, Ky. This photograph was taken by the writer in midsummer 1921. Jenkins, Ky., is located in the Elkhorn Creek valley below.

The COAL INDUSTRY IN KENTUCKY

An Historical Sketch

BY

WILLARD ROUSE JILLSON

B. S., M. S., Sc. D.

DIRECTOR AND STATE GEOLOGIST OF THE
KENTUCKY GEOLOGICAL SURVEY

Member of the
FILSON CLUB · KENTUCKY STATE
HISTORICAL SOCIETY, ETC.

ILLUSTRATED

THE STATE JOURNAL COMPANY
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1922

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Dedicated
to the
Men
who have labored to build
this giant industry
in
Kentucky

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Author's Preface

He who seriously reflects upon the growth and the present extent of the coal producing industry in Kentucky, must necessarily consider at the same time the industrial growth and strength of our country as a whole, and particularly that portion known as the Middle West. Here intensive manufacturing has created the markets which have reached out through successive years further and further into remote and inaccessible regions of our State to acquire the great modern necessity—coal.

There has been much of romance in the development of the rich lowland and mountain coal fields of Kentucky. The genius of Alladen as it were but touched the ground where the ploughboy sang, or solitary hunter trod; and while we watched, the hills gave up their hidden wealth, new cities breathed and grew, and through the skies a rainbow of prosperity circled o'er our State from the Ohio's shore at Uniontown to the Breaks of Sandy and Cumberland Gap.

The amount of detail surrounding this notable industrial expansion is unlimited. If carefully arranged, it would make many an interesting volume. In this little book, the sub-

ject matter of which has been revised and reprinted from the Register of the Kentucky State Historical Society, Vol. 20, No. 58, January, 1922, the writer has endeavored to bring together the salient facts only, to the end that a short, readable story of progress might be available to those interested. At a time when many would propose new, untried solutions for our taxing problems, it might be well to know whereof we speak, and wherefore we act.

For the privilege of reviewing many old and rare volumes, manuscripts, etc., the writer is much indebted to the librarians of the Transylvania University, Berea College, the Kentucky State Historical Society, the Louisville Public Library, the Filson Club, the Library of Congress, and the Field Museum of Chicago.

Old Capitol,
Frankfort, Ky.,
January 10, 1922.

CONTENTS

Preface 9

I.

Discovery and Early Use 17

II.

A New Kentucky Industry 37

III.

The Coal Industry Reborn 49

IV.

Geology and Production of Coal 65

Index 79

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ILLUSTRATIONS

The Elkhorn Coal Field ..... *Frontispiece*

The Pride of Western Kentucky 22

An Eastern Kentucky Bucket Line Tipple 30

The Pride of Eastern Kentucky 38

A Splendid Eastern Kentucky Coal Town 44

Modern Mine Equipment on Clover Fork 50

A Coal Mine in the Hazard Field 56

Mining Coal with a Steam Shovel 60

Map of Kentucky Coal Fields 66

A Unit Coal Mine and Town 70

Middlesboro—A City Built by Coal 74

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The
Coal Industry in Kentucky

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The COAL INDUSTRY *in* KENTUCKY*

I.

DISCOVERY AND EARLY USE.

The story of the discovery and first use of coal in Kentucky for heating and similar purposes will forever remain shrouded in the obscurity of the ages. While to the copper-hued American aborigine must certainly be given the credit for first seeing and using this great present day mineral resource, at what time or where within the confines of this state this marvelous accident occurred no one will ever know. Doubtless in the dim past and long before his race had experienced the intelligence of the "Mound Builders," while on a hunting or warring expedition, he found as he crossed some stream or sandy bar, or shore, light, black fragments of the mineral substance which we call coal. To his primitive mind, these little pebbles at first meant nothing. Perhaps they were picked up, and carried for a time, only to soon be dropped with a growing fatigue or changing

*Read before the Filson Club in Louisville, Ky., Monday, Nov. 7, 1921.

fancy. At another time and in another mood he carried fragments of Kentucky cannel coal back to camp and at leisure carved out little queer-shaped ornaments and beads, as a number of celebrated collections from this state show.[1] Yet strange as it may seem, neither his history nor the material effects which he left indicate that the Appalachian Indian knew or made use of the coals of this region for either cooking or heating.

With all the known evidence against the premise, it still seems odd that the Indians of the eastern United States who were forever picking up stones and putting them into their fires for cooking purposes should not have at some time, and probably remotely, thrown in a lump or two of coal. It is a well known fact that some of the tribes of the south-western United States used coal in firing their pottery, and the records of some of the earliest adventurers in the State of Kentucky show plainly that coal occurred in abundance openly distributed over the ground at a number of points on the Warriors' Trail from Cumberland Gap north-eastward to the mouth of the Little Scioto river. With these facts in mind, it seems impossible to believe that the "Red Man," lazy, yet shrewd as he was, would not have known that this mineral substance would

[1] Prehistoric Men of Ky. Young. Filson Club, 1919, pp. 218, 252.

burn, giving much more durable and satisfactory fire than wood. While we know that the Indian and his ancestor, the Mound Builder, did not frequent the interior of the eastern coal field except on a very occasional hunting party, he was continually crossing and camping within the western coal field, as his relics prove.[2] In this part of western Kentucky there never has been a time when fragments of coal could not be plainly seen in many places and picked up with little effort in hundreds of the branches and along the river banks. There never has been a time when coal has not been exposed either by precipitous meander of streams or through slide or fault in the hillsides of the eastern Kentucky coal field, the Indians, great game preserve. With these facts in mind, though Anthropologists are agreed that the American Indian did not commonly use coal for burning purposes, it seems only reasonable to assume that he knew of its highly combustible nature and had used it when convenient countless thousands of times before the Caucasian ever set foot on the soil of the new world.

GEOLOGY OF COAL FORMATION.

Difficult and uncertain as are those paths which lead back to the actual discovery of coal in Kentucky, the interested investigator who

[2] Prehistoric Men of Ky. Shaler. Ky. Geol. Surv., Series II, 1876, p. 30.

would measure in terms of years the period which has lapsed since first these coals were deposited by the inspired hand of Mother Nature, will find he has yet before him problems by the side of which his earlier quest becomes as child's play. The man does not live who can say with authority or any degree of accuracy the number of years which have passed during the long train of ages since the first coals were deposited in this state. These were laid down in the most recent part of what geologists recognize nowadays as the Mississippian epoch, one of the latter periods of the ancient Paleozoic. Where now known, chiefly in western Kentucky, these sub-carboniferous coals are very thin lenses widely separated horizontally and vertically in the geological sections. Sometimes their thickness attains only a fraction of an inch, while the extent of the seam likewise may frequently be measured in inches or in feet. But coals they are in every respect, and may be recognized as the tell-tale straws presaging the coming of the world's greatest coal making epoch, the Pennsylvanian period.

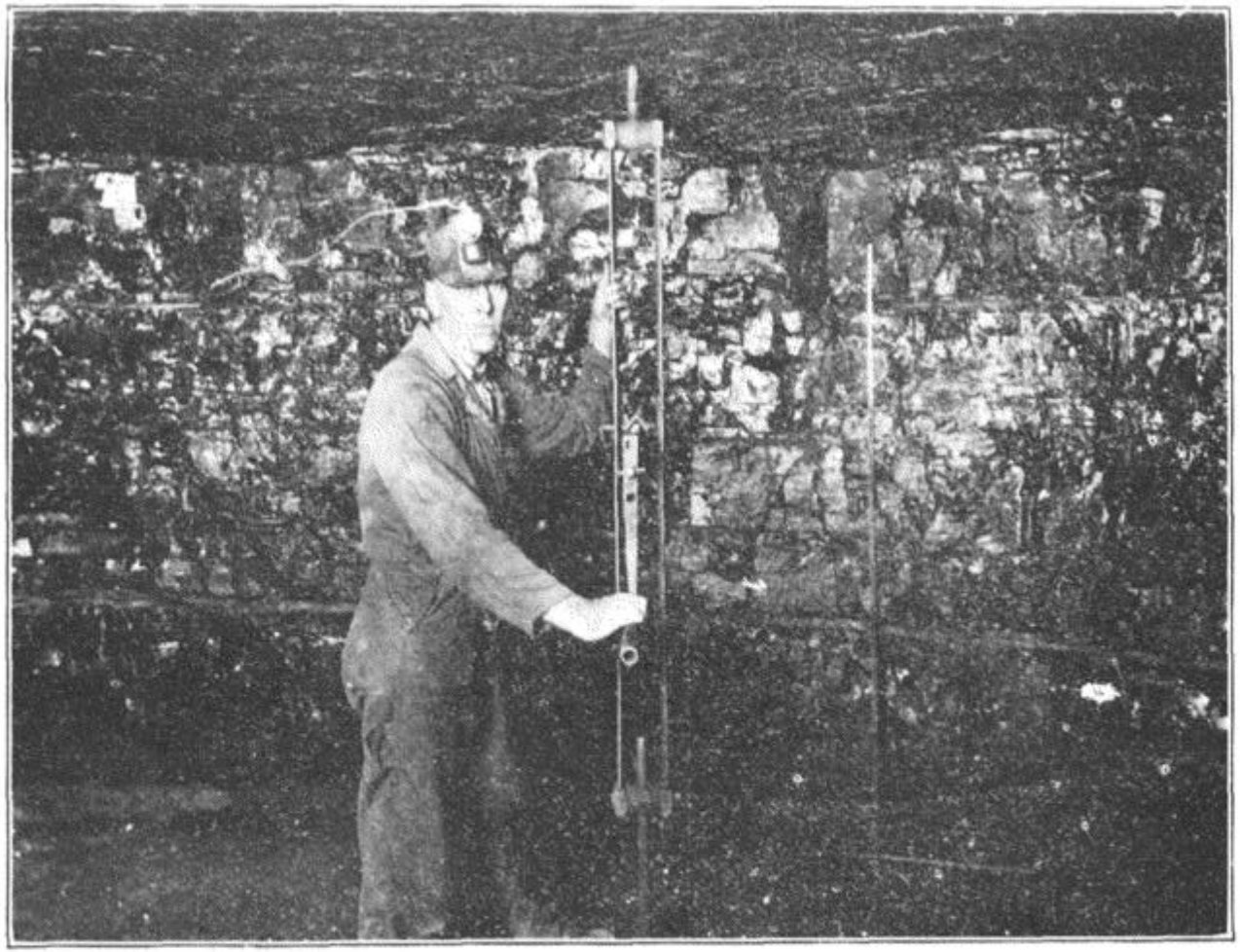
So it is that in this state as elsewhere in the Appalachain region the Coal Measures are known as an almost numberless sequence of coals, thick and thin, intercalated within an alternating system of generally thick sandstones, thicker shales, and very thin and somewhat

rare limestones. In the lower group of Pennsylvanian formations known in ascending order as the Pottsville, Conemaugh and Allegheny, occurs nearly all of the coals which we know in this state today. These range in thickness from less than an inch to as much as six and eight feet in the solid. Where is the man who can ride through the creeks of eastern Kentucky or the flat rolling bottom lands of the western coal fields and seeing these great storehouses of pent-up solar energy, refrain from wondering for the thousandth time where it all came from, and what the exact processes were in its formation?

He who would see the recreation of this ancient workshop of Mother Nature must forget for the moment the topographic appearance of Kentucky today. He must travel backwards, as it were, through flight of fancy, to a time countless thousands of years ago in the late Mississippian period, when as a result of broad crustal uplifts far reaching in their effects, that relatively small portion of the American continent which is known today as Kentucky was gently and quite imperceptibly raised from moderate ocean depths to elevations ever so slightly above sea level. Conceive, if you will, that when the uplift had reached this important point, vegetation growing along adjacent shores spead its network of interlacing fibre

over the new land surface. Great forests composed for the most part of fern-like trees, which were the predecessors of those we know today, spread out and shortly covered in mattress form of tangled root, twig and trunk, the new made land.

The crustal forces, however, which gave rise to this broad uplift were not sustained, and there set in almost immediately a period during which the entire area now embraced within the confines of Kentucky, as well as parts of most of the adjoining states, were slowly depressed. This depression occurred, however, in such a way that there were periods of relatively rapid movement alternating with periods of more or less stability. During the periods of relative stability, vegetation flung its mantle out over the new made land. During the periods of depression, the great forest mattresses, representing the vegetal accumulations not infrequently of many centuries, were submerged and completely covered by newly washed-in and deposited clastic sediments which were to be the sandstones and shales of today. Occasionally some little basin-like area remained far enough from the shore or stream debouchure to preserve a fairly clear water in which came to live migratory forms of marine and semi-marine animal life. This sea life in raining down and abandoning at death countless shells



THE PRIDE OF WESTERN KENTUCKY

Face of No. 11 coal, Nisbett Mine, one mile from Earlington. This mine is owned by the St. Bernard Coal Co. This view shows 80 inches of coal and 2 inches of parting. The roof is shale and the bottom fire clay. The room is 40 E. Sixth entry, 250 feet from the entrance.

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and tests, gave rise to thin and impure limestones. The oscillatory cycle of basin filling, swamp forests and subsequent slight submergence was many, many times repeated. Today each separate and individual coal seam, be it thin or thick, is a certain and enduring monument to those relatively rapid though small crustal changes of the earth in that far-off Paleozoic time.

Through the still lapse of the ages which followed this great coal making epoch, these Pennsylvanian coal measures became slowly consolidated or hardened through regional heat and pressure, the principles of coal formation being undoubtedly quite as active today as they ever were. During all this time no man saw these processes take place. But the record of the animal life of the coal making period is plain. Innumerable fossils show that it was an age in which invertebrate shell fish, bivalves and clam-like animals predominated in numbers. But higher types of life were also present in large numbers. These were the low vertebrates, the primitive and ancient fishes. Here and there in numbers yet much in the minority were the early amphibians of small figure tracking their way across the slimes and muds of old shore lines and beaches. Air breathing reptiles, though present, had not yet made their appearance in abundance, and as for the higher

warm blooded mammals, their time was yet to come by thousands of thousands of years.

But Mother Nature was about her work much the same as she is today. In the course of time, following broad inundations and great continental uplifts throughout North America, that part of the Mississippi Valley known as Kentucky had been a land area for many, many ages. Broad-leafed, hard wood trees had not only displaced the Paleozoic fern tree swamps, but had become in their turn very ancient forests. Through the Coal Measures formed in those ancient periods now uplifted to thousands of feet in some places above sea level, the streams incessantly chiseling out their courses, had carved in consolidated sandstones, mud stones and limestones of the state, the topographic figure much the same as we see it and know it today.

As it had been the battle ground for a migratory and usurping vegetation again and again in the geologic past, so, at this later date it had again become a battle ground, but one pre-empted by fierce and hostile tribes of dusky Aborigines from the north and from the south.. Cherokees from the valleys of the Holston and Clinch rivers of Tennessee, and Shawnees from the broad forested stretches of the Scioto river, found in eastern Kentucky, as did the Chickasaws and other tribes in the western portion of

our state, a happy hunting ground, but one in which there always lurked death and disaster at the hand of an ambushed foe. With varied mineral riches well within their grasp, these Aborigines preferred to waste their time in slaughtering their distant kinsmen. Whether the grievances causing these conflicts were real or fancied, it is a fact that in the inability of the Indians to see and appreciate the coals of this and adjoining states a great source of strength, and material advancement to their position, they had lost out in the coming struggle with the white man long before Columbus ever set foot on the soil of San Salvador in 1492.

DR. WALKER'S DISCOVERY.

Though La Salle in his hypothecated descent from the headwaters of the Allegheny to the falls of the Ohio in 1669-70[3] would have passed by the eastern Kentucky coal field, he left no record indicating that he found coal during these explorations. To Father Hennepin,[4] a French Jesuit missionary, who in 1679 recorded the site of a "cole mine" on the Illinois river near the present city of Ottawa, Illinois, must be given the credit for first noting the occurrence and practical use of coal in the United

[3] Life and Writings of John Filson, R. T. Durrett, 1884, p. 32.

[4] Mineral Resources of U. S. G. S. 1909, p. 24.

States. This ancient mine, however, was in Kentucky, and though others are reported to have seen the boundary and interior of the state at various times from 1543 to 1700, it remained for Dr. Thomas Walker on April 13, 1750, to be the first representative of the Caucasian race to discover and use the coal of Kentucky. Five years later, in 1755,[5] coal was discovered in the Indian Territory north of the Ohio river in what is now the state of Ohio. In the same year Lewis Evans' map of the Ohio-Kentucky region was published showing coal in what is now Greenup and Boyd counties, Kentucky.

Dr. Walker's memorable discovery occurred, as his diary shows, the evening of the first day that he set foot upon what is now Kentucky soil. Dr. Walker, who was an able, ingenious and observing civil engineer, as well as a physician, had been employed by the Loyal Land Company of Virginia on December 12, 1749, "to go to the westward in order to discover and prepare a place for a settlement."[6] At the head of a small party he had toiled through the uncharted mountain valleys and passes of south-western Virginia and Tennessee, and had come up to the vicinity of the Cumberland Gap early in April. His diary which has been so

[5] Mineral Resources of U. S. G. S. 1911, p. 25.
[6] First Explorations of Kentucky. J. Stoddard Johnston, 1898, p. 33.

ably interpreted by J. Stoddard Johnston tells of his important discovery, and gives by way of inference, the first use of this mineral resource. The diary reads:

"April 13, 1750. We went four miles to a large creek . . . and from thence six miles to Cave Gap (Cumberland Gap) the land being level. On the north side of the gap is a large spring . . . this gap may be seen at a considerable distance, and there is no other . . . At the foot of the hill on the north-west we came to the branch . . . that made a great deal of flat land. We kept down it two miles, . . . we came out on the bank where we found very good coal. I did not see any limestone beyond this ridge."[7]

It is easy to picture the scene that first night in Kentucky. The locality to which Dr. Walker came was Bell county, within two miles of the Cumberland Gap. It was the combined occurrence of good drinking water and an almost providential deposit of loose surficial coal which caused Dr. Walker to locate his first camp at this spot, which it may be noted was located on one of the strategic points of the old Warriors' Trail. At that time the English-American whites were on friendly terms with the Cherokees. Dr. Walker probably found no occasion to detour from the good path, or conceal his camp or its fire in any way. What

[7] First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 48, 49 and 50.

thoughts must have gone through his mind and those of his party as they sat there that night toasting themselves before a good coal fire and reflecting on the rugged country they had already passed, and the unknown territory before them. Already familiar with coal in Virginia, where it had been discovered in 1701, and was at the time of his pilgrimage in its first process of operation,[8] Dr. Walker announced his discovery of coal in Kentucky in most prosaic terms. He was to find and see a great deal of coal before he had completed the territory of eastern Kentucky. His diary states further:

"April 23. . . . We all crossed the (Cumberland) river (four miles below where Barbourville now is located). We traveled about twelve miles and camped on Crooked creek. The mountains are very small hereabouts, and here is a great deal of flat land. We got through the coal today."[9]

Dr. Walker had undoubtedly crossed what is now known as Knox County and a part of Laurel County and was in the region of the Pottsville Conglomerate on the Laurel river. We see further in his diary:

"May 5—We got to Tomlinson river (a tributary of the Laurel river). Here is plenty of coal on the south bank opposite to our camp."[10]

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[8] New International Encyclopedia, 1920, Vol. V, p. 499.
[9] First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 52 and 53.

This was undoubtedly the Inter-Conglomerate coal of eastern Kentucky which may be frequently seen in the cliffs along the streams of this section of the state.

"May 12—Under the rock (Pottsville Conglomerate) is a soft kind of stone almost like Allum. In passing below it a layer of coal twelve inches thick and white clay under that."[10]

At this time Dr. Walker was no doubt in the western part of Laurel County, and may have been on a south-western flowing tributary of the Rockcastle river. Day by day the journey to the north, and finally around to the north-east and east continued. Though the diary of Dr. Walker does not record for some little time the occurrence of coal in his travels, there is little doubt but what he found it frequently and made use of it at his camps. These inferences are not to be regarded as remote, since we find that just before he leaves Kentucky he makes the following statement:

"June 19—We got to Laurel creek (head of the Tug fork of the Big Sandy) early this morning, . . . and attempted to cross a mountain, . . . this ridge is nigh the eastern ridge of the coal land."[11]

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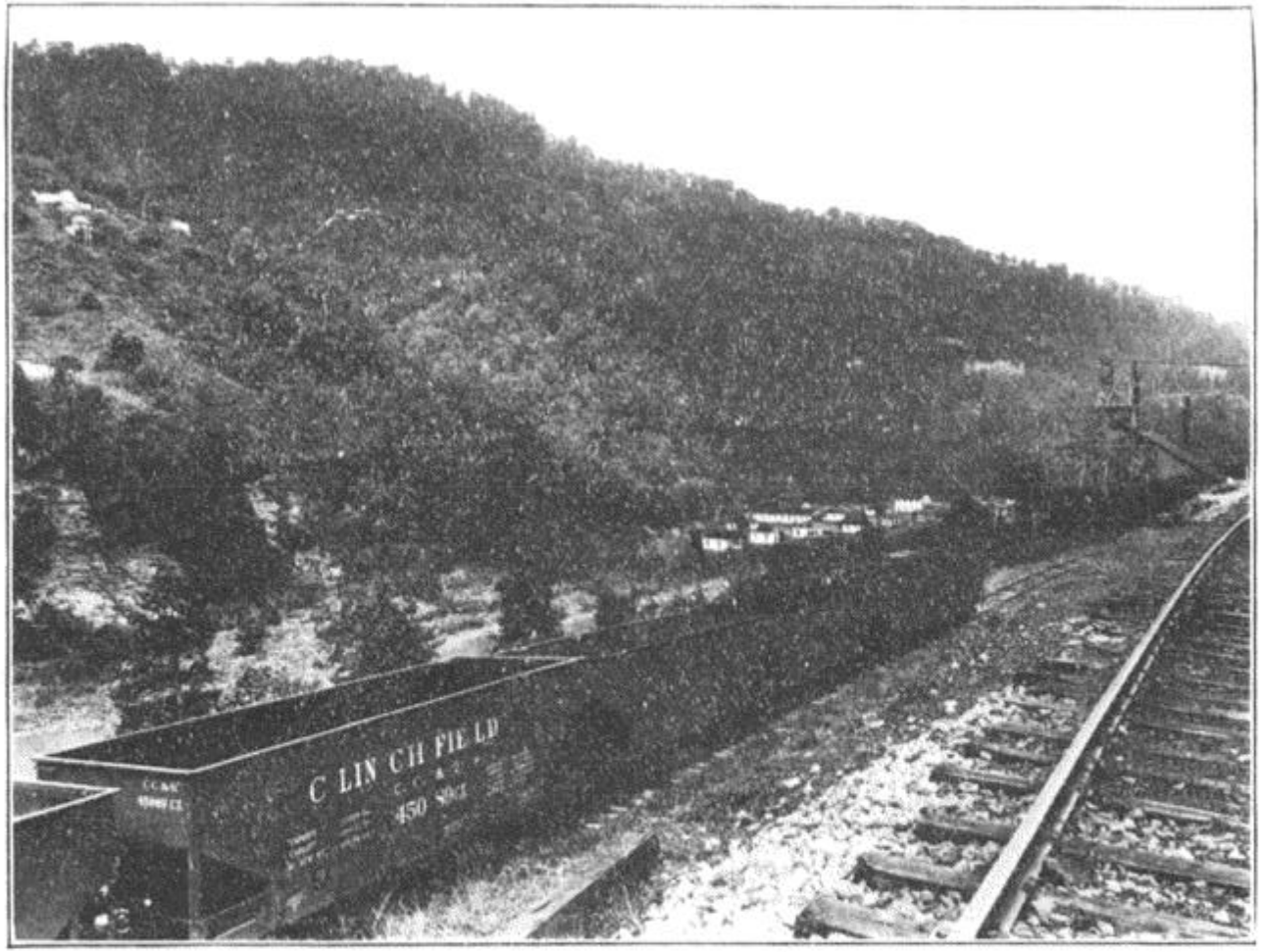
[10] First Explorations of Kentucky. J. Stoddard Johnston. 1898, pp. 58 and 60.

First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 70 and 71.

Reading between the lines, one sees in Dr. Walker something of an able prospector, for he clearly delimits the extent of the Appalachian coal fields as far as Kentucky is concerned. Though great credit is due him for his perseverance and insight which made possible the discovery and use of coal by a white man in Kentucky 172 years ago, it must still be said in all fairness that he probably had very little conception of, and attached less importance to the future of the great industry which he had so casually opened.

GIST EXPORTS COAL.

Almost a year later Christopher Gist, another early and able surveyor in the employ of the Ohio Land Company of Maryland, set out from Oldtown, a point on the Potomac river, and circling up through Pennsylvania and Ohio, came down into Kentucky in the spring of 1751. He had intended as were his instructions to go to the Falls of the Ohio to find agricultural lands, but being informed that warring Indians were in that vicinity, he drifted to the south and after merely glimpsing the broad level stretches of what is now known as the Blue Grass, plunged into the rugged foothills of the eastern coal field. Here he soon discovered the occurrence of coal, as his journal indicates.



AN EASTERN KENTUCKY BUCKET LINE TIPPLE.

The coal is mined high on the mountain on the left of the railroad and the Big Sandy River. It is brought by a cable line in buckets from the little loading house to the railroad tipple on the right where it is dumped into the cars. This operation, which is located one mile above Elkhorn City, Pike County, Ky., is owned by the Kentucky-Elkhorn Collieries Coal Co.

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"Wednesday, (March) 27, (1751) . . . On all branches of the little Cuttaway (Kentucky) river was plenty of coal, some of which I brought in to the Ohio Company."[12]

On the following day he again reports the discovery of coal as follows:

"Thursday, (March) 28, (1751) . . set out south-east fifteen miles crossing creeks of the little Cuttaway (Kentucky) river. The land still being full of coal and black slate."[12]

He evidently regarded these mineralogical discoveries as of some considerable importance, for it is noted again on:

"Monday, April (1), 1751 . . . went down another creek to the Lick where blocks of coal 8 to 10 in. square lay upon the surface of the ground; here we killed a bear and encamped."[13]

To one who will read between the lines it is easy to re-depict the scene which followed. Gist and his party, travel-worn through many months spent in the wilderness of the Indian territory to the north, and now particularly wearied from the rough Kentucky country through which they had just come, found here food, comfort and repose. That the occurrence of coal for a fine fire was quite as much the cause of their encampment as the killing of the bear can hardly be denied. Gist at this time was

[12] First Explorations of Kentucky. J. Stoddard Johnston. 1898, p. 154.

very close to if not on the Warriors' Trail, for his journal shows that two days later, on Wednesday, without having traveled any very great distance, he came:

" . . . to a small creek on which there was a large warriors' camp, that would contain 70 or 80 warriors; their captain's name or title was the Crane, as I knew by his picture or arms painted on a tree."[13]

As in the case of Dr. Walker, however, the common occurrence of coal evidently soon palled upon the imagination of Gist, who fails to make further metion concerning it. He continued his journey of adventure across the ridges and valleys, on the tributaries to the North Fork of the Kentucky river, and finally left the state through Pound Gap. He took back with him to his employers, the Ohio Company, specimens of the coals he found here. These were the first coals to be exported out of what is now known as the state of Kentucky Although found within Virginia's western territory, Gist exported them, for he took them with him on May 17, 1851,[14] when he passed through Wood's Gap (Flower Gap) from Virginia to his home on the Yadkin river in North Carolina.

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[13] First Explorations of Kentucky. J. Stoddard Johnston. 1898, p. 155.

[14] First Explorations of Kentucky. J. Stoddard Johnston. 1898, p. 162.

KENTUCKY'S COALS UNAPPRECIATED.

With the breaking out of the French and Indian troubles in western North Carolina, western Virginia and southern Ohio in 1754,[15] the migrations of those pioneers who might logically have followed in the footprints of Dr. Walker of a few years ago were held up indefinitely. The time was one of such gravity that many families actually returned eastward toward the old settlements of Virginia near the Atlantic.[16] Among those who left their frontier homes to find security west of the mountains was Daniel Boone and his family. Such fragmentary records as come down to us deal principally with the border warfare which was at that time of infinitely more importance than any of the mineral resources of Virginia's western dominion. It was during this time, 1754 to be exact, that John Filson tells us that James McBride made his pilgrimage across this state and cut his name on a tree at the mouth of the Kentucky river.[17] While he was certainly not the discoverer of Kentucky, as Filson claimed, he is illustrative of that group of intrepid explorers who continued their pilgrimages through this state even during this period of extreme hostility, and of whom only partial and

[15] History of Southwest Virginia, Summers. 1903, pp. 55, 56 and 57.
[16] Daniel Boone. Thwaites. 1909, pp. 42, 43.
[17] History of Kentucky. Collins. 1882, p. 519.
[17] Life of John Filson, Durrett. 1884, p. 31.

in many cases unreliable information is now to be secured. These men all came to Kentucky looking for broad, rich agricultural lands, well adapted to the plantation scheme of farming so well worked out in central and eastern Virginia. They were, for the most part, not interested in any of the mineral resources of the new area, and if they made any personal use of such coals as they may have found in their rambles, they probably failed to record it, since they regarded them as of little consequence.

The treaty of Fontainebleau made by the French and English in 1762 resulted in a gradual cessation of Indian hostilities,[18] and in 1769, that memorable year, Boone with his party started what has come to be known as the "great invasion." Consisting of but small and infrequent groups at first, these hardy pioneers and their families treading the Wilderness Trail became more and more frequent, until in the latter part of the 18th century the stream of home seekers was an almost continuous one. Thousands thus found their way into what was to be Kentucky. Such fragmentary records as are preserved speak of the hardships of the journey, the dangers from the Indians, and the allurements of the promised land. While it must be admitted that these pilgrims had for their first and guiding motive a new, cheap and

[18] History of Southwest Virginia. Summers. 1903, pp. 76-78.

good agricultural location, it is impossible to believe that in passinig through the rich coal fields of south-eastern Kentucky they did not notice and make use of such coals for their fires as were readily available.

John Filson published his book[19] in 1784, and included with it a map of the same date showing the Wilderness as well as the Warriors' Trails passing through Lincoln and Fayette counties. He makes a considerable point in describing the agriculture and climate of Kentucky, and on his map takes pains to locate the Stations, Forts, Salt Springs, Licks, Towns, Building Houses, Mills and Wigwams. In eastern Kentucky he indicates the mountain region, but he does not show a single coal outcrop or mine. It may be thus surmised that at this time the great coal fields of this state played a very small and insignificant part in the domestic and industrial life of the new Commonwealth. Throughout his book,[19] there is no mention made of the vast coal deposits of Kentucky.

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[19] Discovery, Settlement and Present State of Kentucky. Filson. 1784.

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II.

A NEW KENTUCKY INDUSTRY.

Yet with the growth of the population, it was only to be expected that interest would eventually develop in the mineral resources of the new area; so we find that a few years later a number of prospectors have been making investigations throughout the state.[20] Imlay in his fascinating book speaks authoritatively of salt springs, beds of coal, limestone, clay for brick making, etc. Speaking of the mineral deposits of Kentucky, he says:

" . . . It is particularly favorable that this mineral (coal) lies at the heads of our larger rivers; as it can be sent down with the greatest facility, . . . "[21]

Imlay's statements have been more than substantiated by subsequent experience. James Hall, whose portraiture of early Kentucky is unsurpassed, when traveling through the Ohio valley and Kentucky during the first half of the nineteenth century availed himself of Imlay's economic information, and noted its accuracy.[22] Towards the last of the 18th century the economic demand for home-made hardware, implements of steel and iron, became so great, due

[20] Topographical Distribution of the Territory of North America. G. Imlay. 1792.

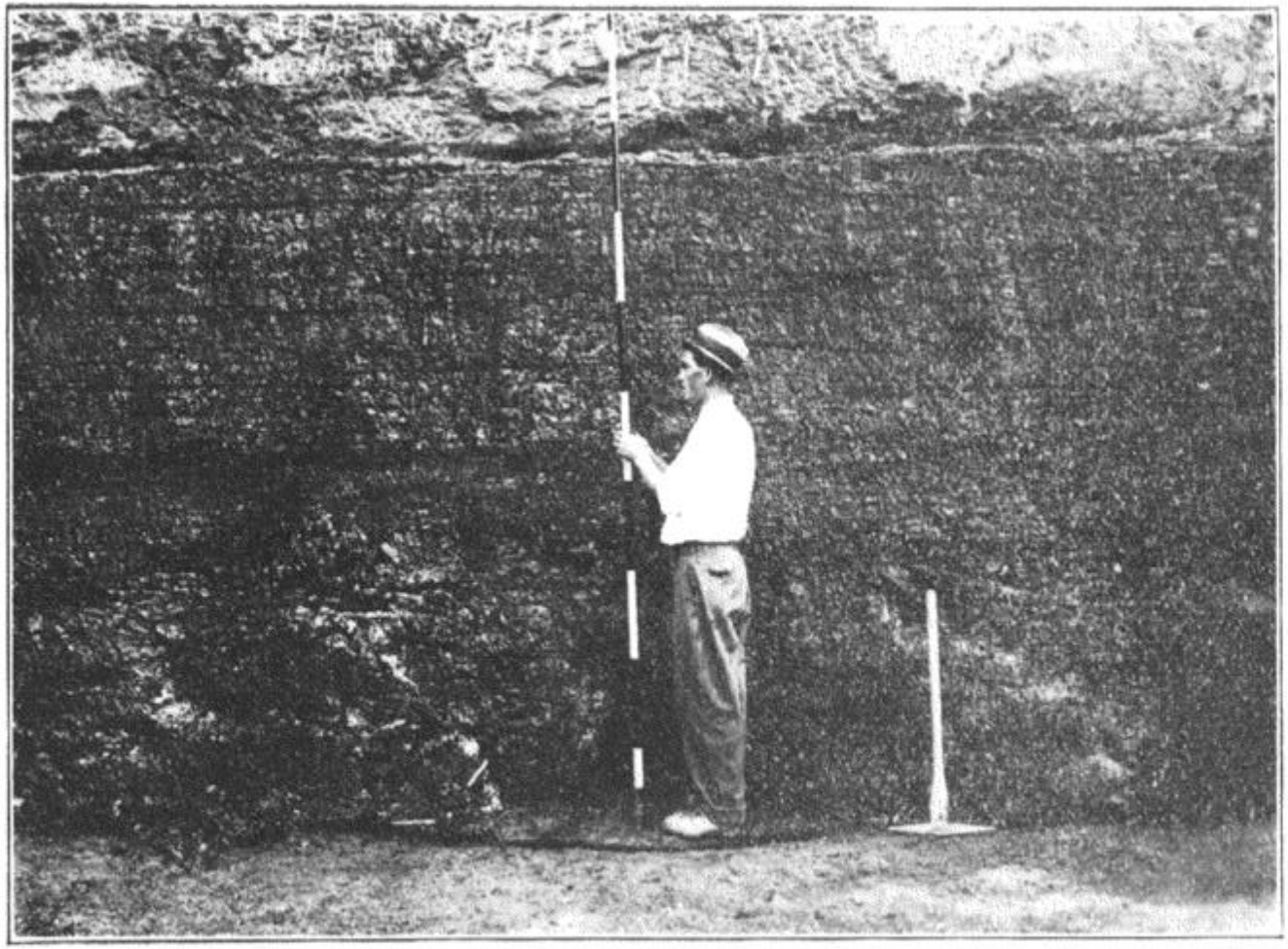
[21] A Topographical Description of the Western Territory of North America, etc. G. Imlay (map), Samuel Campbell, N. Y. 1793, p. 125.

[22] Sketch of the West. James Hall. 1835, Vol. 2, pp. 103-104.

to the rapid increase of the population, that we find in 1790[23] the first iron furnace to be constructed west of the Allegheny mountains was built near Owingsville in Bath, then Bourbon County. The ore here used was a siderite which had weathered from an original limonite, a residual of the Onondaga limestone.

Though wood charcoal was used in its smelting, Kentucky coals found their first real industrial use in the forging of refined products made from this iron ore. Stoves, other domestic utensils, and hardware were made on Slate creek, a branch of the Licking river; and in 1814 during the second war with England four pound cannon balls were cast here and wagoned to the Licking river. Thence they were shipped by flat boat to New Orleans, where General Jackson used them in his engagements with the British. A number of cannon balls of this date and manufacture are still found occasionally in this section, and a number of them are held by antiquarians as relics of this state's early development. The iron industry in Kentucky was in a large degree responsible for the first prospecting and early development of the coal industry in this state. As late as 1853, Mather in making a reconnaissance for the promoters of the Lexington and Big Sandy Railroad notes the operation of coal mines in the

[23] Geology of Kentucky. Miller. 1919. Series 5, Bulletin 2, pp. 307-308-309.



THE PRIDE OF EASTERN KENTUCKY.

The view shows seven and a half feet (ninety inches) of Elkhorn coal at Jenkins, Letcher County, Ky. This property is operated by the Consolidation Coal Company. The Elkhorn coal is very low in sulphur and ash and high in heat units. It has no equal for many industrial purposes.

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north-eastern district in conjunction with the Star Furnace, Beuna Vista Furnace, Clinton Furnace and Mount Savage Furnace.[24]

With the establishment of statehood in 1792, and the growth of a more permanent and stable economic and political relationship, the development of municipal centers at Lexington and Louisville, and elsewhere, there began to grow up a substantial and continued demand for coal for heating and industrial purposes. The coal banks adjacent to the navigable and semi-navigable streams of eastern and western Kentucky were searched for their available coal, and these began to be studied in a sporadic way by the natives, who loaded home-made flat boats and took them down with the tide to points from which they could be distributed by wagon. Lexington, as well as some of the other smaller cities of the Blue Grass area, being somewhat removed from the Kentucky river in distance, had but a small coal trade for many years. The steep ascent from the Kentucky river gorge made it practically impossible for this section of the state to secure as large quantities of cheap coal as the trade demanded. In 1805 Lexington is reported to have consumed about 13,000 bushels,[25] or 494 short tons. This

[24] Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad. Mather. Pub. Pudney & Russell. 1854, pp. 9 and 10.

[25] History of Kentucky. Collins. 1882, pp. 407, 408.

amount of coal could easily be carried in a few coal cars. At Frankfort and Louisville, however, these obstacles were not encountered. The capital city of Kentucky, much smaller than Lexington, consumed about 200 tons per annum, and Louisville, the largest municipal consumer in the state, had an abundant supply of very cheap coal from Kentucky river mines in the Ohio river traffic. The coal industry grew apace in these localities, as a number of early newspaper items[26] and miscellaneous records show. At the same time coal lands in Kentucky were cheap, difficult to dispose of and commonly traded in barter for tobacco, flour, beef, pork or whiskey. Francois Andre Michaux, a Frenchman of real ability, in traveling down the Ohio river in 1802, notes in respect to northeastern Kentucky that: "The chalky stone and abundant coal mines which lie useless are the only mineral substances worthy of notice."[27]

The first quarter of the 19th century was one of broad intellectual, agricultural and industrial development in Kentucky. Transylvania University, at Lexington, Ky., founded a chair of Natural Science, which was filled by Constantine Smaltz Rafinesque[28] in 1819.

[26] History of Kentucky. Collins. 1882, pp. 407, 408.

[27] Travels to the West of the Allegheny Mountains in . . . Ohio, Kentucky and Tennessee . . . undertaken in . . . 1802. F. A. Michaux. 1805, London. Rept. Ed. by R. G. Thwaites, 1904, Cleveland, p. 223.

[28] Life and Writings of Rafinesque. R. E. Call. Filson Club, 1895.

Though interested principally in botany, Rafinesque's unusual and eccentric talents found no limit for their application. He claimed for his own the whole field of science, including geology. While his observations were many and generally of a discerning character when within his own particular field of botany, conchology, and ichthyology, his geological conclusions as revealed in his "Ancient Annals of Kentucky,"[29] are not only impossible, but grotesque. He says, "By operation of submarine volcanoes, the strata of coal, clay, and amyglavid are formed and intermixed at various and intermittent times with the above strata."[30] With such an erroneous conception of the geology of coal held by those of supposed scientific authority, is it any wonder that the development of this great mineral resource of Kentucky was so long embarrassed?

INDUSTRIAL EXPANSION.

Although for many years during the early part of the 19th century Kentucky cities and villages located along the Ohio river made use of a great deal of Pennsylvania and West Virginia mined coal shipped in barges down this natural thoroughfare, the uncertain nature of this traffic, due to the lack of adequate reposi-

[28] International Encyclopedia, 1920. Vol. 19, p. 482.
[29] History of Kentucky. Marshall. 1824, pp. 9 to 39.
[30] History of Kentucky. Marshall. 1824, p. 14.

tories along the river, tended gradually toward its discontinuance.[31] The fact that all of Kentucky's streams of any importance find either their headwaters or middle courses in Kentucky coal fields began at this time to facilitate the development of the coal industry of this state. The expansion was not, however, as rapid as might have been expected for several reasons.

Kentucky streams have always been subject to high and low water, and these conditions before the improvement of the river by locking became gradually worse than better, due to the gradual deforestation of the highland watersheds. River traffic was, therefore, subjected to short and uncertain periods of fairly high water, which unfortunately were the identical periods in which large amounts of timber, both loose and rafted, were floated down the streams. The logging industry was, therefore, a serious handicap to the coal barging or flat boating industry; and although the amount of coal mined and shipped from Kentucky by river continued to grow, it did so in the face of great handicaps.[32] With the construction of the Frankfort and Lexington railroad, in 1835, it was expected that a Blue Grass

[31] United States Census. 1880. Vol. 15, pp. 893-894.
[32] Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad. Mather. Pub. Pudney & Russell, 1854, p. 12.

outlet would be provided for the Kentucky river and mountain traffic; but due to the transfer of goods required at Frankfort, this freight business did not materialize.[33]

It is uncertain at what exact date the production of coal in Kentucky for intrastate transportation and use began to take real form. The extent of the coal fields and many of their best seams were known to the natives and interested public as early as 1810. In 1820 William D. McLean opened what became known later as the "McLean drift bank, on the Green river, and this mine is regarded as the first commercial operation in the western coal field.[34] During the '20's there appears to have been a considerable movement looking towards the development of Kentucky coal for industrial and domestic purposes. The No. 11 or Herrin coal about five feet in thickness was opened and operated by several small mines at Bon Harbor in Daviess county as early as 1825.[35] Statistics are available showing that 328 short tons of coal were mined and sold in Kentucky in the year 1828.[36] From thence on, the development is one of continuous expansion.

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[33] Kentucky River Navigation. Verhoeff. Filson Club, 1917, p. 109.

[34] Coal Mining and Its Bearing on the Coal Industry. Ky. State Hist. Soc., Reg., Vol. 12, No. 35, May, 1914, Rothert, pp. 33-36.

[35] History of Daviess County. Inter-State Pub. Co., 1883, pp. 251-252.

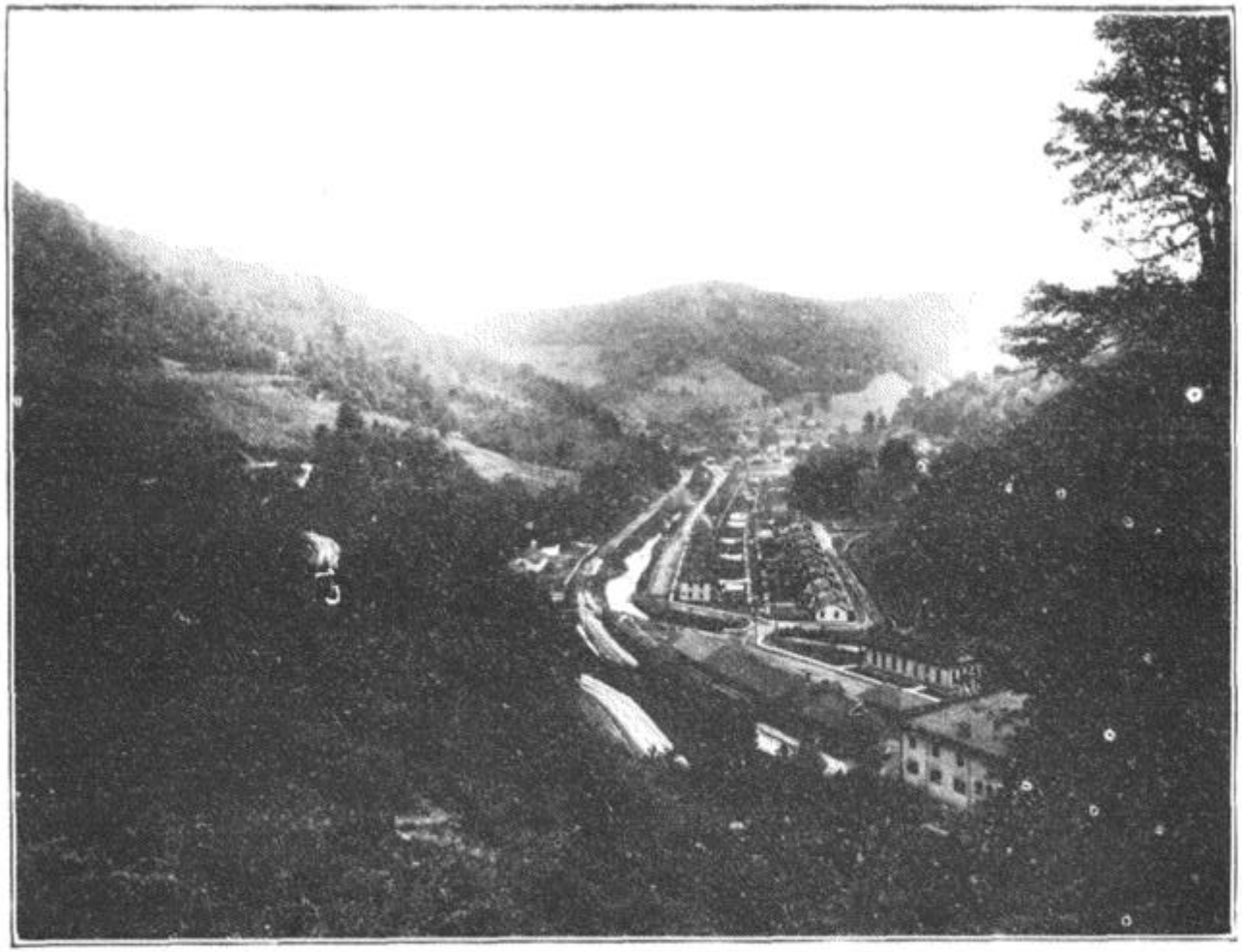
[36] Mineral Resources of the U. S. Geol. Survey, 1906, p. 580.

By 1830 the volume of coal produced in Kentucky had grown to 2,000 tons, and in 1837 it was 10,000 tons. During this decade Mud river coal was wagoned with ox teams in a three day haul to Russellville, and Green river barges became the recognized source of coal for Evansville,[37] Indiana, and Henderson, Kentucky. The late thirties witnessed a notable increase in the interest in coal and iron developments of the state. David Trimble, speaking before the Kentucky legislature, under date of February 12, 1838,[38] says:

"No geological surveys have as yet been authorized by the state, and no scientific researches or investigations have been made by individuals. All that is known has been collected from men of business or men in search of subsistence, and not from men of science. . . . The existence of coal and iron ore was known to the first settlers of the country, but at that period and for many years thereafter the inducements to explore the wilderness in search of either were not sufficient to justify the expense and loss of time; but the demand for coal and iron has increased so much and is increasing so rapidly that the necessary and proper examinations cannot be much longer delayed. Even now

[37] Coal Mining and Its Bearing on the Coal Industry. Ky. State Hist. Soc., Reg., Vol. 12, No. 35, May, 1914, Rothert, pp. 33-36.

[38] Ky. House Journ., 1837-1838, pp. 466-485.



A SPLENDID EASTERN KENTUCKY COAL TOWN.

The view is of Fleming, Letcher County, Ky., from the automobile road above the L. & N. R. R. station. This is one of the newly built coal towns of the Elkhorn Coal Co. Wheelwright, Wayland, Weeksbury, Jenkins, and McRoberts are other new towns of Letcher and Floyd Counties belonging to the same class.

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the people of the rich limestone lands are looking to the hills for future supplies of coal for fuel, and the iron interest is of too much importance to the community at large to be much longer forgotten or neglected."

It was indeed a time of awakening for Kentucky from a mineralogical standpoint, and the Committee on Internal Improvements of the state made history when it succeeded in securing the adoption of resolutions instructing the Governor to appoint an able geologist to make a reconnaissance of the mineral and agricultural resources of Kentucky. Governor Clark selected Dr. William Williams Mather,[39] of New York, whose report consisting of forty pages was published by the state in 1838, and is the first authentic paper on the coal and mineral resources of Kentucky.[40] Separate copies of this early geological report are now exceedingly rare, and only one or two are believed to be in existence besides the copy now in the Kentucky Geological Survey library at Frankfort. After calling attention to the great variety of undeveloped mineral resources in the state, outlining the two Kentucky coal fields, and estimating roughly their potential value, Mather gave suggestions for the formation of a geological survey.

[39] History of the Kentucky Geological Survey, 1838-1921, W. R. Jillson, Register of the Ky. State Hist. Soc., Vol. 19, No. 57, Sept., 1921, p. 91.

[40] Jour. Ky. Senate, 1839. Appendix, pp. 253-292.

KENTUCKY GEOLOGICAL SURVEY ESTABLISHED.

Nothing was done, however, in this respect until 1854, when, following the passage of authorizing legislation in the General Assembly, Governor Lazarus W. Powell appointed Dr. David Dale Owen, of New Harmony, Indiana, State Geologist of Kentucky.[41] Owen organized the first Kentucky Geological Survey immediately, and began forthwith the publication of detailed investigations outlining the definite extent of the eastern and western coal fields, and the correct enumeration and qualitative study of the many coal seams. Unfortunately he and his assistants confined themselves closely to the geology of their subjects, and their reports for this reason contain very little information throwing light on the development of the coal industry in this state up to 1854.

The growth of the coal industry in Kentucky, however, had proceeded apace, each year witnessing the addition of several thousand tons of an aggregate production. In 1840 the amount had increased to 23,527 tons, which in 1845 had more than quadrupled itself to 100,000, and this was increased one-half again to 150,000 tons in 1850,[42] by which time a large

[41] History of the Kentucky Geological Survey, 1838-1921, W. R. Jillson, Register of the Ky. State Hist. Soc., Vol. 19, No. 57, Sept., 1921, p. 95.

[42] Production of Coal in Kentucky, Bulletin No. 4, Series 5, Ky. Geol. Survey, 1921. W. R. Jillson, pp. 160-161.

number of wagon and river bank or barge mines had been opened on the Big Sandy, Licking, Kentucky, Cumberland, Green and Tradewater rivers. In the western coal field of Henderson[43] County a number of small surface mines were in operation at this time, and to the south in Muhlenberg county one of the old coal properties in this portion of the state, the Mud River Mine, which had been opened in 1830, was enjoying a rather large and profitable development by river barging and wagons.[44]

At the time the construction of the Lexington and Big Sandy railroad, now the Chesapeake and Ohio railroad, was being proposed in 1853, William Williams Mather was again brought into Kentucky to report upon the economic geology and mineral resources between Lexington and Ashland along the proposed route. After disposing of the other minerals of the region he calculates that at that time enough coal is to be found in this region to last 200 years on a basis of the transportation of 600,000 tons per annum, which it must be remarked was a stupendous figure for that day and time. He says further: "Lexington and the country along and near the railroad line in that vicinity have been partially supplied with coal from the Kentucky river, but the expense and risks of

[43] History of Henderson County. Starling, 1887, p. 130.
[44] History of Muhlenberg County. Rothert, 1913, pp. 391-392.

transportation have been too heavy to bring the coal into general use."[45]

CIVIL WAR CAUSES DEPRESSION.

At the time of the beginning of the Civil War the coal production in Kentucky had reached the then large figure of 280,000 tons per annum. This volume, however, began to decrease, and had dropped to 200,00 tons at the close of the hostilities in 1865. When one reflects on the widespread and continuous social, political and industrial disruption of Kentucky during this terrible period, the wonder grows that a volume as large as that recorded could have been produced. During the reconstruction period, the industrial depression of the state and the inability of domestic consumers to pay for many things which then as now were considered household necessities is reflected in the greatly decreased amount of coal produced. In the year 1870 the volume of Kentucky mined coal had been reduced to 150,582 tons.[46]

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[45] Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad. Mather. Pub. Pudney & Russell, 1854, p. 11.

[46] Production of Coal in Kentucky. Bull. 4, Series 5, Ky. Geol. Survey. W. R. Jillson, 1920, p. 161.

III.

THE COAL INDUSTRY REBORN.

Fortunately, this condition was not to last for long. With the general introduction of powder for mining coal in both the eastern and western coal fields in the latter '60's,[47] and the reorganization, consolidation, expansion, and improvement of many of Kentucky's "short line" bankrupt railroads, during the '70's, the industry at once came back and grew at the rate of about 100,000 tons per year until 1879, when the 1,000,000 ton mark was reached.

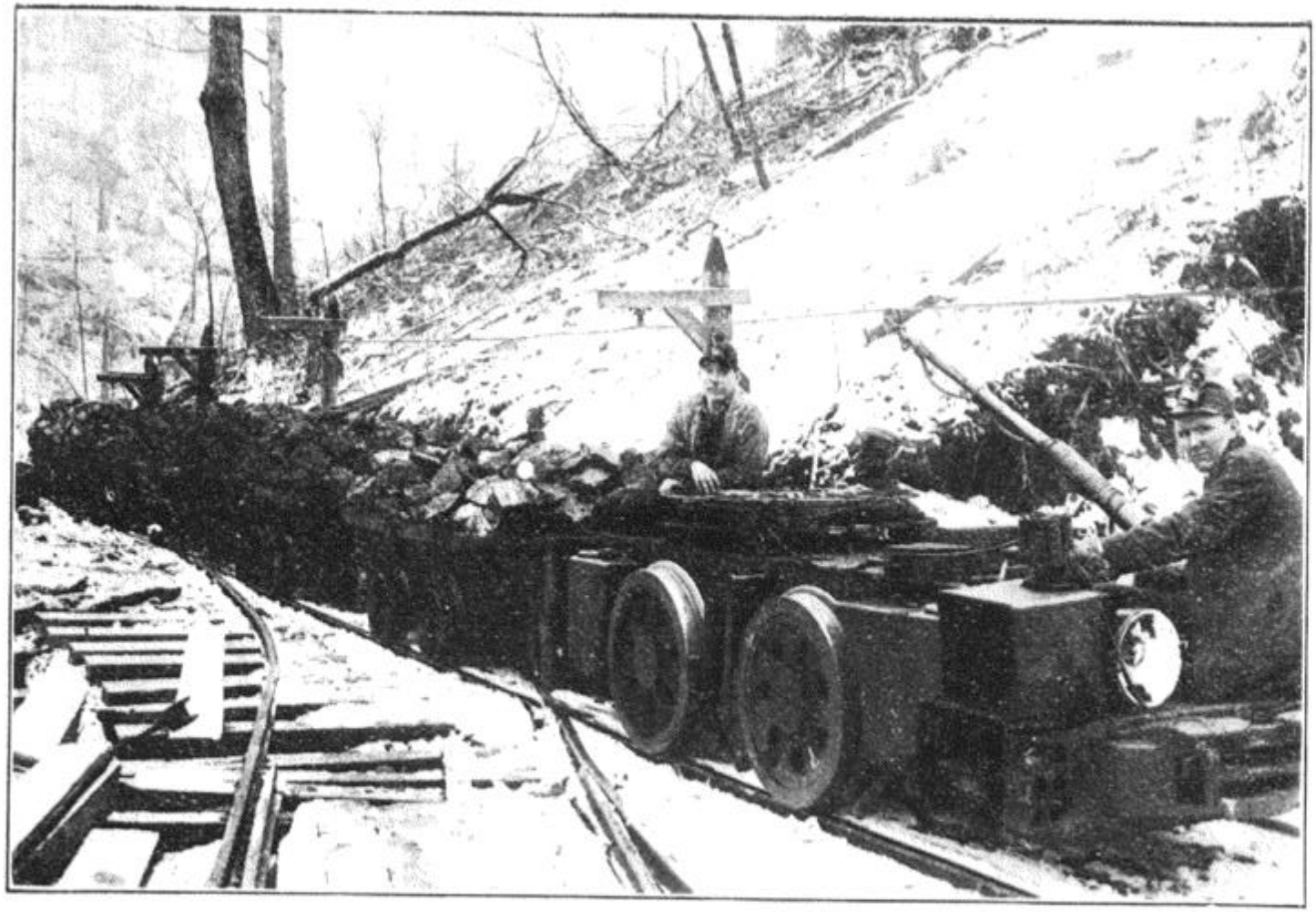
This large volume of increase reflects not only the opening of new mines and increased demand throughout the state and the Ohio river valley, but the gradual introduction of new mining methods whereby labor and overhead costs of mining were reduced, and daily tonnage was at the same time increased. The old fashioned candles and Dutch lamps came to be displaced by new inventions burning oil, and later, carbide. Heavy steel wedges and sledges, and iron rakes, so essential to the early coal miner's "kit," were abandoned in favor of new hand drills and scrapers, which later came to be greatly improved upon by the application of electricity. Man labor on the mine cars was replaced by mules, and these in turn by electric

[47] History of Muhlenberg County. O. A. Rothert, 1869-70, p. 394.

motors driven over steel tracks instead of loose wooden rails.

More recently, the practice of hand undercutting and auger drilling, followed by the dangerous antiquated method of shooting from the solid, common during the '80's and '90's has been abandoned. Electrically operated steel chain cutting machines, drills and shooting devices have taken their place. The industry constantly troubled with growing pains has appropriated hundreds of new devices to alleviate its internal congestion and speed up production. Foremost among these must be mentioned modern ventilating systems making use of continuous motor driven blowers, which have greatly improved conditions in Kentucky coal mines from the operator's as well as the miner's standpoint.

The recent tendency towards standardization of mine operation, the employment of scientific methods beneath the surface, and the economic construction of tipples and miscellaneous equipment throughout, has been largely responsible for the wonderful growth of the coal industry in Kentucky during recent years. To these fundamental factors must, of course, be added the all important headwaters extension of Kentucky's mountain railroads during the last few years. These railroad extensions have made possible the entrance into this state



MODERN MINE EQUIPMENT ON CLOVER FORK.

It has been truly said that the rapid growth of the coal production of southeastern Kentucky has been due in a large measure to the installation of extensive modern coal mining machinery. Snowy or rainy weather has no terrors for mines so equipped. This loaded mine train was snapped on the Clover Fork during zero weather in 1921.

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of the Alladin-like great corporations which with almost unlimited capital have undertaken the operation of unit coal fields such as the Elkhorn, in which scores of mines built around new and especially constructed sanitary mining towns are operated under a single management.

LABOR TROUBLES.

The development of the coal fields of Kentucky, like that of every other field in the United States, has not been accomplished without a number of unfortunate misunderstandings between the owners and their employees. During the early years of this industry in Kentucky the mines were so largely operated by unorganized native labor that there was really little cause and no opportunity for concerted action on the part of labor. The general conditions were all that could be expected at the time, and there was little dissatisfaction. Shortly following the coming of the paid union worker and agitator and their attempts to organize the miners, especially in the western field, there developed the first strikes. One of the earliest and most notable of these was the strike of 1886-87 caused by demands of the miners for the appointment of check weighmen, *i. e.*, a person to represent them and paid by them to weigh their coal.[48]

[48] Third Annual Report, Kentucky Inspector of Mines. 1886. Norwood. p. 11.

In 1889 there was a three months' strike in the Jellico region which was chiefly responsible for the year's shortage. Estimates received from the mine operators placed the loss due to the strike at not less than 1,000,000 bushels[49] or 60,800 tons. This, with the mild winter, caused the coal production of Kentucky for the year 1889 to fall below that of 1888, when the production in the state was 2,570,000 tons. The production for 1889 was 2,399,755 tons. Eight years later, 1897, Whitley county fell from the second to fifth place in the line of production due to an extended strike in the Jellico district.[50]

Small or localized disturbances have been experienced at different times in the western Kentucky coal field from this date on, but nothing approaching a large tie-up of the industry occurred until a drivers' strike started in Central City in April of 1920. In the confusion which followed the general walkout, other mines became more or less involved, and for a time the situation appeared very threatening, but was finally settled at the end of six weeks, not, however, without a considerable loss in production.

During the past eighteen months probably the most severe labor disturbance that has ever

[49] Sixth Annual Report, Ky. State Inspector of Mines, 1889, p. 9.

[50] Report, Kentucky Inspector of Mines, 1897. G. W. Stone, p. 30.

affected the coal industry of Kentucky occurred in the Tug Fork section of Pike county, Kentucky, and Mingo county, West Va., centering about Williamson, Chattaroy, and Mattewan. Although a number of intricate and somewhat confused principles have been involved in this strike, the real issue seems to have been the attempt of the United Mine Workers branch of the American Federation of Labor to unionize the Kentucky and West Virginia mines of this district in the face of opposition of the operators and a considerable percentage of the native mine workers themselves. The conflict early in 1921 assumed serious proportions and literally became a real border warfare between armed bodies of guards and outlaws.

During the present year both Kentucky and West Virginia state troops were called in to restore order. It was finally only through the intervention of President Harding, with the dispatch of a regiment of U. S. infantry and machine gun units, that peace and order were secured. This same executive order operated to turn back a body of 5,000 unionized miners, who had started from other points in West Virginia to march into the Williamson area, and thus further complicate the situation. Though not at the present settled, this titanic labor struggle of the hills of eastern Kentucky and West Virginia gives promise of some sort of reasonable

solution in the near future. Needless to say, its extent geographically, and duration, has seriously impaired the production of Kentucky coal for the years 1920-21 from the Pond Creek region of Pike county, where a loss of 300,000 tons has been estimated by the office of the State Mine Inspector of Kentucky.

REMEDIAL COAL MINING LEGISLATION.

With the rapid increase in importance of the coal mining in Kentucky, legislation looking toward the control and safeguarding of the industry began to be enacted by the Kentucky General Assembly towards the latter part of the 18th century. In 1884, the state legislature created the office of State Inspector of Mines, and Prof. C. J. Norwood, who had been employed as assistant geologist by Prof. Nathaniel Southgate Shaler and Mr. John R. Procter, on the 2nd Kentucky Geological Survey, was appointed to the new office by Governor J. Proctor Knott.[51]

The old trouble between the operators and miners concerning the amount of coal mined was settled on May 18, 1886, when a bill was passed through the State Assembly providing for a check weighman for miners where there were as many as 20 miners employed in a mine

[51] First and Second Annual Report of the Ky. State Inspector of Mines, 1884, p. 5.

and the majority of those employed in any such mine demanded the services of a check weighman.[52]

In 1887, the General Assembly passed a law regulating the ventilation of mines.[53] This was the beginning of artificial ventilation of all operations. Heretofore, with few exceptions, natural ventilation had been the only means provided. In 1892, a bill was passed by the legislature which provided for an assistant inspector of mines.[54] A year later, by legislative action, the State Inspector of Mines was made the Curator of the Kentucky Geological Survey,[55] which as directed by John Robert Procter had just been abolished.

In 1898 a law was passed by the General Assembly requiring the coal mining companies to pay their employees before the 16th of the month following the month in which the service was rendered. This bill also made it illegal for coal companies to coerce their employees into buying their supplies from any certain store or corporation.[56]

The employment of children in Kentucky coal mines had become somewhat general in the late '90's, and in 1902, there was a child Labor

[52] Report Kentucky State Inspector of Mines, 1894, p. 200.
[53] Report Kentucky State Inspector of Mines, 1889, p. 6.
[54] Report Kentucky State Inspector of Mines, 1892, p. 3.
[55] Report Kentucky State Inspector of Mines, 1893, p. 5.
[56] Report Kentucky State Inspector of Mines, G. W. Stone, 1900, pp. 286-287.

law[57] passed affecting mine employes. This law made it illegal to employ a child under 14 years of age in the mines. A miners' oil law was passed in 1906,[58] which required all oil used for illuminating purposes in the mines to be inspected and approved by the chief mine inspector. The State Mine Inspector had urged the passage of this bill in every report from 1892 to 1906, when it was passed. In the same year a bill was passed authorizing the chief mine inspector to settle all disputes between employers and employees in regard to the mine scales for the weighing of coal.

The child labor law was amended in the same year, limiting the labor hours of work of children under 16 years of age. Additional constructive legislation was written in 1908. These new statutes required mine foremen to pass an examination held by the chief inspector of mines with two assistant inspectors, before they were eligible for the position of mine foremen.[59] Following a tendency of recent years, the General Assembly of 1920 passed legislation regulating wash rooms and other sanitary conveniences for coal mines.[60]

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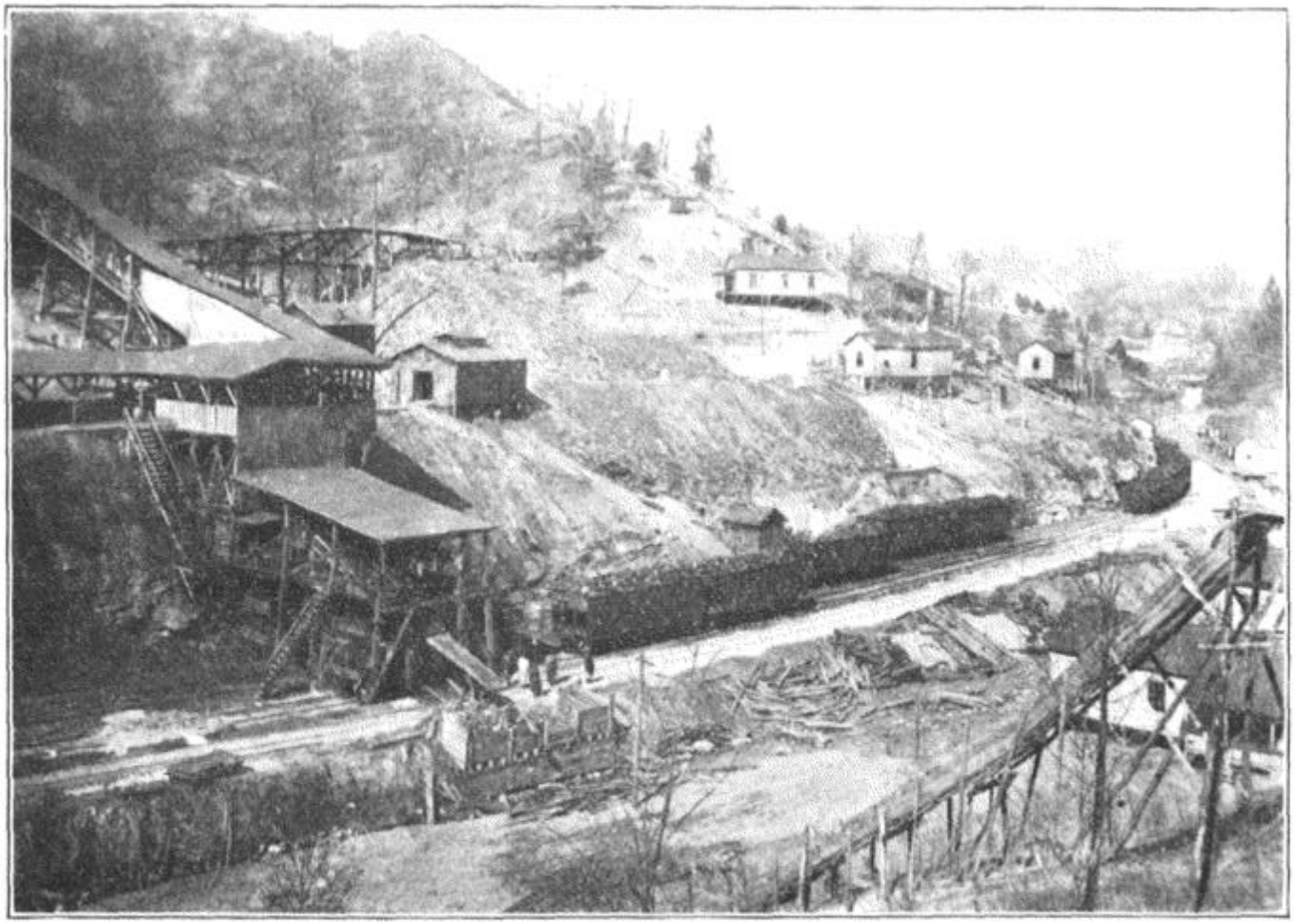
[57] Report Ky. Inspt. of Mines, 1902, p. 15, on mining laws—form given.
[58] Report Ky. Inspt. of Mines, 1905-6, p. 248, form of both laws given.
[59] Report Ky. Inspt. of Mines, 1908, p. 7, reference to law.
[60] Acts of Gen. Assembly of Ky., 1920, Chapter 20.



A COAL MINE IN THE HAZARD FIELD.

Although most of the operations in the southern Perry County coal field are smaller than many which are found in Bell, Harlan, Letcher, and Pike counties, the quality of the coal is very high. This tipple and camp belong to the Hazard-Blue Grass Coal Co. The mine is near Hazard.

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KENTUCKY COAL MARKETS.

From the earliest times, as was only natural, a very considerable proportion of the coal produced in Kentucky was consumed within the state. In the days of the infancy of the industry, however, the percentage of Kentucky coal used by Ohio river towns was not as large as it might have been, due to a popular prejudice in favor of Pennsylvania river barged coal. This trend of public feeling was justified about the middle of the 19th century, due to a really inferior grade of coal produced by a number of our river mines. With the larger development of the industry in the '80's, this undesirable fuel which had always constituted a small part of the total production was forced by a growing competition out of the market. Yet Louisville in 1884-85, consuming annually 500,000 to 600,000 tons,[61] purchased only a small percentage of the Kentucky product, and Cincinnati with a total annual consumption of 1,675,841 tons used no Kentucky coal except a small portion of the product of the mines of Boyd and Lawrence counties. The greater part of the production of the mines of this section of Kentucky adjacent to the Cincinnati Southern Railway which was exported went, not to the north but to southern markets. During this decade, it will be

[61] First and Second Rep., Ky. Inspt. Mines, 1884-85, pp. 18, 19, 20.

seen, Kentucky coals were not known and did not have a reputation in the northern industrial centers. This reputation had to be established before the market was ready to accept the product of this state in large quantities. The absence of any large industrial demand within Kentucky then as now, coupled with this unfortunate lack of information concerning Kentucky coal in the north, operated effectively to retard the development and hold down the total production of the state for many years. In 1889 the completion of the Chesapeake and Ohio railroad from Ashland to Cincinnati gave an outlet to a much increased production in the north-eastern district to new markets in Chicago and the north-west[62] generally.

It is a fact well remembered by the older generations that the development of Kentucky coal fields, especially the eastern field, passed through a remarkable "boom" during the middle '80's, which for a time facilitated all operations, but later had a very retarding effect. About the year 1886 a great deal of interest in the exploitations of several portions of the eastern coal field developed in promotion circles in Louisville. A Mr. F. D. Carley started a land and mineral corporation, and built a railroad to Jackson, in Breathitt county. In 1890 this corporation had 500,000 acres upon the waters of

[62] Sixth Ann. Rept. Ky. Inspt. Mines, 1889, p. 9.

the Kentucky river. The coal promotion craze spread like a grass fire. English capitalists founded Middlesboro and published much concerning it.* Louisville promoters undertook to do the same for Pineville, Barbourville, Beattyville, Ky., and Big Stone Gap, Virginia. The Louisville and Nashville railroad was extended to Cumberland Gap and up Powell's Valley, Virginia, to meet the Atlantic connection of the Norfolk and Western railroad. Iron furnaces were built at Middlesboro which became greatly over boomed. Building frontages sold as high as $400.00 per foot that had been worth little or nothing a few years previously. The boom began to deflate itself about 1890, and in 1893[63] the general panic reduced eastern Kentucky coal lands and town property to its then actual value. But the havoc wrought was not repaired for a number of years to come.

The fine qualities of the coal of Kentucky, however, gradually forced their own way into the open market. In 1892, market studies show that Louisville had increased her consumption of Kentucky mined coal from 124,159 tons in 1884 to 412,443 tons,[64] or 232% in eight years. Yet contemporary history says:

" . . . Notwithstanding the large amount of coal brought to Louisville by rail (Kentucky

* Log Mountain, Clear Creek Region, A. R. Crandall, 1890.
[63] Memorial History, Louisville. J. S. Johnston, 1896, Vol. I, p. 113.
[64] Rept. Ky. Inspt. of Mines, 1892, p. 50.

coal), there has been no decrease in the amount of Pittsburg coal brought here, the Kentucky coal rarely keeping pace with the increased annual consumption."[65]

The World's Fair in Chicago in 1893 provided the means for a most rapid national educational program concerning the coals of Kentucky and their respective merits which was readily seized by the state with very beneficial results. The following relative to coal is taken from a letter[66] to the Inspector of Mines from Col. M. H. Crump, of Bowling Green, who had charge of the Kentucky Mineral exhibit: "The exhibit attracted great attention, and was excelled by no state in the union, and was only equalled by West Virginia in its quality and excellence, . . . more than 30 awards, carrying medals and diplomas, setting forth the various qualities of the coal, were received. It was a source of much surprise to the world to find that Kentucky claimed to be a mineral state, as theretofore it had been known chiefly from its livestock and agricultural products. In cannel coal it far exceeded any other state. . . . No less than 50 papers, from Maine to California, reproduced the cut, with a description. Not less than 400,000 visitors passed under the arch and inspected, more or less critically, the exhibit;

[65] Memorial History, Louisville. J. S. Johnston, 1896, Vol. I, p. 248.
[66] Report Ky. Inspt. of Mines, 1893, p. 156.

MINING COAL WITH A STEAM SHOVEL.

A stripping operation of the Western Collieries Coal Co., on the former Tradewater Coal Co. property at Ilsley, Hopkins County, Kentucky, showing steam shovel loading coal. In the left foreground the caterpillar tracks show where the coal has been operated. The company owns 500 acres.

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of these, more than 75,000 left their names upon the register. . . . "

The popularizing effect of the Kentucky coal exhibit was tremendous, as a study of the production figures for the state in the late '90's will show. In the last decade of the old century nearly three million tons was added to Kentucky's production, thereby doubling it. This coal was shipped through by rail to large and rapidly growing markets in the industrial centers of Ohio, Indiana, Illinois, Wisconsin and Michigan, and laid the basis of the excellent reputation and large demand found for Kentucky coal in those manufacturing portions of the United States today.

A NOTABLE RECORD OF EXPANSION.

Comparisons serve well to illustrate the shifting growth and expansion of the coal industry of Kentucky from the middle '80's, when it may be said to have been reborn, down to the present year 1921. In 1886-87[67] there were 43 mines operated in the western coal field, 8 in the north-eastern coal field and 24 in the south-eastern field, a total of 75 for the entire state. In 1920 the total number of mines in Kentucky was 834, or an increase of 1012 per cent. The amount of money put in circulation

[67] Third Ann. Rept. Ky. Inspt. Mines, 1886. Norwood, p. 5.

in 1885[68] by coal mining was: Western field, $790,000; eastern field, $745,000; totaling $1,535,000. The value of coal produced in Kentucky in 1920 was $159,457,380, or 103 times as much as the total of 1885.

The growth of the coal industry is well shown by an examination of the production records of the various coal counties within the state. While the original discovery of coal was made in 1750 in what is now Bell County, it was in the western coal field county of Muhlenberg that the first commercial mine was operated in 1820. Following the lead of Muhlenberg County, the western coal field saw the first commercialization on a large scale, Hopkins, Muhlenberg and Ohio standing at the top of the production list in the order named in 1885.[69]

In 1890, with Hopkins county leading, Whitley (Jellico field) first rose to second place, relegating Ohio to third in rank. Ohio came back to second place again in '91 and '92, but in '93 lost it again to Whitley, which was permanently displaced for second rank by Muhlenberg in 1903. In the meantime in 1901 Johnson and Morgan came in as producers in the north-eastern field and were followed by the entrance into the productive ranks of Pike in 1904; Floyd in 1906; Wayne in 1910 (produced this

[68] Ann. Rept. Ky. Inspt. Mines, 1884-85.
[69] Second Ann. Rept. Ky. Mine Insp., 1885, C. J. Norwood, p. 5.

year only); Harlan in 1911; McCreary, Letcher and Perry in 1912; and Jackson in 1915. Hopkins continued the productive leadership until 1908, when it was relegated to the second place by Muhlenberg. Bell had risen in 1905 to third place and maintaining it in 1908 carried this position until 1915, when Hopkins displaced it. In 1914 Pike county, which had first produced in 1904, and was considered a virgin coal county, took the lead in production from Muhlenberg which had held it almost continuously since 1908. Again in 1916 Letcher, which had come into the list of producers in 1912, became the largest producer of coal in Kentucky. In 1919, the latest date for which detailed figures are available, Pike county, producing 4,784,899 tons valued at $11,916,261, as much coal as the entire state produced annually until 1900, took and has since maintained the first rank of the thirty-two counties mining and exporting coal in Kentucky.

MANUFACTURE OF COKE.

Coke is now produced in both the eastern and western coal fields of Kentucky. Although the best coking coals are now known to exist in the eastern coal field, and this field now produces the most coke, principally by-product, it was in the western field that the first coke was produced, in the commercial quantity of 4,250 tons

from 45 ovens in 1880.[70] In 1887[71] the Clifton mines in Hopkins County were the only ones producing coke. The first commercial production of coke in the eastern field occurred in 1889. The coke industry grew from 123 ovens in 1889[72] to 279 in 1892,[73] and in 1891 there were 32,693 tons of coke produced.

Up to and including 1900 the coking industry in this state had depended for its existence chiefly upon the utilization of slack and mine run coal. Stimulated by the active demand for coke in 1899 and 1900 the production increased to 95,532 tons valued at $235,505, or approximately $2.46 per ton. In 1915, Kentucky, which had entered the by-product coke industry, produced 526,097 tons of coke valued at $1,129,769. This had grown in 1917 to 863,071[74] tons of coke valued at $4,119,263. Of this amount, 531,539 tons valued at $2,324,948, or considerably more than half, was by-product coke. Among the twenty-two coke producing states, headed by Pennsylvania, Kentucky has risen from 16th place in 1913 to twelfth place on her total coke and fourth place on by-product coke alone in the year 1917.[75]

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[70] Min. Res. U. S. G. S., 1900, p. 497.
[71] Rept. Ky. Inspt. Mines, 1892, p. 61.
[72] Rept. Ky. Inspt. Mines, 1889, p. 25.
[73] Rept. Ky. Inspt. Mines, 1892, p. 4.
[74] Min. Res. U. S. G. S., 1917, p. 1145.
[75] Min. Res. U. S. G. S., 1917, p. 1158.

IV.

GEOLOGY AND PRODUCTION OF COAL

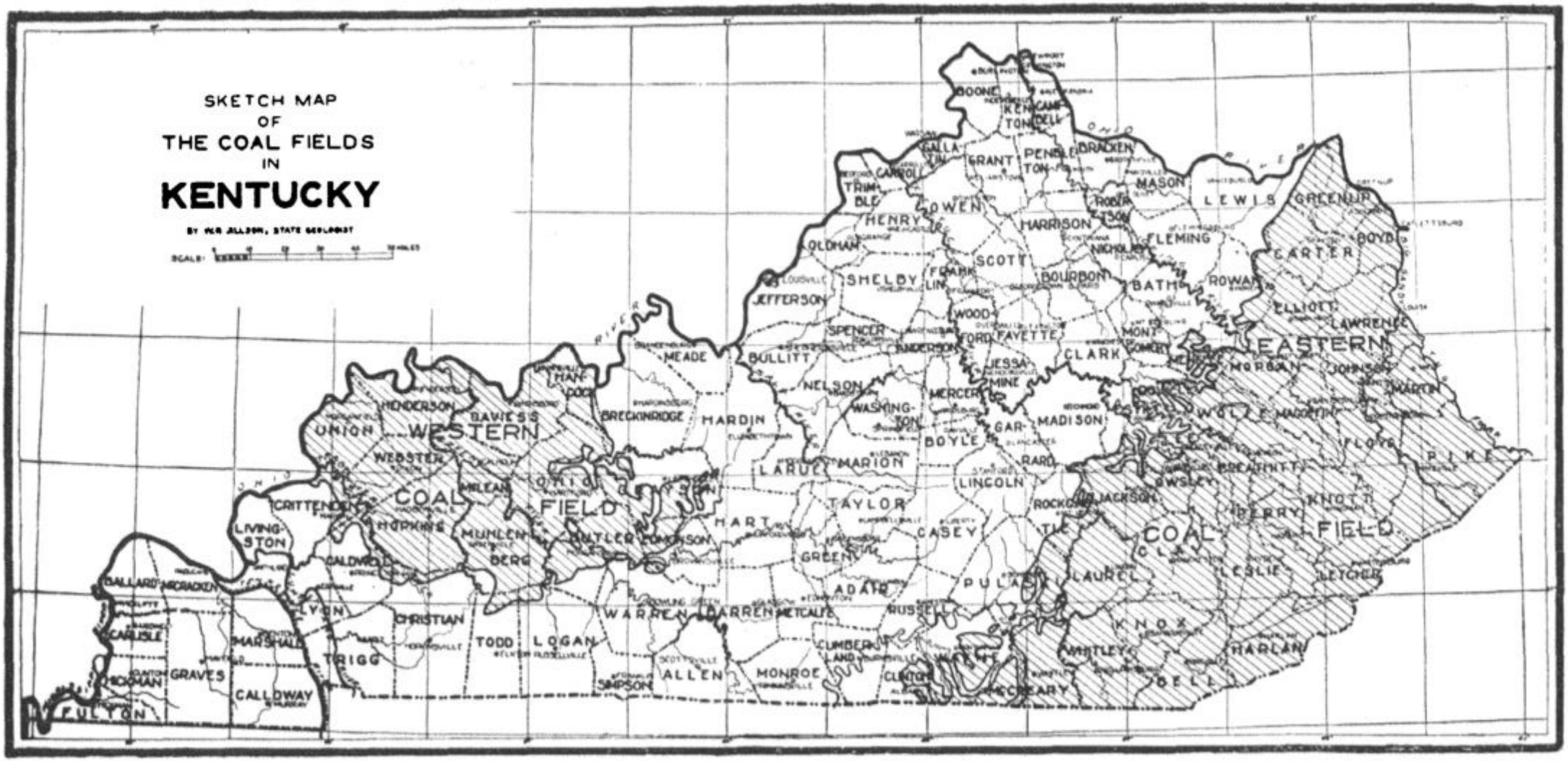
To adequately outline the geology of the coals found in Kentucky would require space far in excess of that allowed in this book. The main points may, however, be stated within small compass. Kentucky's coal fields are now two separate and distinct units, though time was, when following the Paleozoic era for many, many ages they were actually a single coal field from Livingston county on the Ohio in the west to Martin county on the Tug Fork of the Big Sandy in the east. Long since their point of union, which was over the Blue Grass region, has worn away, due principally to uplifts of the Cincinnati arch. Waste of that once continuous strata may still be found stretching out towards central Kentucky on the hill tops from either side.

The eastern coal field covering an area of 10,450 square miles lies in a great structural trough or geo-syncline, the south-east end of which is the Cumberland range and the north-west side of which is the Cincinnati arch. The eastern field contains thirty-seven counties, producing and non-producing, and occupies the whole of the eastern part of the state. The border counties of the eastern coal field are Menifee, Powell, Estill, Lewis, Rowan, Madi-

son, Rockcastle, Pulaski, McCreary, Wayne and Clinton. The interior counties are Greenup, Boyd, Carter, Elliott, Lawrence, Morgan, Johnson, Martin, Wolfe, Magoffin, Floyd, Pike, Lee, Breathitt, Knott, Jackson, Owsley, Perry, Letcher, Laurel, Clay, Leslie, Whitley, Knox, Harlan and Bell.

The western coal field covers an area of 4,680 square miles and lies in a broad and deep structural basin, the southern tip of the great interior coal field of Illinois and Indiana. The western coal field contains twenty-one counties, Twelve of which are marginal counties and show but a small portion of the coal measures. These border counties are Hancock, Breckinridge, Grayson, Hart, Edmonson, Warren, Butler, Logan, Todd, Christian, Caldwell, Crittenden and Livingston. The counties located entirely within the western field are Daviess, Union, Henderson, McLean, Ohio, Muhlenberg, Hopkins and Webster, and these are of course the largest producers.

The coals of the eastern Kentucky coal field are many, the exact number of which is not known, though many tentative and regional correlations have been made. The field generally lacks adequate correlation of its coals, which may not be accomplished for some time, due to the inability of private individuals to undertake so great a work, and lack of provision for this


SKETCH MAP
OF
THE COAL FIELDS
IN
KENTUCKY
BY A.R. CRANDALL, STATE GEOLOGIST
SCALE:
WESTERN
COAL
FIELD
EASTERN
COAL
FIELD
BOONE
KENTON
CAMPBELL
GALLATIN
GRANT
PENDLETON
BRACKEN
MASON
LEWIS
GREENUP
CARROLL
TRIMBLE
OWEN
HENRY
HARRISON
ROBERTSON
NICHOLAS
FLEMING
CARTER
BOYD
OLDHAM
SHELBY
FRANKLIN
SCOTT
BOURBON
BATH
ROWAN
JEFFERSON
WOODFORD
ELLIOTT
LAWRENCE
SPENCER
ANDERSON
FAYETTE
MONTGOMERY
MEADE
BULLITT
JESSAMINE
CLARK
MORGAN
JOHNSON
MARTIN
NELSON
MERCER
WASHINGTON
MADISON
HENDERSON
DAVIESS
UNION
BRECKINRIDGE
HARDIN
GARRARD
WOLFE
MAGOFFIN
FLOYD
PIKE
WEBSTER
LARUE
MARION
BOYLE
RANDOLPH
BREATHITT
CRITTENDEN
LINCOLN
OWSLEY
LIVINGSTON
HOPKINS
MUHLENBERG
BUTLER
LOWNDES
TAYLOR
ROCKCASTLE
JACKSON
PERRY
KNOTT
HART
CASEY
CALDWELL
GREEN
LESLIE
LETCHER
BALLARD
MCCRACKEN
ADAIR
PULASKI
LAUREL
LYON
CHRISTIAN
WARREN
BARREN
METCALFE
RUSSELL
KNOX
CARLISLE
MARSHALL
TODD
LOGAN
CUMBERLAND
WHITLEY
HARLAN
GRAVES
TRIGG
ALLEN
MONROE
CLINTON
MCCREARY
BELL
CALLOWAY
SIMPSON
FULTON

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important work by the General Assembly. The principal coals now mined and their type locality are: (1) Elkhorn seam, Pike and Letcher Counties; (2) Amburgy seam, Letcher County; (3) Freeburn, Upper Thacker, Lower Thacker and Alma seams, Pike county; (4) Millers Creek seam, Johnson and Floyd Counties; Harlan or Straight Creek seam, Knox, Whitley, Bell and Harlan Counties; (5) Wallins or Dean or Fire Clay seam, Harlan, Perry, Breathitt and Lee Counties; (6) High Splint seam, Harlan county; (7) Leonard seam, Harlan County; (8) Keokee or Kellioka seam, Harlan County; (9) Cornett seam, Harlan county; (10) Hazard or No. 6 seam, Perry and Breathitt Counties; (11) Flag or No. 7 seam, Perry County; and many others of local or undeveloped importance.

These coals of eastern Kentucky exhibit many of the excellent qualities of the coals of the Appalachain Basin, to which they belong geologically and geographically. They are bituminous, have a high volatile content and are generally low in ash and moisture. These characteristics make many of the seams well adapted for coking and the manufacture of artificial gas. Furthermore, many of these coals are what is known as "splint" or "block" coals, which makes them very desirable for domestic purposes. The eastern coals range in heat val-

ues from 13,000 to 14,000 B. T. U.'s which gives them a widespread demand as steaming coals. Lastly, these coals are the "low sulphur coals" of Kentucky, many of them ranging down as low as .75 and lower which is a very desirable factor for general or coking purposes. Drift mining is the principal method of coal operation in eastern Kentucky. Stripping has but local importance. Shaft mining is a method of the future in this field. The Chesapeake & Ohio, the Baltimore & Ohio, the Louisville & Nashville, the Cincinnati Southern railroads and a few insignificant short lines serve the eastern field. Some little coal is still barged from Lee county on the Kentucky river.

Any enumeration or discussion of the coals of the eastern part of this state would be incomplete without some reference to the cannel coals of this region, which are found: (1) as unit seams, and (2) constituting a portion or bench of the main seam. The best cannel coals in the United States occur in Kentucky, which produces more cannel coal than any other state. The best cannel coals in Kentucky occur in Morgan county, but Bell, Carter, Elliott, Floyd, Magoffin, Breathitt, Knox, Johnson and Leslie counties also produce excellent cannel coals. The principal portion of the production is shipped to the north-west and Canada, where it is used for domestic fuel and as an enricher in the

manufacture of illuminating gas. Kentucky cannels of good grade average about 55 per cent volatile matter, and therefore compare favorably with any other cannels produced.

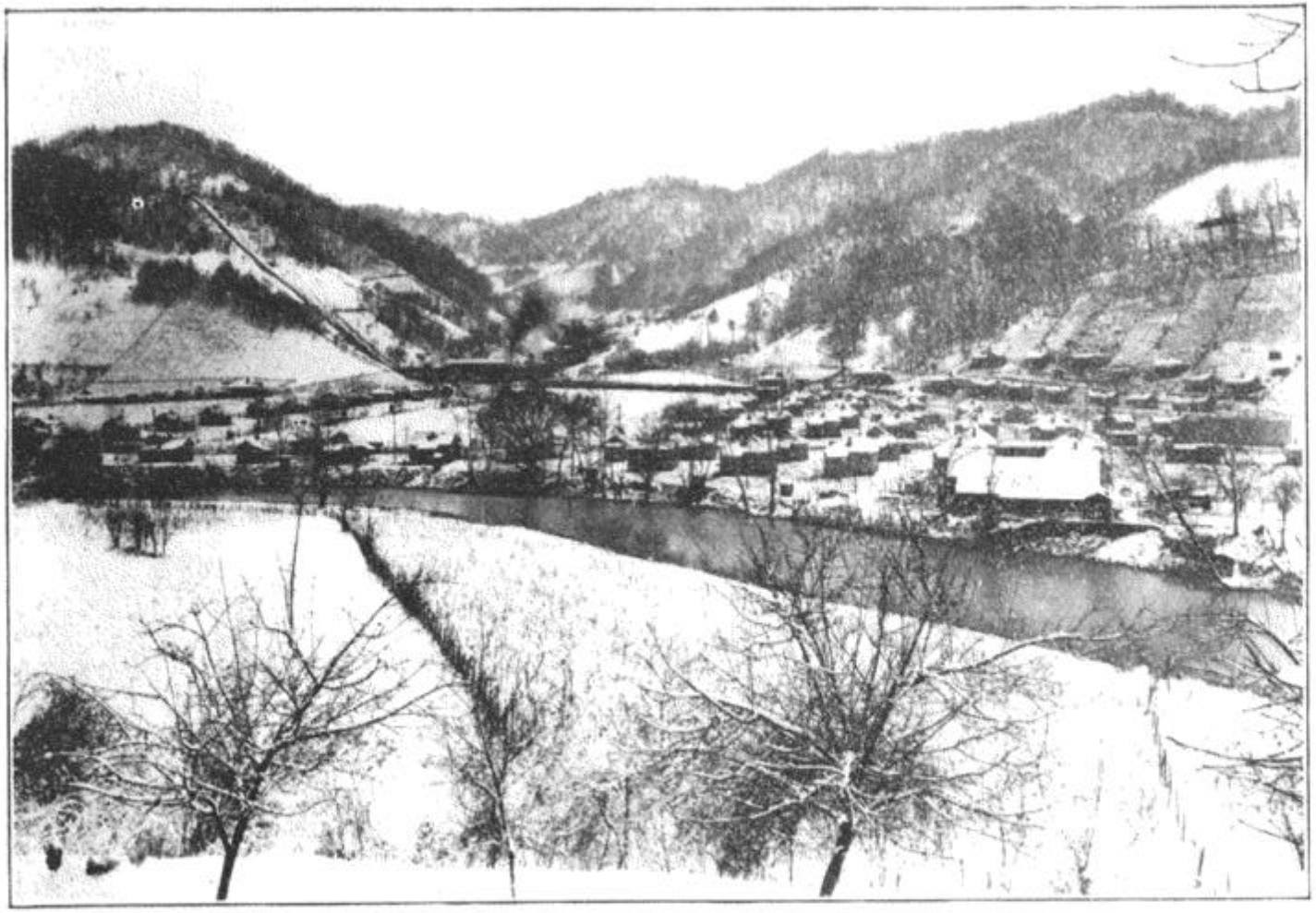
While the coals of the western Kentucky coal field are less in total number than those of the eastern field, there are several very excellent coals to be found in this portion of the state. Those coals which enjoy the widest commercialization, with the localities in which they are now being operated, are: (1) No. 12 seam, Hopkins and Webster counties; (2) No. 11 or Herrin seam, Webster, Hopkins, Union and Ohio Counties; (3) No. 9 or Springfield seam, Muhlenberg, Henderson, Ohio, Union, Webster, Hopkins, McLean and Daviess Counties; (4) No. 14, Muhlenberg County; (5) Nebo seam, Hopkins and Henderson counties; (6) Mannington or Empire seam, Christian County.

The coals of the western Kentucky coal field are a unit geologically and chemically with the interior field of Illinois and Indiana. Like the coals of these adjoining states, these western Kentucky coals are bituminous, and when compared with eastern Kentucky, West Virginia and Pennsylvania coals they are found to be relatively high in volatile matter, ash and sulphur. While somewhat softer than the eastern coals they are free burning, and therefore command a large domestic and steaming market.

They are excellent gas producers and can also be coked. Slope and shaft mining are the principal methods used in this field, though stripping or open pit (steam shovel) mining has become of considerable importance in some districts during the last few years. The Illinois Central and the Louisville and Nashville railroads serve the western field.

KENTUCKY'S COAL PRODUCTION.

There is, perhaps, no better way to evaluate the factors of growth which have operated in the development of Kentucky's coal fields than to review the total yearly figures of production. For the period extending from 1828 to 1920 inclusive the total production figures reach the stupendous volume of 402,235,581 tons, of which more than one-half, 215,023,557 tons, has been produced in eight years, 1913 to 1920 inclusive, as compared with 187,212,024 tons of the total production for the eighty-four years recorded prior to 1913. It may be seen by a review of the table given herewith that the recent production of coal in Kentucky during the last decade has been little short of marvelous; in fact, the production of the last three years, 1918-1920, inclusive, has reached the figure of 100,457,547 tons, valued at $327,939,755.



A UNIT COAL MINE AND TOWN.

This excellent property is located a short distance above Harlan on Martin's Fork of the Clover Fork of the Cumberland River. Harlan County coal has built a fine reputation during the last few years and this mine, owned by the Wallins Creek Coal Corporation, is profiting thereby.

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PRODUCTION OF COAL IN KENTUCKY*
1828 TO 1920.

Year	No. Short Tons
1828	328
1829	2,000
1830	2,000
1831	2,100
1832	2,500
1833	2,750
1834	5,000
1835	6,000
1836	8,000
1837	10,000
1838	11,500
1839	16,000
1840	23,527
1841	35,000
1842	50,000
1843	60,000
1844	75,000
1845	100,000
1846	115,000
1847	120,000
1848	125,000
1849	140,000
1850	150,000
1851	160,000
1852	175,000
1853	180,000

*Production of Coal in Ky. Jillson. Ky. Geol. Surv., Series V, Bull. IV, pp. 160-162.

1854	190,000
1855	200,000
1856	215,000
1857	240,000
1858	250,000
1859	275,000
1860	285,760
1861	280,000
1862	275,000
1863	250,000
1864	250,000
1865	200,000
1866	180,000
1867	175,000
1868	160,000
1869	160,000
1870	150,582
1871	250,000
1872	380,800
1873	400,000
1874	360,000
1875	500,000
1876	650,000
1877	850,000
1878	900,000
1879	1,000,000
1880	946,288
1881	1,232,000
1882	1,300,000
1883	1,650,000

1884	1,550,000
1885	1,600,000
1886	1,550,000
1887	1,933,185
1888	2,570,000
1889	2,399,755
1890	2,701,496
1891	2,916,069
1892	3,025,303
1893	3,007,179
1894	3,111,192
1895	3,357,770
1896	3,333,478
1897	3,602,097
1898	3,887,908
1899	4,607,255
1900	5,328,964
1901	5,469,986
1902	6,766,984
1903	7,538,032
1904	7,576,482
1905	8,432,523
1906	9,653,647
1907	10,753,124
1908	10,246,533
1909	10,697,384
1910	14,623,319
1911	14,049,703
1912	16,490,521
1913	19,616,600

1914	20,382,763
1915	21,361,674
1916	25,393,997
1917	27,809,976
1918	31,530,442
1919	30,036,061
1920	38,892,044
1828-1920	402,235,581

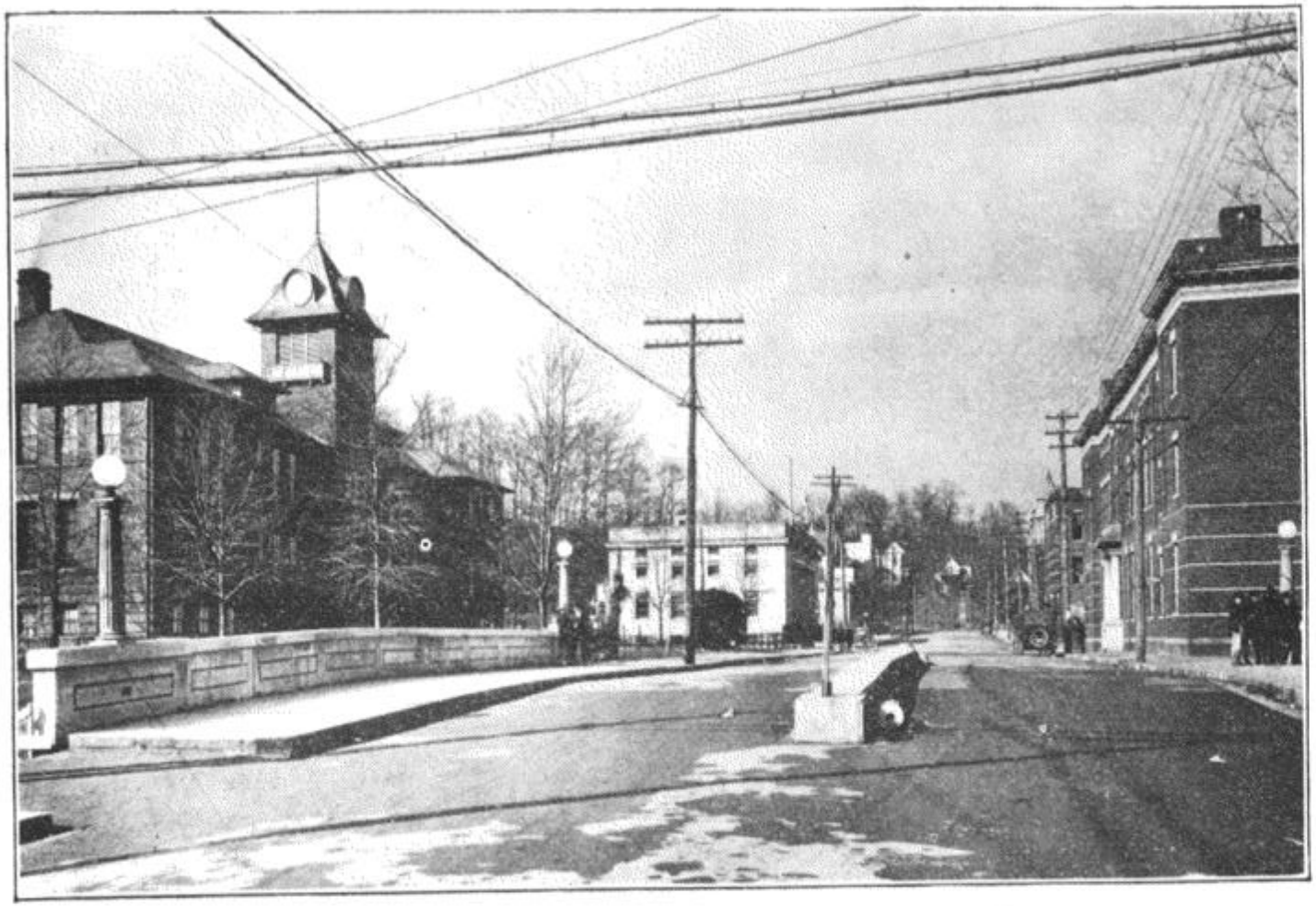
KENTUCKY COAL PRODUCTION IN TWO GROUPS.

Year	Tons
1913-1920 inclusive (eight years)	215,023,557
1828-1912 inclusive (84 years)	187,212,024
Excess	27,811,533

KENTUCKY A NATIONAL COAL PRODUCER.

Rising from a position of comparative obscurity as a coal producer, Kentucky in 1898 and 1899 took tenth place among the states of the United States and contributed 1.8 per cent of the total coal production of the country.* In 1905, Kentucky rose to eighth from the top in the list of coal producing states, which position was maintained through 1907, when she headed Colorado, which had preceded her until then, and became seventh. In 1912 the rapid development of eastern Kentucky began to be felt

*Min. Res. U. S. G. S. 1900, pp. 298, 299.



MIDDLESBORO—A CITY BUILT BY COAL.

One of the finest, healthiest and most picturesque of southeastern Kentucky cities is Middlesboro in Bell County. Coal put it on the map a few decades ago. This is a view of North 20th Street, showing public school and U. S. post office on the left and municipal buildings on the right. Surrounded by high mountains, the city affords many unique views, including Cumberland Gap.

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and this state took fifth place, which was held through 1913. In 1914, with only Pennsylvania, West Virginia, Illinois ahead in the order named, Kentucky became the state of fourth importance on a coal producing basis. Ohio bid closely for the great northwest markets and her own and slipped back into fourth place in 1915, relegating Kentucky to an easy fifth, which has been held through 1917, the last year for which comparisons of total volumes of coal produced are available at present.

RECAPITULATION AND SUMMARY.

Kentucky has seen a wonderful advance in coal production during the past three decades. The state has risen from the bottom of the list in the middle 80's to fifth place in 1921. Prior to 1893 practically all the coal mining was done by hand and with the pick. About this time operators began to gradually introduce the use of machinery. This movement has grown rapidly, especially during the past three decades. In 1893, 20% of Kentucky coal was machine mined; in 1903, 49% was machine mined, and in 1913 approximately 70% was machine mined. In 1916 this had increased to 84.4%, and is about 90% at the present. The remarkable growth Kentucky has made in coal production during the last decade has been due to the discovery and development of new, thick, market-

able coals in the eastern counties. Thus Letcher County enters the list of counties as producing commercial coal in 1912, and in 1916 heads the list, outrivaling her sister county, Pike, the then leader, which began producing commercial coal in 1904. Thrilled by the advance of Letcher, Pike County returns to the first place in 1917, and has led the state down to the present.

Harlan county has seen a similar development. Kentucky's output of coke was trebled the second year Harlan county produced commercial coal. The third year after Harlan County entered the list, the coke poduction was increased almost tenfold. The western field has increased its production greatly by the consolidation of operations and the comparatively recent introduction of modern methods of stripping shallow coals with the steam shovel. The war demand stimulated coal production greatly in Kentucky. A reversion to normal conditions bids fair to maintain the figure, and the end is not yet in sight. The number of tons of coal produced per death in this state has been unusually high when compared with that of other coal producing states. This, while lamentable, can be corrected by proper care and rigid inspection. The number of strikes in the coal fields of Kentucky has been notably low, indicating in general, not only good labor condi-

tions, but also conditions of good and farseeing management. To these excellent operative factors must be added a vast quantity of coal not only unmined but still largely unopened and unsurveyed, which facts when taken together reasonably assure Kentucky's future position as a great national coal producer.

THE END

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INDEX

A

Aborigines 25
Allegheny 21
Allegheny Mountains 38
Alma Seam 67
Amburgy 67
American Federation of Labor 53
American Indian 19
Ancient Annals of Kentucky 41
Anthropologist 19
Appalachian Basin 67
Appalachian Coal Fields 30
Appalachian Indian 18
Ashland 47, 58

B

Barbourville 59
Bath County 38
Bell County 27, 62, 63, 66, 68
Big Sandy River 29, 47
Big Stone Gap 59
Block Coals 67
Blue Grass 30, 39, 42, 65
Bon Harbor Mine 43
Boone, Daniel 33
Bourbon County 38
Boyd County 26, 57, 66
Breathitt County 58, 59, 66, 68
Breckinridge County 66
British 38
Butler County 66
Buena Vista Furnace 39

C

Caldwell County 66
California 60
Canada 68
Cannel Coal 68
Carley, F. D. 68
Carter County 66, 68
Central City 52
Cherokees 24, 27
Chickasaws 24
Christian County 66
Cincinnati 57, 58
Cincinnati & Ohio Railroad 47
Civil War Depression 48
Clark, Governor 45
Clay County 66
Clifton Mines 64
Clinch River 24
Clinton County 66
Coal, Discovery of 17
Coal, Expansion of 61
Coal, Geology of 19, 65
Coal, Kentucky Mined 59
Coal, Production of 65, 70, 71, 72, 73, 74
Coal Industry in Kentucky, The 17
Coal Industry Reborn 49
Coal Interest Develops 37
Coal Markets 57
Coal Measures 20, 24
Coals, unappreciated 33
Coke, manufacture of 63
Colorado 74
Columbus 25
Conemaugh 21
Cornett 67
Crittenden County 66
Crooked Creek 28

Crump, M. H., Col. 60
Cumberland Gap 18, 26, 27, 59
Cumberland River 47
Cuttaway River 31

D

Daviess County 43, 66
Dean Seam 67
Drift Mining 68
Dutch Lamps 49

E

Edmonson County 66
Elkhorn 51
Elkhorn Seam 66
Elliott County 66, 68
Estill County 65
Evansville 44
Evans, Lewis 26

F

Falls of the Ohio 30
Filson Club 17
Filson, John 33, 35
Flag Seam 67
Flower Gap 32
Floyd County 62, 66, 68
Fontainebleau 34
Forts 35
Frankfort 40
Frankfort and Lexington Railroad 42
Freeburn Seam 67
French and English 34
French and Indian Troubles 33
French Jesuit Missionary 25

G

General Assembly....46, 54, 55, 56, 67
Gist Exports Coal.... 30
Gist, Christopher 30, 31
Grayson County 66
Green River 44, 47
Greenup County 26

H

Harding, President W. G.... 53
Hall, James 37
Hancock County 66
Harlan County 63, 66, 76
Harlan Seam 67
Hart County 66
Hazard Seam, ... 67
Henderson County 44, 66
Hennepin, Father 25
Herrin Seam 69
Holston River 24
Hopkins County 62, 63, 64, 66

I

Illinois 61, 75
Imlay 37
Indiana 44, 61
Indians 34
Industrial Expansion 41
Inter-Conglomerate Coal 29
Iron Industry 38

J

Jackson, Gen. 38
Jackson 58
Jackson County 63, 66
Jellico Field 64
Johnston, J. Stoddard.... 27
Johnson County 66, 68

K

Kellioka Seam 67
Kentucky 53, 66
Kentucky Geol. Survey 45, 46
Kentucky Legislature 44
Kentucky River Traffic 43
Kentucky River Mines 40
Kentucky River 33, 47
Keokee Seam 67
Knott, J. Proctor 54
Knox County 28, 68

L

Labor Troubles 51
LaSalle 25
Laurel River 28
Laurel County 28, 66
Lawrence County 57, 66
Lee County 66, 68
Leslie County 66, 68
Letcher County 63, 66, 76
Lexington 39, 40, 47
Lexington & Big Sandy R. R. 38, 47
Licking River 38, 47
Licks 35
Little Scioto River 18
Livingston County 65, 66
Logan County 66
Lewis County 65
Louisville 39, 40, 59
L. &. N. Railroad 59
Loyal Land Co. 26
Lower Thacker Seam 67

M

Madison County 65
Magoffin County 66, 68
Maine 60
Mannington Seam 69
Martin County 65, 66
Mather, Dr. William Williams 38, 45, 47
McBride, James 33
McLean, William D. 43
McCreary County 63, 66
McLean County 66
Menifee County 65
Michaux, Francois Andre 40
Michigan 61
Middlesboro 59
Millers Creek Seam 67
Mills 35
Mississippian System 20
Morgan County 62, 68
Mound Builders 17, 19
Mt. Savage Furnace 39
Mud River Mine 47
Mud River 46
Muhlenberg County 63, 66

N

Nebo Seam 69
New Orleans 38
Norfolk & Western R. R. 59
North Carolina 32, 33
Norwood, Prof. C. J. 54

O

Ohio 57, 61, 66, 75
Ohio Land Co. 30
Ohio County 32
Oldtown 30

Onondaga Limestone 38
Ottawa, Ill. 25
Owen, Dr. David Dale 46
Owingsville 38
Owsley County 66

P

Paleozoic Era 65
Paleozoic Fern Trees 24
Potomac River 30
Pennsylvania 41, 57, 64, 75
Pennsylvanian Coal Measures 23
Pennsylvanian System 20, 21
Perry County 33, 66
Pike County 53, 62, 63, 66, 76
Pineville 59
Pottsville 21
Pottsville Conglomerate 28
Pound Gap 32
Powell County 65
Powell, Governor Lazarus W. 46
Powell's Valley 59
Prehistoric Men of Kentucky 19
Procter, John R. 54, 55
Pulaski County 66

Q

R

Rafinesque, Constantine Smaltz 40
Remedial Legislation 54
Rockcastle County 66
Rockcastle River 29
Rowan County 65

S

Salt Springs 35
San Salvador 25
Scioto River 24
Shaft Mining 68
Shaler, Prof. N. S. 54
Shawnees 24
Splint Coals 67
Springfield Seam 69
Star Furnace 39
State Inspector of Mines 55, 56
Stations 35
Straight Creek Sea 67
Strikes 53

T

Tennessee 24, 26
Todd County 66
Tomlinson River 28
Towns 35
Tradewater River 47
Transylvania University 40
Trimble, David 44
Tug Fork 29, 53, 65

U

Union County 66
United Mineworkers 53
United States 59, 68, 74
Upper Thacker Seam 67

V

Virginia 26, 28, 32, 33, 59

W

Walker, Dr. Thomas.....25, 26, 27, 29, 30, 32, 33
Wallins Seam 67
Warren County 66
Warriors' Trail 18, 27, 32, 35
Wayne County 62, 66
West Virginia.....41, 53, 60, 69, 75
Whitley County 62, 66
Wigwams 35
Wilderness Trail 34
Williamson 53
Wisconsin 61
Woods Gap 32
World's Fair 60

X

Y

Yadkin River 32

Z