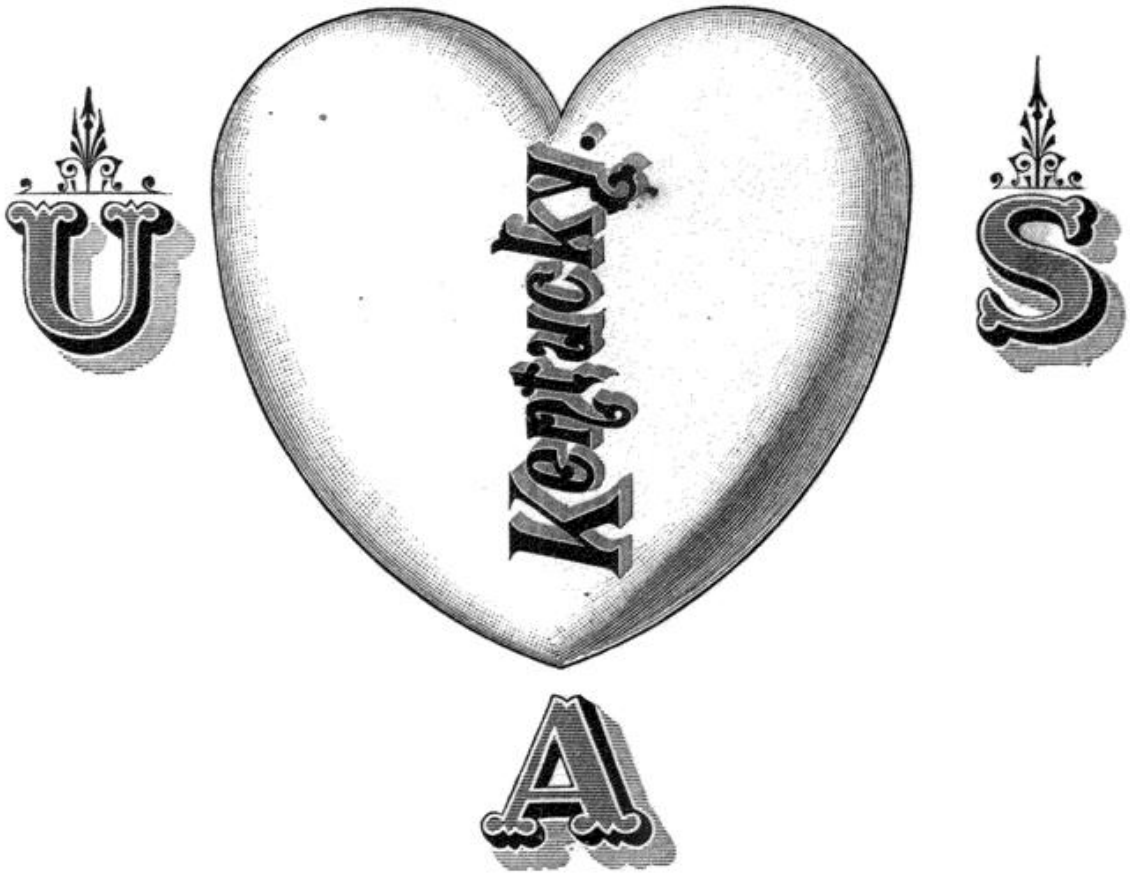
# The Kentucky Union Railway Company.

GENERAL OFFICES:

COURT HOUSE SQUARE, CORNER CHEAPSIDE AND MAIN ST.,

LEXINGTON, KY.

1883.




PROF. N. S. SHALER OF HARVARD UNIVERSITY.

See Page 9.


Awarded by the United States Centennial Commission to the HADDOCK COAL MINING COMPANY of Breathitt County, Kentucky, for the best

# CANNEL COAL IN AMERICA.

THIS MINE IS ON THE LINE OF THE

## KENTUCKY UNION RAILWAY COMPANY.

**PRESIDENT:**

T. J. MEGIBBEN, Harrison County.

**VICE PRESIDENT:**

A. G. P. DODGE, Lexington, *Managing Director.*

**DIRECTORS:**

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J. M. THOMAS, Bourbon County.
JOHN S. CAIN, Louisville.
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SAMUEL CLAY, JR., Lexington.
GEO. W. BOWEN, Bourbon County.
R. B. HUTCHCRAFT, Bourbon County.
WM. SHAW, Bourbon County.
RICHARD P. STOLL, Lexington.

**SECRETARY:**

J. M. THOMAS, Paris, Ky.

**TREASURER:**

RICHARD P. STOLL, Lexington.

## LANDS DEPARTMENT:

CAPT. J. M. THOMAS, Lexington.
BENJAMIN CRAWFORD, Lexington.

**ENGINEERS:**

WM. A. GUNN, (*Late Engineer Cincinnati Southern.*)
WM. McCLOY.

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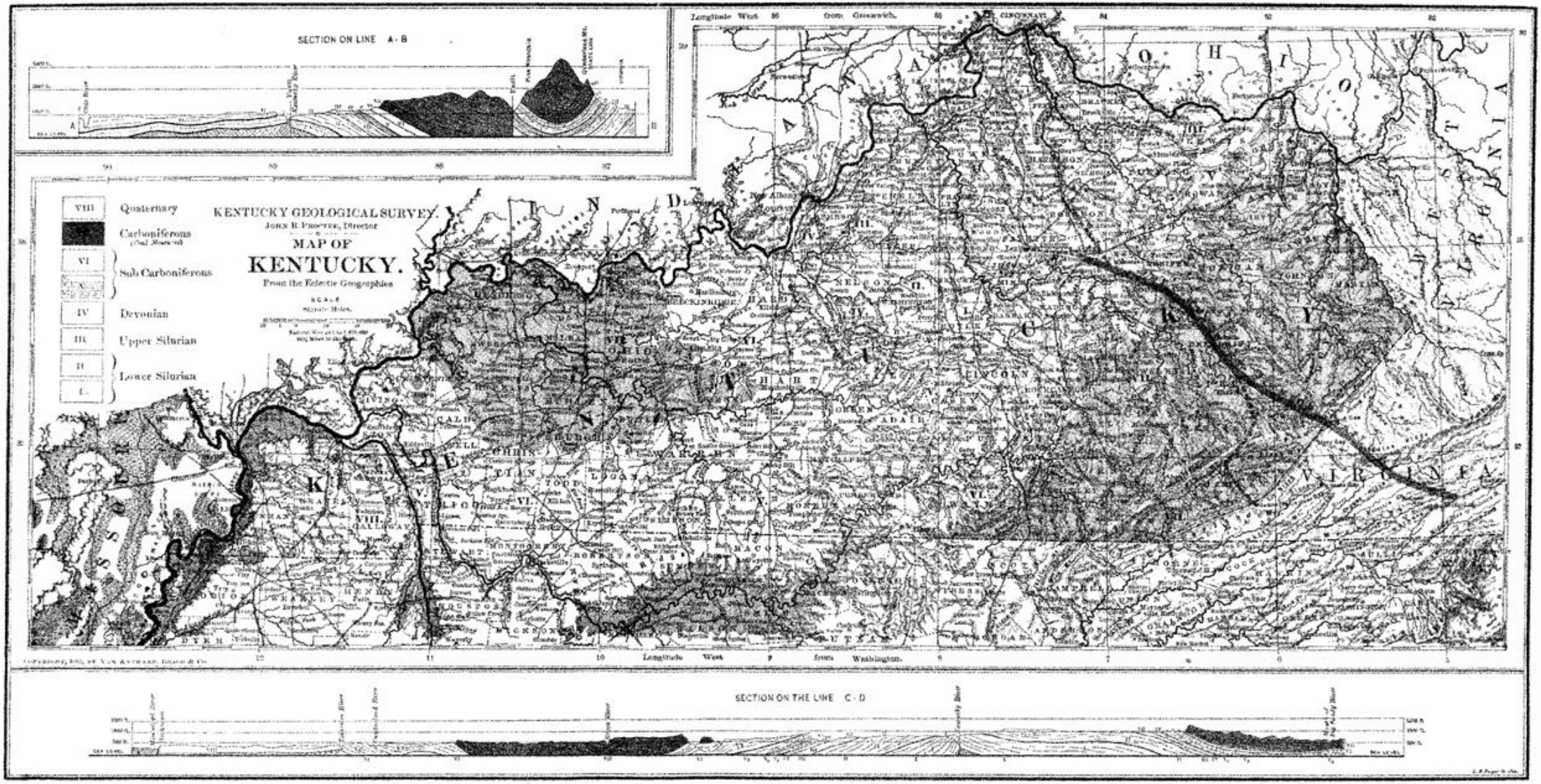
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# STATEMENT.

## The Blue Grass Counties of Kentucky.

These embrace a region with an acreage larger than the States of Massachusetts and Connecticut combined, and constitute the most permanently fertile body of land on this continent and the most beautiful rural district in America.

PROF. SHALER, of Harvard University, says: "I am personally well acquainted with the conditions of the fertile lands of this country and of Europe, and I have never seen another body of land *equal to this* for the purposes of a cheap and varied tillage. Passing, on several occasions, from this region to the richest lands of Middle England or *vice versa*, I have been struck by the singular likeness of the two countries."

There are few agricultural regions of this country where so large a proportion of the products are calculated to furnish eastward freights. This region is naturally well fitted to become the seat of those extensive industries that require wood and iron for their basis; as, for instance, the manufacturing of Agricultural Implements, Railway Cars, Carriages, Wagons, etc. Kentucky offers unsurpassed advantages for the creation of industries—the widest markets with the least carriage.

Reference to the map will show that this region lies in the most centrally placed State in the group east of the Rocky Mountains, and, as PROF. SHALER says, is the very *heart of the United States.* He predicts the time when it will be the greatest seat of those productions which require cheap raw materials (wood, iron, and coal), cheap power, and cheap food for their making, and when there will be not less than *eight millions of people in Kentucky* with sources of wealth and power *unsurpassed on this continent.* He closes one portion of his able Reports with these words: "It is only necessary to add that your road having been completed to Virginia would constitute another of those main lines *on the creation of which absolutely depends* the chance of future greatness of *the Commonwealth of Kentucky in point of wealth and numbers.* (*See Detail Descriptions, indexed Blue Grass Regions.*)

**The Mineral Counties of Eastern Kentucky,**

With 10,000 *square miles* of the richest coal and mineral lands in America, immediately adjoin these rich counties. There is, therefore, every reason why *at this time* this *region* should have been more thoroughly *grid-ironed* with Railways than in any State to the north of it. It would take volumes to discuss the *useless question* why Kentucky, the first State of the Ohio Valley in order of time and in order of resources, has been the last in order of growth.

Suffice it to say, the vast majority of her business men are fully alive to the situation and heartily anxious to do all in their power to place Kentucky in the front rank as a manufacturing and commercial State, a position to which she is justly entitled. The *warmest welcome* is extended by a truth-loving and chivalrous people to all from the North or from Europe who can aid this development. All the bitterness and animosities of the war-period have been buried, and it is full time that her *sister States* should crush out prejudices and misrepresentations that have stood in the way of the development of the most beautiful part of our common country. No section of the Union presents to-day a more promising field for Railway enterprise. The statistics of the Chesapeake & Ohio, and of the Cincinnati Southern show that their resources within the State are taxed to their utmost capacity, to provide for a rapidly increasing traffic.

All along the valleys of Eastern Kentucky in munificent abundance, may be found the different varieties of **cannel,** splint, block, **coking,** and common bituminous coal, located by nature in the most favorable position for mining and shipping, the seams varying from three feet to eight feet in thickness, and lying nearly horizontal, and from a few feet to three hundred feet above the bottom of the ravines in which they are exposed.

Here is a region of country larger than all the coal and mineral lands of England of which PROF. SHALER says— "Its economic future lies in the fact that *it is the richest field of mineral wealth known in any country;*" and again, "No portion of the State exceeds the upper Kentucky River region in number, thickness, or quality of coals;" and again, "There are no cannel and coking coals superior to those of the upper Kentucky Valley and on the line of the Kentucky Union Railway." PROF. PROCTOR, State Geologist, says— "In no region of the United States can iron be produced cheaper." He further says of the neighboring Virginia ores— "This excellent ore can be delivered to furnaces along the eastern border of the Kentucky coal-fields at prices ranging from *fifty cents to one dollar a ton.*" JOHN J. STEVENSON, Professor of Geology in the University of New York City,

estimates that pig-iron can be made in this vicinity at *eight dollars and twenty-five cents per ton.*

The above is but a small part of the ore supply available to *this region.*

PROF. SHALER says—"I believe it will be found that *no ores of like richness and purity are to be found so convenient to pure cheap coals as are these ores;*" and again, "The nearness of the very pure ores of East Tennessee and western North Carolina to the pure coals of eastern Kentucky are an assurance that with transportation secured that region will be one of the great iron and steel-producing centers of the world. As it requires about five tons of coke to produce a ton of finished bar iron or steel it is evident that these ores will be brought to the coal, and for this reason you have an interest in the quality, quantity, and development of these ores."

PROF. DAVID T. ANSTED, of England, of the highest standing as a Geologist, speaking of a region reached by the Kentucky Union Railway, says—"There can be no doubt, whatever, that the general coal fields west of the Alleghanies, will have to supply the manufacturing part of America before very long;" and again, "With regard to the mining of the iron ores—that can be done at a cost below the price of mining similar ores in any other part of the world that I have visited." PROF. SHALER confirmed by all the Reports says—"The **Timber** in the belt of country to be traversed by this line constitutes the finest forest of virgin hard wood known to me in this country." PROF. PROCTOR says—"The great variety and the richness in valuable timbers of these forests I think can scarcely be surpassed." The country from the centre of the Blue Grass region at Lexington to the Virginia railroads is as full of resources for railway traffic as any similar mileage in America. A competent explorer and railroad man lately returned from a month's tour on the line says—"If the coolest headed Railway Superintendent in the United States had been with me he would have been obliged to report that it would tax the capacity of the ablest traffic manager to accommodate with a single track the freight that would offer almost as soon as the road opens."

This vast region has, from well understood causes, been left almost in a state of nature, without railway facilities and with very few wagon roads; its timbers and coal have found their way, in very limited quantities, to market by the uncertain river routes.

EDWARD ATKINSON, ESQ., of Boston, says, in an article published in *Harper's Magazine*, June, 1881: "This country, mountainous and hilly as it is, would have been filled with a hardy, industrious, and thrifty population, instead of a few settlements now met with, were it not for

two causes, the principal one of which has been want of communication and market, the other the magnificent growth of timber with which the land is covered. The mountain sides and valleys of eastern Kentucky and East Tennessee, northern Georgia, western North and South Carolina, and south-western Virginia, in many regards a *terra incognita*, comprise a Territory larger than Great Britain, and contain more and purer iron and coal, equal deposits of copper, lead, zinc, and salt." It enjoys what is probably the finest climate on this continent. It is permeated by the most fertile valleys, and bears upon the hills and mountain sides the heaviest growth and greatest varieties of hard wood timber.

PROF. PROCTOR says—"The two great railway lines from Central Kentucky have skirted along the outcrop of this coal field in a curious fashion before entering it. The Cincinnati Southern runs almost parallel with the south-western borders, and only enters the field south of the Cumberland River; while the Lexington & Big Sandy (now the Chesapeake & Ohio) avoids the coal on the north-western border of the field, for many miles. It is therefore evident that a railway, such as you propose, will afford the *shortest route*, and on account of the favorable grade to be obtained, the *cheapest means* of supplying *a large area* with coal, lumber, and other products."

## The Kentucky Union Railway

has been chartered to run through the *heart* of this region to the Virginia line. It presents *the most feasible, direct, and cheapest attainable line* for the development of the wonderful resources of this *long neglected region.* CHIEF ENGINEER GUNN'S Report shows that only from seven to eleven miles in distance is added to an actual *air-line* from central Kentucky to the centre of the Coal Basin in Breathitt County. This part of the road can be built and equipped at a cost of not over $30,000 per mile. No one who will study the subject can doubt the certainty of a traffic that will pay a large profit on its cost. The long and able reports hereto attached will bear testimony to the resources of the country and the value of the line.

PROF. SHALER says—"The line of the Kentucky Union Railway has, it seems to me, certain especial advantages over any other, in that it crosses the coal and iron belt at its widest part, and where there is the heaviest timber;" again, "The distance from the eastern coal field to Louisville by this line would be *shorter than by any other*;" again, "I believe it to be one of the most important roads for the mineral interests of Kentucky that can possibly be built;" again, "The mountains of Kentucky, far from being a barrier to the passage of railways, constitute

on the whole, a region more fitted for their passage than the Blue Grass Country," and says he is "repeating the opinion of *competent engineers.*" Again, "The valley of the Kentucky River, on a line from the city of Lexington to Pound Gap, affords the most practicable and desirable line;" again, "This road, passing through Pound Gap, would give direct connection with Norfolk and Wilmington, North Carolina, by a nearly air-line route. Our principle mineral belt would be brought into most immediate contact with all the shore belt cities of the Atlantic."

PROF. PROCTOR says—"Your road will penetrate through the centre of this great region on a route as finely located for easy grades as could be selected, and having the advantage of entering the coal field of eastern Kentucky at right angles to its out-crop, thus insuring *the shortest possible route* from these excellent coals to the central or Blue Grass region;" and says again—"I do not believe too high an estimate could be placed upon the importance and value of the proposed road, combining as it will, such a variety of advantages. *It will be the great mineral road of the country.*"

## Resources and Memoranda of Railway Line.

Extending from Lexington or Paris or both to Winchester or above on the line of the Chesapeake & Ohio Railroad, a cheap and advantageous route can be had if favorable running arrangements are not made with existing roads. The line thence for *forty-five miles* is reported on as follows—"The substratum is, first a rotten limestone, next shale, next sandstone. The hydrography is such that the grading would cost very little—for a distance of twenty miles not more than throwing up an embankment with occasional small side cuts to shorten the curvatures of streams. There is abundant timber along the line for ties, sandstone for abutments, and suitable gravel for ballasting. At a distance of *twelve miles*, from the Chesapeake & Ohio Railroad we reach the old **Red River Iron Works** with its magnificent water power (15 foot head and fall) and eligible location for ore. At this point there was formerly produced not only the domestic iron of the country, but a large quantity was exported. The company now owning it yet make, in the vicinity, *the noted Red River car-wheel iron*, but are restricted in the amount of production by the extravagant cost of wagoning it out to the line of the C. & O. Railway. Here on the opposite side of the river, are also located, with extensive boom arrangements, **Lumber Mills** of the largest capacity in the State of Kentucky, producing the choicest walnut, white and yellow pine, oak, hemlock and other lumber, in quantities limited only by the means of transportation.

Machinery and provisions for an out-put of over 30,000,000 feet of lumber, etc., from this station are provided for, and over 1,500,000,000 feet of choice timber is naturally tributary to this point from the Red River and its branches which run through over 80,000 acres of *choice white pine lands*, the only tract of the same south of the Ohio. These lumber and iron resources with the water power *will build up a most*

Powell Co. *thriving town at this point.* Powell County, covering the valley of the Red River, is the border county of this vast mineral region of Kentucky. Its iron is unequaled, its forests abundant.

At the mouth of Cat Creek, a distance of twenty miles from the C. & O. Railroad, an excellent smithing coal is found in strata, thirty to thirty-six inches in thickness. At this point the road would be in

Iron Works. tramway distance of the Estill Iron Furnace on the hill.

The entire mountains on either side of the Red River are filled with iron ore, best known as the "*Red River Car-wheel Iron.*" The coal measures increase in thickness as the line progresses, and the rising grade of the river makes them more convenient until, at a distance of thirty miles from the Chesapeake & Ohio Railroad, we find, nearly on the road level, coal three and a half to five feet in thickness.

Wolfe Co. **The Town of Campton,** county seat of Wolfe County (36 miles from the C. & O. Railroad) is underlaid with coal. In its vicinity is the *Hobb's Bank, five and a half feet thick*—excellent bituminous coal. Thence all the way on the waters of Devil Creek to the right, Stillwater to the left, and Holly and Frozen, there is abundance of coal on every hand. Stillwater and Frozen have workable veins of *cannel coal of fine quality.* Crossing at the mouth of Frozen Creek the road would run three miles to **The Town of Jackson** up the main river

Breathitt Co. under a heavy vein of *fattest bituminous coal* (the favorite grate coal of Kentucky). All the way the stratum is just high enough to dump conveniently into the cars. The route from here is, all the way, through heavy timber, CANNEL COAL, and minerals, through

Perry and Letcher Counties. Perry and Letcher counties to Pound Gap by way of the Troublesome and North Fork, 136 miles from Winchester, cutting through *the centre* of the great *Cannel Coal Bed of this continent*, and to the best of *Coking Coals* (see Prof. Proctor's Analysis) which, from their accessibility would alone justify a double track road. If the Pound Gap route from Perry County is abandoned to avoid the long tunnel and heavy mountain work in Virginia (not more expensive however, than all the other east and west main lines), a careful recognizance shows a most desirable line through all the company's lands in Perry

Harlan Co. County to the rich county of Harlan; thence by direct route to Pennington or Cumberland Gap, and east and south-west connections.

There has been no route projected or proposed of such easy grade, running so directly into these mountains of wealth, as this represented by the **Kentucky Union Railway Company.** The first twelve miles of this road would pay well. Every additional five miles would increase its value. Forty miles of this road, constructed from the line of the Chesapeake & Ohio Railroad, would, by its own earnings, build itself to Virginia connections.

The controllers of the Lexington & Big Sandy, and also of the Kentucky Central (now the C. & O. Railroad) have every reason and disposition to encourage the enterprise, so that our connections and outlets north, east, and west, would be secured.

Almost any day, from the middle of April to the last of November, a traveler may meet forty wagons, laden with lumber and iron, coming from Red River to the C. & O. Railroad, besides what goes toward Mt. Sterling. This is but a trifling thing compared to what may be produced and sent out of this country. The growths of hickory, oak, and hard woods, the production of staves, hoop-poles, etc., would support wagon and barrel factories. The valleys and bottoms are amply rich to support a large population. The soils of Wolfe and Breathitt counties are well suited to the culture of tobacco. They produce good corn and small grains. All this country to the Virginia line is admirably adapted to sheep-farming. The coal and iron ores are inexhaustible. The right of way has been secured for the greater part of the distance, and liberal donations of lands are offered to a company that will make the road. Besides the products recited, the lithographic and freestones are even now articles of commerce—the *lithographic stone* of this region being pronounced equal if not superior to the best German, and the freestone quite as good as the best Ohio freestone.

Wolfe and Breathitt Counties.

Reference is made to the Geological Reports of the State (*extracts hereto attached*) as to the relative value of our coals, and to the superior price of the Red River Iron in market, and as to its value. *This portion of Kentucky has the largest body of valuable timber lands in the United States.*

This company has not only thoroughly surveyed this line, but has secured by purchase in the counties through which the line is to run, over 500,000 acres of valuable coal and timber lands. These lands lie mostly in the counties of Breathitt, Perry, and Letcher, of which it is truly said in the State Geological Reports— "Strata of coal and iron ores underlie their entire surface. The hills are covered with fine timber; springs impregnated with salt and other minerals abound; the streams are stocked with fish." The soils, as before stated, are well adapted to corn, tobacco, and sheep-grazing. *The vine and fruit*

*trees flourish.* Take the country for *its surface growth* and the *richness of its bowels*, and it is unsurpassed in *power of production;* for besides the bituminous and superior coking coals, and iron, and timber, these counties are underlaid with the *heaviest known deposits of Cannel Coal.* Noted for richness of quality are Haddock's, Sewell's, and Roark's Cannels, in Breathitt county. Wolfe Creek has a solid vein of pure bituminous coal, seven feet thick. Comb's and Landrum's banks, seven miles above the mouth of Troublesome Creek, measure *seven and a half feet cannel coal*, with one foot parting of shale. These strata run through the county, and are found at same levels, with slight variations of thickness *everywhere*, with tendency to increased thickness up to Letcher county. Perhaps the heaviest vein of coal in Kentucky is on Clover Lick Fork, of the Poor Fork of the Cumberland, in this same county of Letcher. The vein seems bedded on coal (possibly shale,) yet the face measures fourteen feet four inches in thickness.

For details of length of line and connecting roads, see Report of CHIEF ENGINEER GUNN hereto attached.

The Kentucky Union Railway Company is composed of **Kentuckians** —men of property, men of business—acquainted with the resources of their State and the manners of their people. They are in personal favor in the mountain districts through which the road would pass, have received the encouragement of the Legislature of their State in this enterprise in which they are engaged. They ask the fullest investigation, not only as to the value of their proposed road and chartered privileges, but also as to the standing and integrity of their officers and stockholders.

## Lands Department.

Lands Department.

In purchasing the large bodies of land owned by this company, Capt. J. M. Thomas and Mr. Benjamin Crawford have become more familiar with the location of lands and their values, and the difficult titles of this section than perhaps any other persons available in the State. Of the highest standing for integrity and ability probably no negotiators can be found of greater prudence and carefulness.

These gentlemen have given their services to this company, and we hope through them, to lay before the capitalists of Kentucky and the United States the most available and desirable purchases to be made in any part of this wonderful coal and mineral belt. Maps and detailed information will be furnished at the company's Lexington office, and **correspondence with any one desiring to invest in eastern Kentucky lands is solicited.** With its rapid development few parts of America can frunish such large returns for investments made *now.*

# EASTERN KENTUCKY COAL,

## Iron, Timber and Farming

# LANDS.

COKING, CANNEL AND BITUMINOUS COALS.

CLINTON AND LIMESTONE (CAR WHEEL) ORES.

CHOICE BLACK WALNUT, POPLAR, OAK, ASH AND HICKORY WOODS.

GRAZING, FRUIT AND TOBACCO FARM LANDS.

## LANDS DEPARTMENT,

**Kentucky Union Railway Company,**

*Court House Square, Cheapside, Corner Main Street,*

LEXINGTON, KY.

**Capt. J. M. THOMAS.** **BENJAMIN CRAWFORD.**

Correspondence solicited with parties controlling lands in these counties, or wishing to invest in same.


Longitude West of Greenwich
MINNESOTA
NEBRASKA
IOWA
ILLINOIS
INDIANA
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
PENNSYLVANIA
NEW YORK
MARYLAND
CONNECTICUT
L. MICHIGAN
L. ONTARIO
Ozark Mountains
GULF OF MEXICO
ATLANTIC OCEAN
GULF STREAM
Scale 160 Miles to 1 Inch.
Statute Miles.
Kilometres.
(1.6 Kilometres=1 Stat. Mile.)
GEOLOGICAL SURVEY
OF
KENTUCKY.
JOHN R. PROCTER, DIRECTOR
MAP OF THE
UNITED STATES,
East of Long. 102° W.
BY J. B. HOEING C. E.
LANDS DEPARTMENT,
KY. UNION RAILWAY.

PROFESSOR N. S. SHALER,
HARVARD UNIVERSITY,
CAMBRIDGE, MASS.

[EXTRACTS FROM HIS VARIOUS REPORTS.]

It is but just to myself and to the reader to give some account of the opportunities I have had of becoming personally acquainted with the country adjacent to the line of this road.

A service of over six years in charge of the geological survey of Kentucky has brought me into every county of that State, which the road will enter.

Others have made more detailed studies on particular divisions of the belt than I have been able to make, but my opportunities for seeing the whole line have been better than have fallen to the lot of any other one person.

Some service, as geologist in the Coast Survey in the Virginia district, and later, several summers in charge of the work of the Harvard Summer School of Geology, in Central and Western Virginia, have served to make me pretty familiar with the districts it is proposed the road shall pass through in that State.

In the published and unpublished reports of the Kentucky Survey, I have repeatedly urged the building of a railway through this belt of country, for the purpose of opening up this region, which, considered from the point of view of its mineral resources, *is the very heart of the continent.* It has long been clear to me that we have here a remarkable combination of the resources best calculated to make the foundations of rich and prosperous communities; an admirable climate, fertile soil, forests rich in manufacturing woods, and a singularly varied store of mineral wealth. On either side of the great Appalachian mineral and forest belt we have States with large and growing populations, which are just shaking off the lethargy that their old conditions imposed on them. These conditions insure to the road the large traffic that has been given to every railway that has yet been built across the Appalachian mountains.

I affirm my conviction that the belt of country lying between the parallels of 36° and 40°, and from the Atlantic west to the Mississippi, contains the greatest and most varied mass of mineral resources of any equal area on this continent—resources destined to play a very great part in the future industries of this country. This proposed road will have the advantage of following perhaps the best possible line through this belt.

The soil bears heavy forests of varied timber. Not one per cent. of all this mountain surface is without a forest covering, except where it has been removed by man.

Forests. The same quality of soil that gives heavy forests on this belt makes the greater part of its surface fit for tillage.

Although the food-producing capacity of this district is a matter of importance in considering the prospects of its future, it is not in the resources of this character that we find the element of greatest interest to the economist. *Its economic future lies in the fact that it is the richest field of mineral wealth known in any country.* Placed between the agricultural districts of the Atlantic slope and the Mississippi valley, these vast stores of coal, iron, copper, zinc, and other mine products are admirably situated for the use of the populous States that are now growing up in those sections. No one can doubt that this peculiarly fortunate relation of rich mineral resources to the rich tillage soils of this continent will lead to a great commerce between the two.

The Alleghany range of mountains contains in its folds and on its flanks great areas of petroleum, and several levels where waters thickly charged with salt are found. There are also abundant deposits of fire and pottery clays in the coal series. Taken in its entirety, this coal bearing belt is, by the quality of its coals and their fitness for use in all the arts that demand fuel, *the richest field in either America or Europe.*

The line of the Kentucky Union road has, it seems to me, certain especial advantages over any other, in that it crosses the coal and iron belt at its widest part, where there is the heaviest timber.

At either end of the route are vast districts occupied by agricultural and manufacturing populations, which will afford a large and constantly growing market for the products of the mines as they are opened up all along the lines. This advantage is shared to a greater or less degree by all the roads that cross both these mountain ranges from New York southward.

Coals. In the western, or Alleghany mountains, we have the mineral resources of the newer rocks of the geological series. Coal in great

quantity exists along this range, nearly fifty thousand square miles of it, an area at least seven times as great as that of Great Britain lying in this system, between New York and Alabama. This coal varies from non-flaming anthracite to the torch-like cannel coal.

## Coals.

There is enough coal in the known beds in this district to supply any demand that may be made upon them for centuries to come.

Coals.

These coals are of two different qualities—ordinary bituminous and cannel. The ordinary bituminous coal varies a good deal in its properties. In part it is what is called a caking coal, *i. e.* a coal that runs together when heated.

## Cannel Coals.

Cannel Coals.

The central part of this field, including the *greater part of Breathitt, Perry*, and some of the adjacent counties, contains a large cannel coal field, in which are found one or more beds of this quality of coal of *remarkable thickness and purity.* I regard access to this cannel coal field as one of the greatest advantages that will accrue to the Kentucky Union Railway, for it ensures the road a coal that can stand the cost of a long transportation and still be marketed at a large profit. Nor do I regard the conceivable risk of a cessation of the demand for it in the manufacture of illuminating gas as seriously threatening the market, as it will always have the preference for domestic use in the grate or open hearth, for which its cleanliness, bright flame, and great heating power especially adapt it.

It is now well known that these cannel coals were formed in the lakes that were enclosed in the swamps of the coal period. These lakes were generally of small size and passed by insensible gradations into the swamps on either side, so that the cannel coals that were formed from the mud accumulated in these waters passes generally into ordinary bituminous coal on either side. It results from these circumstances of their formation that cannel coals occupy, in most cases, a very small area compared with the larger limits of a bituminous coal field. This cannel coal field of eastern Kentucky probably covers an area over three thousand square miles, and is much the largest known to me. This peculiar sort of coal has always commanded a higher price than the ordinary bituminous coals of this and other countries. A cannel coal of no better quality than the best from this region, now sells in the Boston market for thirteen dollars per ton. This coal is brought from Wales. In the New York market,

cannel coal from Cannelton and Peytona mines of West Virginia, was quoted at ten dollars per ton, while the best anthracite coal was held at four dollars per ton.

## Iron Ore.

Iron Ore.

The iron ores of the Kentucky valley have, on account of its isolation, remained essentially unexplored. Near the western part of the coal basin there are, however, at least two horizons of valuable ores, both of which have been extensively proven by practical and extensive tests.

The first of these is encountered where the road enters the valley of Red River in Powell Co. This ore lies on top of the subcarboniferous limestone, and is commonly termed a limestone ore. This deposit, apparently, is co-extensive with the top of this limestone, and thus underlies a very broad field in eastern Kentucky. For many years it has been used in the manufacture of excellent charcoal iron, which has found its way out to Mount Sterling by wagons over difficult roads, or to Louisville, by the more difficult and precarious route of the Kentucky River. The Red River, Estill, and Cottage Furnaces represent several hundred thousand dollars worth of furnace property upon this belt of ores.

Below the levels of the last mentioned ore lies the horizon of the Clinton iron ore, so extensively exposed in the valley of Powell's River.

Route.

Passing through Pound Gap this road would descend Guest River to the valley of the Clinch, and come into contact with the peculiar Iron ores of the Clinch and Powell Valleys.

These ores are, in the first place, the "fossil ores" or dyestone ores of the Clinton limestone, and are similar in position, and somewhat in general character, to the Clinton ores of New York and Pennsylvania. Although undeveloped in this region, there is reason to hope that they will be found in workable form in Clinch Mountain and Birch Mountain, though their best development is on the waters of Powell's River.

If this route were taken, it would be necessary, in order to obtain access to the best parts of this Iron field, to build a branch through the Gap at the head of Powell's River and thence southward as far as Pennington's Gap.

The whole of Powell's Valley is very fertile limestone land, so that there would be an agricultural basis for such a road, though access to this set of ores should be the main aim of such a branch.

The singular continuity of this deposit gives this valley an eminent

advantage for this industry. I have examined many points between the gap at the head of Powell's River and Big Creek Gap of the Cumberland Mountain, and have never failed to find this iron ore in workable quantities. I believe that it forms nearly, if not quite, a continuous belt, and that it may practically be regarded as workable for the whole of its line of outcrop.

In the foot hills on the west side of the Blue Ridge, many very extensive deposits of brown hematite, derived from the decay of the other classes of ores, have been found; in fact they occur, from point to point, along the whole of this belt.

We have also several other very rich varieties of iron ore, some of which have been proven to be of excellent quality for the manufacture of a good grade of iron and steel. They need only transportation to bring them into prominence and to make them the basis of extensive industries. This mineral belt is bordered on either side by a wide extent of country that must always look to it for those twin staples of modern industry—coal and iron.

## Salt.

The rocks at the base of the coal field in Eastern Kentucky contain a considerable amount of salt. The quantity of this is sufficient to afford the basis of an extensive industry. Salt.

At Saltville, in Wythe County, Va., this deposit has furnished the basis for a long continued production of salt. It is said that the bed of rock salt from which these salt wells flow, has been penetrated to the depth of one hundred and seventy-five feet without passing through it.

The Kentucky Union Railway would furnish this district with much needed fuel in the shape of cheap coal, and at the same time give Central Kentucky access to the salt and gypsum of this section.

## Petroleum.

Several explorations have been made in the rocks of this district for petroleum. It does not seem very likely that it will be found here in the same level in which it is found in Pennsylvania and Western Virginia. Below that level, however, separated from it by the subcarboniferous limestone, we have the horizon of the Devonian Black shale—the Ohio shale of the Kentucky deposits. This shale is probably the source of a great deal of coal oil. We are not yet certain just what are the conditions that favor the formation and storage of petroleum in this region, but it seems likely that in a wide trough of rocks, such as underlies this basin between Pine Mountain and the central district of Kentucky, the essential conditions for the retention of Petroleum.

the coal oil produced by the Black shale will be found. I am therefore hopeful that future investigations may discover profitable amounts of petroleum in a lower horizon than it has yet been sought for in this district.

## Pottery and Fire-brick Clay.

Clays.

Of less importance, yet not without their value, are the clays suitable for pottery and fire-brick that abound in this region, and which are found in immediate connection with many of the coals. These clays are as good as those that are extensively worked in the region North of this line.

Below and further to the west we have in the upper part of the silurian section thick deposits of a clay suitable for pottery purposes.

This clay is now used in the manufacture of ordinary pottery that has quite an extensive sale. A proper mingling of this and the clays from the coal series will make it possible to produce a much greater variety of articles than are now furnished by these potteries. They have made their beginning at great disadvantage, owing to the want of cheap fuel.

## Timber.

Timber.

The timber in the belt of country to be traversed by this line constitutes **the finest forest of virgin hard wood known to me in this country**. It especially abounds in the **black walnut**, a tree now becoming scarce in all the regions adjacent to railways or other lines of transportation. Besides this valuable wood there are extensive forests of white oak, which are also no longer readily accessible in large quantities.

There are some areas of white pine, and there are about twenty other species of marketable woods that attain their best conditions in this belt.

The general surface of this country, though not mountainous, is rough, and whilst but little of the surface is incapable of tillage, a great deal of it consists of steep hillsides, suitable only for grass husbandry or the growth of fruits. Along the streams there is more or less of level land, and on the hill tops there are extensive areas of excellent soil. Fruits, flax, and tobacco are the products for which these latter are best fitted, and for which they appear extremely well adapted. Small grains are raised for local consumption, but the region is not naturally fitted for this form of agriculture. Nature has meant it for a permanent forest, and in this form of culture it will probably prove, on the whole, more profitable than in any tillage.

These forests show a singular activity of growth and quickly reproduce themselves.

Some of the old furnaces in this region have been cutting charcoal timber on the same ground for over fifty years. It is found that the woods renew themselves with great rapidity, and in seventeen or eighteen years are again ready for the axe. The greater part of the Ohio and Mississippi valleys are naturally destitute of good timber, and it is to this region that they must look in the future for their supply. These forests should play the same part in the development of the industries of the Ohio that the Black Forest does in that of the Lower Rhine. In a few years it will be found that, in timber alone, they will pay better returns than in any other form of cultivation, and that the soil will withstand the exhaustion incident to this crop better than any other. In this way they will furnish exports more valuable for a railway than they can under tillage. Timber.

The climatal relations of a district give us some of the most important elements of its economic conditions. The district now under consideration consists of diverse areas, the difference being produced by the various levels of land above the sea. Climate.

The country rises rapidly in height until we obtain an average elevation of from one to two thousand feet.

This brings about two somewhat important changes in the climate. The rainfall rapidly increases and the average temperature is lessened. The climate by these changes becomes admirable in all regards. The greater rainfall causes a more luxuriant vegetation and a greater abundance of streams and springs. It is an assertion that any one conversant with the climatology of this country will accept that the elevated level between the Eastern face of the Blue Ridge and the upper part of the Kentucky and thence at the same height above the sea, southward to Georgia, is the most favored region in this country.

The climate is more equable than that of the most of the Mississippi Valley. Its height above the sea, on the average one thousand feet, protects it from the great heat of summer common to this latitude; and the winters are generally mild and open, though exposed to a sharp cold for brief periods. These conditions of climate favor bodily labor.

Along the lines of railways that reach the coal fields fuel will be cheap, and along such lines manufactures of hemp, cotton, etc., will find suitable conditions for their development.

The State of Kentucky has a **mortality** assigned to it by the statistics of the United States census as low as eleven per thousand, which seems almost incredibly small; but there is an apparent Mortality.

justification for the statistics in the large per cent. of very old people in this section.

The general character of the climate in this region is well shown by the fact that the section is peculiarly favorable to the growth of apples, pears, and peaches. This assemblage of fruits, when grown as they are here, with peculiar success, is good proof of a climate of a strictly temperate character. Great excesses of heat or cold are certain to render one or the other of them unsuccessful.

It is only in a few perfect climates that they will attain their best growth together.

But of all the evidence, I prefer that given by the admirable physical condition of the people whose race has been many generations upon the soil.

Per cent. of different Nationalities.

In Kentucky is found the same essentially British blood, probably ninety-five per cent. of the whites being of that strain.

The admixture is principally of Pennsylvania Germans, recent German immigrants to this country, and about the towns a sprinkling of Irish. In central Kentucky the average is probably not more than about five to eight per cent. of the whole population.

The Blacks are much fewer in number than in eastern Virginia, constituting at present only about fifteen to twenty per cent. of the population.

All persons who know the South will agree, that the Negro population of Virginia and Kentucky constitutes the best part of their race.

Races.

The Blacks in these states are on a distinctly higher level than in planting states of the South. A long and careful study of this element of the population has convinced me that it is steadily gaining in all the qualities that go to make good citizens, and that it will not in the future be any hindrance to the advance of this region.

In Kentucky the larger part of the large gain in population, during the last decade, is due to the immigration of persons from beyond the seas, principally Germans. There are some counties in the State where from five to twenty-five per cent. of the population is of German birth.

## The Blue Grass Region.

Blue Grass Region.

In the central region of Kentucky the line of this railway is upon the limestone rocks that underlie the fertile *Blue Grass District* of that section, as this portion of Kentucky is commonly called, a name given to it on account of the vigorous growth of the grasses known now to botanists as *Poa pratense* and *P. compressa.* These grasses occur all

over the world, but they find themselves in such peculiarly favorable conditions in this district, that they take on a vigor of growth unknown in other lands.

This region includes an area almost as large as Massachusetts and Connecticut combined, and is probably the most permanently fertile body of land in this country.

Many of the prairies are at the outset as fertile as the best of these limestone soils, but cultivation soon exhausts their store of phosphates and rapidly diminishes their yield.

In this Central Kentucky region the subsoil and the rocks below it contain the same substances as the soil, and deep plowing will restore worn fields to their pristine fertility. Though manuring is much neglected, yet the soils have not been lessened in their fertility by eighty years of cultivation. I am personally well acquainted with the conditions of the fertile lands of this country and of Europe, and I have never seen another body of land equal to this for the purposes of a cheap and varied tillage.

The singular success that has been attained in the rearing of high grade horses and cattle in this district is, probably, to be attributed to the nutritive quality of the pasturage that these grasses afford. Large export crops of cattle, horses, mules, and sheep, as well as considerable amounts of grain, hemp, and tobacco, are now produced. Live Stock.

The present tendency of the agriculture of this region is to increase the raising of stock and to diminish the agricultural productions, except hemp and tobacco. As nearly every acre in this central district is good land, this change will tend to increase the production of exportable articles which must, to a great extent, find their markets to the eastward. Agriculture.

There are few agricultural regions of this country where so large a proportion of the products are calculated to furnish eastward freights. As this section was first of all the districts west of the Alleghanies to to be settled, the occupation of the soil is probably more complete than in any other district of equal area in the West; and yet not much more than two-thirds of the tillable ground has yet been reclaimed from the original forest, and even that is not producing more than one-half what it can furnish with careful husbandry.

There is, however, at present a rapid advance in the agricultural progress of this district.

The region is sure to maintain a large and wealthy agricultural population, which must look for its supplies of coal, iron, timber etc., to the mineral belts traversed by this railway, and which must receive and send large quantities of freight in its commerce with the East. At

present, coal is the principal fuel used. The average price exceeds four dollars a ton, while the cost of mining and carriage by this road should not, on the average exceed one-half this sum, *as the distance from the eastern coal fields to Louisville, by this line, would be shorter than by any other.*

Manufactories.

This region is naturally well fitted to become the seat of those extensive industries that require wood and iron for their basis, as, for instance, the manufacture of agricultural implements, railway cars, etc.

From this region there is now a considerable export of timber to the eastern states and to Europe. Great quantities of staves for wine casks can be sent down the Ohio to New Orleans, and thence by ship to Europe. The furniture and decorative woods, cherry, black walnut, maple, etc., are now taken by the river to Frankfort, and then sent by cars to the East, whence much of it finds its way to Europe. The natural outlet of these woods would be by rail direct to the sea coast.

On the border of this eastern Kentucky coal and iron district we have a belt of limestones of the sub-carboniferous age, about two hundred feet in thickness.

This series of rocks affords some excellent building stones; and stones suitable for the coarser sort of lithographic printing have been quarried from it in considerable quantities.

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EXTRACTS FROM REPORTS OF
PROF. N. S. SHALER,
KENTUCKY STATE GEOLOGIST.

## Water Navigation.

Water Navigation.

The river system of the Mississippi has its center within the borders of Kentucky, and her lands are penetrated by more navigable rivers than any other State in the Union. Her territory includes about fifteen hundred miles of streams that are navigable at all stages of water, and about four thousand miles of other streams that can be made navigable by locks and dams. These streams give access to the whole Mississippi system of inland navigation, which includes about twenty-five thousand miles of streams now navigable, or readily rendered so by the usual methods of river improvement. The State has at present connection by water transportation with at least twenty millions of people, occupying an area that will probably contain near two hundred millions within a century from this date.

I am satisfied, that if the slack-water navigation of the Kentucky river was carried up to the Three Forks, it would be rapidly extended

up the smaller tributaries. The cost of the locks and dams in the smaller tributaries is much less than in the large streams. Sufficient locks and dams on the Three Forks of the Kentucky will cost only about one-half what would be required on the main stream, and the rate of fall would give something like three-fourths of the navigation to each lock that it would in the main stream. When the navigation of the Kentucky is fully developed, it will afford about six hundred miles of navigable water, boardered by coal, iron, salt, and timber lands.

Every dam will be a possible source of water power; for the flow is much in excess of the probable needs for lockage.

The cost of this navigation will probably be not far from five thousand dollars per mile.

The navigation of this river has been improved by locks and dams as far up as a point about twenty-five miles above Frankfort. The stream is admirably adapted for the extension of this method of navigation.

## Coal.

At least four hundred miles of water-front, open to vessels able to carry three hundred tons of coal, can be made on the *Three Forks of the Kentucky river.* The coal holds along the hill sides as far as Station Camp Creek. The upper half of the Red River branch contains also an abundance of coal. Coals.

The entire drainage of the Kentucky River, above its forks in Lee County, is in the carboniferous rocks.

*No portion of the State exceeds the Upper Kentucky region in number, thickness, or quality of coals.*

A preliminary section, made by Mr. C. A. Moore, of the Kentucky Geological Survey, from Red River, in Wolfe County, to the mouth of Troublesome Creek, in Breathitt County, establishes the fact that up to the latter point there are at least five workable coal seams above the conglomerate sandstone.

## Iron.

The iron resources of Kentucky are extensive and varied. At a few localities a considerable development of them has been attained; but, taking the State as a whole, it has hardly reached a fraction of the possibilities of production. The greater portion of the ore territory of the State is as yet untouched by the pick of the miner; but enough has been done in most of the ore districts to learn the quality and something of the extent of the ores. Iron.

The ore district of eastern Kentucky, where the ores have been manufactured, are two, known as the Red River and the Hanging Rock iron regions. The Red River iron region embraces portions of Estill, Lee, Powell, Menifee, and Bath Counties.

The ores found in this region are the Clinton ores, and an ore, stratified, resting upon the sub-carboniferous limestone at the base of the coal bearing shales.

It is found both as Carbonate, or Clay Ironstone, and as Limonite, or Brown Hematite. It is this ore which has been most largely worked, and upon which the excellent reputation of the iron from this region has been made.

Iron Manufacturing.

Assistant P. N. Moore, in the second volume of this series of reports, says— "After a careful personal study of the conditions in this valley, I am satisfied, that this section is sure of a prosperous industry in iron manufacturing. I am convinced that, reckoning the cost of getting the product to a great market as part of the cost of manufacture, *there is no region in the world where iron can, at the present time, be made any cheaper than it can here.*

Red River Car Wheel Iron.

Just below the coal the carboniferous limestone bears upon its top the ore known as the Red River iron ore, which has long furnished a very celebrated cold-blast charcoal iron, well known as **"Red River car wheel iron."** There is probably about one hundred miles of outcrop of this ore within a short distance of the tributaries of the river, and within twenty miles of the main stream.

I am very anxious to see a road built from the central belt, by way of Red River, for the reason that I believe it to be *one of the most important roads for the universal interests of Kentucky that can possibly be built.* In the first place, it will bring the furnaces of the Red River district into close connection with the admirable ores of the Clinton beds. These ores can be put at the Red River furnaces for about two dollars per ton, so that four dollars worth of ore will make a ton of pig iron. It will, at the same time, give an outlet for the product of these furnaces. One and a half million dollars have been invested in these furnaces, but they are now lying idle for lack of sufficient transportation to furnish them with ores and take away their produce. These furnaces could be operated to-day at a profit if this railway were in existence.

To give a chance for this interest to develop itself, to build in our borders, as we certainly should, *one of the most extensive iron industries in this country, would be of itself a sufficient result of this road to pay for its building many times over.*

## Soils.

The soils in this valley have the same character as in the Licking, ranging from the light loamy soils of the Carboniferous, through the clays of the Silurian and Devonian to the exceedingly rich blue grass soils of the Cambrian and Cincinnati Limestone rocks. Soils.

As in the case of the Licking and the Green, it has the peculiar advantage of having a very great variety of soil and natural products within a narrow compass. The timber resources of the part of this valley that lies within the coal bearing area are very great; all the important timber trees of Kentucky, except the cypress, are found within the valley. The black walnut is found *in abundance* on the hillsides throughout this section, the *finer qualities of oak*, much yellow pine, some white pine, etc.

## Climate.

The climatic conditions, as far as they can be described here, are as follows:—The average temperature is about 50° Fahr. As in all America, the range of temperature throughout the year is considerable; it is, however, much less in Kentucky than in the States further to the north. It is rare to have the thermometer below zero, Fahrenheit, and it never happens that it remains for twenty-four hours below that point. The summers, though warm, are less oppressive than along the lowlands near New York for instance, owing to the considerable elevation above the sea, and the relative dryness of the air. The summer heats do not at all interfere with the labor of northern-born people in the open sun. There is much experience to show that in this respect the climate is not more trying than that of New York State. Open-air work is generally possible during the whole winter, the ground rarely being so frozen as to impede construction or even ploughing. Cattle are not fed, generally, more than three to four months, and are often left in the pasture for the whole winter. Climate.

## Blue Grass District.

The cultivated district of Central Kentucky, commonly known as the **Blue Grass District**, is perhaps for its area *the most beautiful rural district in America*. The surface is undulating; large areas of the original forests have been cleared of their undergrowth and produce a fine close sod, and in these wood pastures are some of *the finest flocks and herds in the world*. It has happened to the writer to pass on several occasions from *this region to the richest lands of Middle England or vice versa*, and he has always been struck by the *singular likeness of the two countries*. There is probably a closer resemblance between the surface Blue Grass District.

of the country, the cattle, horses, the agriculture, and even the people of these two areas than any other two equally remote regions in the world.

Proximity to Markets.

As regards *proximity to markets* this State has peculiar advantages, which only await the completion of transportation routes already begun, to render its position unequalled among American States. Reference to a map will show that it is the most centrally placed in the group of states east of the Rocky Mountains. From the geographical centre of Kentucky it is about an equal distance to Central Maine, Southern Florida, Southern Texas, and Northern Minnesota. The State of Colorado, the great lakes and the mouth of the Mississippi fall in the sweep of the same line.

For all the important branches of agriculture and manufacture so far as they depend on cheap and fertile soils, good climate, and a great abundance and low price of coal, iron, and hard-wood timber, and last, but not least, low taxation, Kentucky offers *unsurpassed advantages* for the creation of industries. It will be impossible to name the opportunities in detail, but some of the most important may be suggested. The growing industries of the Ohio Valley and the neighboring regions offer continued opportunities for the increase in the export of the raw products of the State.

Coal, iron, salt, timber, cements, building-stones, can all be produced at great profits. The Ohio Valley probably gains in population at an average rate of not less than five per cent. per annum. This great elasticity of demand insures a successful result in any discreet industrial venture. Besides the coal and iron mines, the attention of capitalists is requested to the production of other articles of equally steady demand.

Salt.

Salt can be produced over a large area at the cheapest possible rate,—the water hardly requiring pumping from the shallow wells, and the

Clay.

gas furnishing fuel. The great amount of fire-clays should be considered. The tile-clays are admirable in quantity and quality. Already

Staves.

a large trade in wine cask staves exists between this region and Europe. These staves pass through six hands before coming to the consumer. These exchanges could be readily reduced to three by direct shipment. The demand seems to be practically inexhaustible, and the timber exists in very great quantities. To this industry there could be readily added a business in the manufacture and shipment of spokes, felloes, and other carriage-parts, the parts of railway carriages, agricultural implements, etc.

Centre of Population.

The State of Kentucky lies, as a region of peculiar mineral resources, in the center of the region now holding, and destined always to hold, the mass of American population. The present center of population is

within the northern border of Kentucky, and it is practically certain that in centuries to come it must remain within or on the borders of Kentucky. This makes it sure that manufactures will from this region always command *the widest markets with the least carriage.*

State Government

The government of Kentucky is at present modelled in part on that of New York, and in part on that of Virginia,—the legal framework being essentially that of the former State.

State Debt.

There is no actual state debt,—the school-fund debt being such only in appearance, in fact only an obligation to pay a certain sum for the support of the schools. No state debt can constitutionally be contracted, and during the last ten years, while other states have been steadily increasing their obligations, Kentucky has paid off the debt which was left by the war, and now is debtless, and with considerable assets.

The whole traditions of the state are strongly in favor of economy and honesty in every branch of public affairs. No loss by defalcation has ever occurred to the state. Debts can not be incurred by counties, cities, or towns without special authority from the legislature. This permission is now given only in rather rare cases, and is subject to great limitations from the organic law. The result of these conditions is an immunity from the danger of destructive taxation, such as does not exist in any other state in this country.

## Education.

Education.

The State now gives from the general treasury the sum of one million dollars to the purpose of common school education; this is, *per capita*, as large a contribution from the general fund as is given in any other state; as yet, this has been inadequately supplemented by local aid, but much progress is now making towards the creation of graded schools in every village where the population admits of it. The laws allow the imposition of a considerable local tax for schools. There is no other state with an equally scattered population where so much has been done for elementary education.

Eight Millions Population.

The unequalled blessings of the Ohio Valley, its wealth of mineral stores, fertility of soil, goodness of climate, and facilities for transportation, are all shared in large measure by Kentucky. Another century will doubtless see this valley the greatest seat of those productions that require cheap power and cheap food for their making, bringing a population equal to that of the equal areas in the great European States. When this comes, this Commonwealth will contain within her borders probably not less than *eight millions of people* and sources of wealth and power *unsurpassed on this continent.*

Year by year the marvellous growth of the Ohio Valley makes the products of its tributary streams more valuable.

But it is, in a high degree, important, that in this growth our State should have its full share of the increasing markets.

That it has failed to get this share in the past cannot be questioned.

Growth.

The first state of the Ohio Valley, in order of time and in order of resources, she has been the last in order of growth. The reason for this is plain. The other states, from the Gulf to Canada, have had their ways leading to the East, whence has come the tide of immigrating capital and labor—ways of water and of iron—the best that art could build. Kentucky has had the "Wilderness Turnpike," a way where the tolls are about the only evidence of the existence of a road. It is easier for the immigrant to find his way to Kansas than it is to Kentuky; and it is not surprising if he concludes that the region must have little to offer where there are so many obstacles in the way of access. We have permitted the great store of coal and iron, which forms the so-called mountains of the State, to serve as an unbroken barrier between us and the outer world, cutting us off from the great cities of the Atlantic seaboard, from the southern and eastern states, and from the European markets.

Railway Facts.

The so-called mountains of Kentucky, so far from being a barrier to the passage of railways, comprise, on the whole, a region better fitted for their passage than the Blue Grass section. The valleys are more traversable, and the great obstacles more easily turned. The cost of trunk roads to the sea should be less than an equal mileage in Central Kentucky, constructed with the same thoroughness. In this I am expressing the opinions of *competent engineers*, who have examined the country with preliminary surveys, whose judgments my own observations have abundantly confirmed. In the present condition of capital in Kentucky, and with the limitation of our constitution, it is absolutely necessary that the greater part of means of construction of these roads should come from other states.

Virginia, North Carolina, and South Carolina have a material interest in getting highways through Kentucky, and whatever can be done by them will doubtless be done in aid of this work.

It is, however, to ourselves, and to the states to the north and west, that we must look for the execution of these great works.

The need of co-operation and the chance of obtaining it, will necessarily greatly influence our plans of breaking through our eastern barriers. The same causes which led to the creation of the Cincinnati Southern Railway will, in time, force other lines through the State.

My aim is simply to show points at which this barrier can best be

broken by railways, both as regards the physical and mineral conditions of the routes.

The shipment of the coal to the Cincinnati centre from these eastern Kentucky mines would, doubtless, make this region one of the sources of supply for that great market. Coal.

The valley of the Kentucky River, on a line *from the city of Lexington to Pound Gap, affords the most practicable and desirable line.* This must be a Kentucky river line, for all of its path within the State, must lie in the basin of this stream. From the point of view of our industries, this road must have very great value. Traversing the Appalachian coal field at nearly right angles it comes in contact with all the important beds of coals that exist in this section. Route.

The Clinton iron ores are found on the Virginia side of the coal field, a little beyond the State line, securing a market for our iron smelting coals in the working of these ores in that section.

These coals of the Kentucky field ought to find a considerable market in the valley of Virginia, and might pay for transportation to the sea-board.

The timber resources of this section are admirable, and, in the existing state of the market, would alone warrant the extension of the road for a great distance into the coal field. Timber.

I have already expressed my opinion concerning the importance of this road to central Kentucky.

It is only necessary to add thereto, that this road, being completed to Abingdon, Virginia, would constitute another of those main lines, *on the creation of which absolutely depends the chance of future greatness of the Commonwealth in point of wealth and numbers.* Trunk Line.

The great importance of this line cannot be presented without considering its relations beyond the limits of the State of Kentucky. It is as a *through line* from the northwest to the southeast that it most deserves our attention.

The road passing through Pound Gap would give direct connection with Norfolk and Wilmington, North Carolina, by a nearly **air-line route;** our principal mineral belt would be brought into the *most immediate contact* with all the shore belt cities of the Atlantic for a hundred miles of coast.

The coaling of the ocean navigation steamers, which in fifty years will go forth from these cities, between Washington and Florida, would itself develop the mining interests of eastern Kentucky. These Kentucky mines can put coal in Norfolk *cheaper than it can be had from any other region,* owing to the fact that they can be worked Coals for Ocean Navigation.

without pumping and deliver their coal directiy on the tracks of the railways.

I do not know of an instance where a road, passing for its whole distance through a valuable coal, iron, and timber district of fair agricultural qualities, connecting at either end with a far extending ramification of routes with first-rate regions rich in other resources but wanting in mineral and timber products, has failed to pay.

Cheap Transportation.

The waters of Chesapeake Bay—the great harbor of Norfolk especially—furnish the best outlet for the commerce of the region south of that line. Year by year it will be better and better understood that the transportation of the heavy freights of the West can be more cheaply accomplished from Norfolk than from New York, on account of the difference in the distance of land carriage. Moreover, roads can be constructed and operated in this almost snowless and nearly winterless belt far more cheaply than they can be in the latitude of New York and Pennsylvania. Add to this, the greater length of line within the region abounding in coal and iron, and we perceive the conditions which will in time determine a large share of the commerce of the country to lines which will traverse this section. But the roads will not build themselves; and it will be quite possible for Kentucky to remain as she is—the most inaccessible State in America, a State whereto capital and labor cannot penetrate, and out of which its wealth can find no suitable way—*if its people do not determine it shall be otherwise.*

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EXTRACTS FROM REPORTS OF PROFESSOR P. N. MOORE TO PROFESSOR N. S. SHALER, DIRECTOR OF GEOLOGICAL SURVEY OF KENTUCKY. GEOLOGY OF A SECTION FROM RED RIVER, IN WOLFE COUNTY, TO TROUBLESOME CREEK, IN BREATHITT COUNTY.

Coal.

The coals of this region are numerous and of excellent quality, and, taken as a whole, will bear comparison with those found in any other portion of the State in quality or thickness. They are all classed as bituminous coals, but they show all the varieties of this class, known as dry-burning, caking, and cannel coals. The principal coals are of the dry or free-burning variety, while the caking or fat coals are comparatively rare. Cannel coals are abundant and of excellent quality; certain of them having a reputation second to none in the State.

As yet, this region is almost entirely undeveloped, so that it is difficult or impossible, without the most detailed and careful study, to

obtain a complete section, showing the thickness and position of all of the coal seams—a study which has as yet not been given to it.

## Coal No. 3.

From our present knowledge this coal seems to be one of the most regular and trustworthy of any in this region, which characteristics it holds all through eastern Kentucky, as far as we now know it.

Along the ridge between the Red and Kentucky Rivers it is first opened at the head of one branch of Upper Devil Creek, about four and a half miles from Campton, at the *Hobbs Bank.*

The coal here consists of three members or divisions, separated by thin shale partings.

There is a total thickness of four feet eleven inches of coal.

The quality of the coal here is excellent. It is somewhat sulphurous in appearance, but the pyrites is in small flakes, which hardly form an appreciable percentage of the whole.

This *splendid coal* is the first of a thickness greater than three feet which would be reached by the Kentucky Union Railway, after crossing Red River.

At the Hobbs Bank this coal is about four hundred feet above the river. It rapidly descends to the southeast until, at the Holland Bank, it is only a little over three hundred feet above. At Jackson it is only one hundred feet, while above this it descends still more rapidly, until, at the mouth of Quicksand Creek, it is at the level of low water in the river. Along the river, opposite and above Jackson, this coal has been mined at many places.

These frequent openings in this coal, along the river, identify it beyond doubt, and also show the rate of dip.

In character it is usually a distinctly laminated and dry-burning coal with considerable fibrous coal or mineral charcoal between the laminae. At places portions of it are bituminous enough to coke, but this is not its general character.

Character of Coals.

The amount of sulphur present varies considerably, but is usually low, as is also the ash, while the percentage of fixed carbon is high. These three qualifications render the coal an excellent fuel for general purposes, and when considered in connection with its dry-burning, non-caking character, render it extremely probable that the coal would make a successful furnace fuel for the manufacture of iron.

## Cannel Coal.

The first workable cannel coals are found near the line of this section.

Such coals occur, at various levels, all through this region.

Cannel Coal. On the Kentucky River, at a distance varying from thirty to fifty feet above coal No. 3, is found another coal. It is a rather fat, bituminous coal, of very good quality; but it has not been worked. It is seen at the Spencer and Cardwell Banks, below Jackson and still further down the river.

The cannel coals of this region are, for the present, and probably will be for some time to come, more valuable than any other.

They will always command a higher price per ton than any other coals, on account of their excellent qualities as household fuels and for steam-making. They are also valuable for the manufacture of gas.

Haddock Mine. At a height—where best known—of two hundred and fifty feet above the Kentucky River, is found the most valuable cannel coal of this region. It is commonly known as the *Haddock coal*, as it is mined most largely at the Haddock mines, at the mouth of Troublesome Creek. This is the thickest cannel coal on the line of this section, and in quality it is equal to any. It does not contain as much volatile combustible matter as some of the other cannel coals, and will not make quite so brilliant a fire, but it contains less ash than the most of the others. It is mined, for this region, in considerable quantities at the *Haddock* and *Sewell mines*, near the mouth of Troublesome Creek. Here it usually shows a thickness of thirty-eight inches of cannel coal,

Four Feet Vein. with ten to twelve inches of bituminous above, and the miners report that in some rooms the cannel reaches a thickness of forty eight inches.

It has been found at enough places, widely seperated from each other, to prove that it underlies a large area, sufficiently large to be able to supply all the demands of an extensive mining industry for a long time to come.

The greater thickness and regularity of some of the other coals may eventually, when facilities for transportation become adequate, render them the most valuable, as they can be more cheaply mined than the cannel coals; but the latter, of good quality and reasonably free from ash, will always be in demand.

Salt. There is a salt well on the Kentucky river, opposite the mouth of Troublesome Creek, which is reported to have passed through four coals in sinking to its present depth of four hundred and ten feet.

Were Kentucky River slack-watered to these mines, so that coal could be shipped at nearly all seasons of the year, it would drive all foreign coal from our markets and could even do a large business on the Ohio River.

Until improved means of transportation are furnished this region, either by slack-water or railroad, there can be no extensive and regularly conducted mining enterprises.

EXTRACTS FROM REPORT OF PROF. L. H. DE FRIESE TO PROF. N. S. SHALER, DIRECTOR OF THE GEOLOGICAL SURVEY OF KENTUCKY.

## Timber.

Some extra care should be taken to perpetuate so rich a forest of such timbers as black walnut, black, white and blue ash, white hickory, tulip tree, black birch, etc.

The walnut timber is ruthlessly destroyed. I saw a magnificent walnut tree forty inches in diameter with a trunk of more than fifty feet in length cut for rails—a tree worth hundreds of dollars sacrificed for Timber. a few panels of fence. No care whatever is taken, either to preserve the old forest walnut now standing or to encourage the young growth.

So valuable are the ashes and the white hickory now becoming that a Paris, France, carriage manufacturing firm is thinking seriously of establishing a spoke factory in some part of Kentucky where these timbers can be most easily obtained, already there is a very large trade going on in *Liriodendron* or tulip tree (called yellow poplar) timber.

However, I see no reason to apprehend any near exhaustion of this timber. At least a dozen species of the most valuable timbers in the markets of the world now grow in large quantities. Kentucky alone might, at the expense of a few hundred dollars, have exhibited at Philadelphia, in 1876, a collection of timbers which would have rivaled the timber exhibit of any foreign country in the *quality*, *variety*, and *value of its woods.*

I found a remarkable belt of the *finest old-forest walnut timber that I have ever seen.* The trees are more scattering now in this belt than Walnut. they have been; for the trunks of several of the finest, which had fallen during the year, where still lying there. There is no undergrowth of any kind, whatever, to be found within the compass of this belt.

One of the many magnificent walnut trees that I found was fourteen feet six inches in circumference, with a curling but straight and beautiful trunk, sixty feet in length.

On the hillside exposed to the south, about forty-five per cent. of the whole timber was of the most massive and splendid white oak, often *four feet in diameter and ninety feet high.* Here there was less than one per cent. of *Liriodendron.* On the northern exposure opposite, on the contrary, about thirty-five per cent. of the timber was massive *Liriodendron* many trees of which were *six feet in diameter, with trunks sixty to eighty feet high.* Here the white oak formed less than one per cent. Of course this is a very striking example, and it could not be said that difference of exposure every-

where in these mountains produces such a marked effect upon the white oak.

Of course the black walnut, already noticed, and the black birch, of which there is a considerable quantity, are the most valuable timbers. But the people seem to attach very little importance to either.

The *Liriodendron* is largely floated out every winter, as I mentioned before, for lumber. The white hickory and black and blue ash rank next in value. Owing to the abundance of water-power, the accessibility, in large quantities, of these timbers, and their great demand in carriage-making, I see no reason why the near future should not see many spoke factories, axe-handle factories, and carriage factories in this part of Kentucky. Already the eyes of some large carriage manufacturers are turning toward these timbers, and they only need to be better known in order to become a good source of revenue to the people. The red maple, which is growing more and more into favor in cabinet work, also abounds. The linden (*Silia Americana*) is also found in large quantities through these mountains, and is very valuable in cabinet work, paneling, etc. The pines, especially the pitch pine (*Pinus rigida*) and the yellow pine (*Pinus mitis*), are very abundant in parts of the mountains. They are too well known to need especial mention.

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REPORT OF PROFESSOR JNO. R. PROCTOR, KENTUCKY STATE GEOLOGIST, ON THE RESOURCES OF THE REGION ADJACENT TO THE KENTUCKY UNION RAILWAY.

OFFICE OF THE
KENTUCKY GEOLOGICAL SURVEY,
FRANKFORT, KY.

*T. J. Megibben, President, and J. M. Thomas, Secretary of Kentucky Union Railway Company.*

DEAR SIRS: That portion of the great Appalachian coal-field comprising Southeastern Kentucky and portions of West Virginia and the southwestern portion of Virginia, is the largest area east of the Mississippi river unpenetrated by railways. The road proposed by you will penetrate through the centre of this great region, on a route as favorably located for easy grades as could be selected, and having the advantage of entering the coal-field of Eastern Kentucky at right angles to its outcrop, thus insuring the shortest possible route from those excellent coals to the Central or Blue Grass Region. *The two great railway lines from this region have*

Railway.

Shortest Route.

*skirted along the outcrop of this coal-field in a curious fashion before entering it.* The Cincinnati Southern runs almost parallel with the southwestern border, and only enters the field south of the Cumberland River, in Pulaski County, whilst the Lexington & Big Sandy avoids the coal on the northwestern border of the field for many miles. It is therefore evident that a railway, such as you propose, will afford *the shortest route*, and, on account of the favorable grade to be obtained, *the cheapest means* of supplying a large area with coal, lumber, and other products. The consumption of coal in Central Kentucky is large and increasing rapidly. The high price of lands, and large and profitable yields of agricultural products has demanded the clearing of lands. The grate for burning coal has supplanted the old-fashioned fire-place for wood. Population is increasing, and the demands for coal will increase year by year. It only remains to know something of the quantity and quality of the coals to be assured that a railway penetrating in that direction would be assured of profitable and ever-increasing freightage. After leaving the Central or Blue-Grass Region, your road would, in a few miles, pass over a variety of geological formations, from the Upper Silurian to the Carboniferous, inclusive, giving, in a short distance, quite a variety of soils and timbers, and a variety of agricultural products. In these various formations are to be had, in abundance, hydraulic limestone, building stones of superior excellence, pottery and fire-clays, valuable timbers, and iron ores.

The Conglomerate Sandstone holds up a broad, high table land, at an elevation of from 1,200 to 1,500 feet above sea level. Here the lands are gently rolling, similar to the "*Plateau Lands*" of Tennessee, with the advantage of being nearer the great markets of the Ohio Valley. These lands are admirably adapted to fruit-growing. They produce good grass, and are well suited to sheep husbandry. The excellent climate, abundant and pure water, healthfulness, and ease with which they may be cleared of timber and brought under cultivation, will cause them to be rapidly settled by immigration when transportation is afforded. Elevation.

## Red River Iron Ore.

The reputation of the "*Red River Car-wheel Iron*" is so wide spread as to need no description. The ore from which this iron is made is a limonite, resting on top of the St. Louis Group of the Subcarboniferous limestone, and is very persistent, with a varying thickness of a few inches to several feet along the eastern outcrop of the coal-field in the counties through which your road would pass. In Estill County three charcoal furnaces have been erected, two of them large and

well-constructed. At present the product of these furnaces must be hauled in wagons seventeen miles over mud roads to reach railway transportation. The construction of a railway through this region will give an outlet to these furnaces, and will insure the building of others using coal. The iron ores range from thirty-nine to fifty-two per cent. of metallic iron; and the pure coals to be obtained convenient to the ores will insure the manufacture of a superior iron at small cost.

Red River Iron.

It is easy to see the importance of a railway crossing the Appalachian coal field of eastern Kentucky, and connecting the North-west with the Atlantic Cotton States, and bringing the very rich and pure ores of North Carolina to combine with the cheaper ores near the out-crop of this coal-field, where coke equal to the best can be had. It is not unreasonable to suppose that all the furnaces in the Ohio Valley will use ore from North Carolina when the proposed system connecting the Ohio River with these ores is completed. These ores could then be delivered on returning coal barges, so that the ore could be carried to Pittsburg at less cost than the Iron Mountain and Lake Superior ores.

## Coals.

The first coals reached by this railway are the coals in the shales beneath the Conglomerate Sandstone. These coals are well up in the hills, above drainage, in this valley, and are favorably situated for cheap mining. All of these coals stand exposure and "yarding" well. Similar coals are sometimes brought down the Kentucky River in small flat boats during high water, and such coals always command many cents more per bushel for household use than the best Pittsburg coal. From these coals to the Ohio River by the proposed road is down grade, a guarantee of cheap freights, enabling the coals to compete with Pittsburg coals in the Cincinnati market, and to monopolize the market of a large part of Central Kentucky. In this valley towards the heads of the streams there are two coals above the Conglomerate. One of these is a fat caking coal, and will doubtless make an excellent coke. On the upper portion of Red River, on the Stillwater, the Gillmore, the Gladie, and other streams, an excellent cannel coal of workable thickness is to be had. There is doubtless a large area of valuable cannel coal in this valley.

Coal.

Cheap Freight.

Coke.

Cannel Coal.

The revival of "open fires" in cities, the increasing demand for cannel coals to enrich gas, and the failure of mines from which these supplies have hitherto been drawn, insure to any railway penetrating the valley of the Red and Kentucky Rivers a profitable and constantly growing freightage from the superior cannel coals abounding in the valleys of those streams.

Penetrating the eastern coal field in the direction of the proposed road, there is a steady increase of the thickness of coal-measure rocks and also in the number of coals. A section from Red River to the mouth of Troublesome Creek, in Breathitt County, shows this very plainly, and establishes the existence, up to that point, of at least five workable seams of coals above the drainage level of the country. These coals are thick and admirably suited for cheap mining, and are of excellent quality, as the following analysis, by the chemists of the survey, from samples carefully averaged by officers of the Geological Survey, will show, though these samples were, for the most part, taken from imperfect openings near the outcrop, thus showing the coal at a disadvantage. Coals.

| | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. |
|---|---|---|---|---|---|
| Specific Gravity | 1.300 | 1.294 | 1.297 | 1.290 | 1.289 |
| Moisture | 2.50 | 3.50 | 3.56 | 2.76 | 2.10 |
| Volatile Combustible Matter | 41.10 | 35.20 | 33.59 | 36.60 | 36.20 |
| Fixed Carbon | 49.22 | 56.70 | 58.38 | 56.50 | 58.20 |
| Ash | 7.18 | 4.60 | 4.50 | 4.06 | 3.50 |
| Coke | 56.40 | 61.30 | 62.88 | 60.56 | 61.70 |
| Sulphur | 0.818 | 1.189 | 1.381 | 0.865 | 0.836 |

No. 1.—Coal from Frozen Creek, Breathitt County.
No. 2.—Coal 5 feet 7 inches thick from Devil Creek, Wolfe County.
No. 3.—Spencer's Coal, Breathitt County, 4 feet thick.
No. 4.—Coal 6 feet to 7 feet thick, Wolfe Creek, Breathitt County.
No. 5.—Coal from near Hazard, Perry County, over 5 feet thick.

The above analyses of some of the bituminous coals of this valley show what a variety of excellent coals can be depended upon. The sample of No. 5 was taken from a pile of coal at the mouth of the mine which had been exposed to the weather for over twelve months. From the appearance of this coal, after so long exposure, and its freedom from slack, it is evident that it will stand long shipment, handling and yarding. The detailed survey of this region will doubtless bring to knowledge the existence of other valuable coals.

In addition to the above mentioned bituminous coals, the valley of the upper Kentucky abounds in cannel coal of great value. The demand for cannel coal for the purposes of enriching gas is large and increasing, and the supply convenient to existing transportation is nearly exhausted. One great objection to cannel coal for domestic use

is its manner of "popping" when first placed on the fire. The Kentucky River cannel coal is *remarkably free* from this objection.

Cannel Coal.

The following are analyses of some of the cannel coals from this region, from averaged samples taken by officers of the survey, and analyzed by the chemists of the survey:

| | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. |
|---|---|---|---|---|---|---|
| Specific Gravity | 1.280 | 1.265 | 1.219 | 1.180 | 1.290 | 1.280 |
| Moisture | 0.94 | 1.30 | 0.30 | 1.20 | 1.20 | 3.40 |
| Volatile Combustible Matter | 52.38 | 47.00 | 56.70 | 58.80 | 40.86 | 43.40 |
| Fixed Carbon | 35.54 | 44.40 | 38.10 | 35.30 | 48.44 | 46.96 |
| Ash | 11.14 | 7.30 | 4.90 | 4.70 | 9.50 | 6.24 |
| Coke | 46.68 | 51.70 | 43.00 | 40.00 | 57.94 | 53.20 |
| Sulphur | 1.423 | 1.574 | 1.513 | Not estimated. | 0.634 | 0.634 |

No. 1.—George's Branch cannel coal, Breathitt County.
No. 2.—Haddock cannel coal, mouth of Troublesome Creek, Breathitt County.
No. 3.—Cannel coal, near Jackson, Breathitt County.
No. 4.—Frozen Creek cannel coal, Breathitt County.
No. 5.—Lot's Creek cannel coal, Perry County.
No. 6.—Robert's Bank, Troublesome Creek.

The value of these coals is best shown by comparison with the follownig analysis of well-known cannel coals. These represent four of the best gas coals of Great Britain; No. 1, Lesmahago cannel; No. 2, Ramsay's Newcastle cannel; No. 3, Weyms' cannel coal; No. 4, Boghead cannel; and No. 5, the cannel coal from Kanawha, West Virginia:

| | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. |
|---|---|---|---|---|---|
| Specific Gravity* | 1.228 | 1.29 | 1.183 | ..... | 1.27 |
| Volatile Matter | 49.6 | 36.8 | 58.52 | 70.10 | 43.37 |
| Fixed Carbon | 41.3 | 56.6 | 25.28 | 10.30 | 46.50 |
| Ash | 9.1 | 6.6 | 14.25 | 19.60 | 10.13 |

* Including moisture. Sulphur not determined.

*There are no cannel coals superior to those of the Kentucky Valley;*

Cannel Coal.

and on the line of the Kentucky Union Railway the beds are thick, above drainage and the coal can be cheaply mined. The very high

price for a superior article of cannel will justify long shipments of these coals by rail; and if there were nothing else to be shipped from that region, I believe the freights to be had by shipment of this coal would alone justify the building of a railway to reach it.

The dip of the rocks is continued until Pine Mountain is reached, and consequently the coal-measures thicken, and the number of coals increase to the southeast.

Reference has been made to the freightage of bituminous coals to Central Kentucky, Cincinnati, and Louisville. The cannel coals of this region will find profitable markets in the entire Ohio Valley and the cities on the Atlantic slope. Excellent coke can be manufactured from some of the coals along the line of this road, and the connections which this road will make with roads penetrating North and South Carolina will open profitable markets for coal and coke in that direction.

## The Timber Resources

Of this Valley are great. The only considerable area of white pine in the State is here. There are also extensive forests of yellow pine, white oak, yellow poplar, and other valuable woods. On the ridges and uplands, near the borders of the coal-field, are extensive forests of chestnut oak—enough to yield for years a large supply of tan-bark. Timber.

Prof. L. H. DeFriese, Botanist of the Geological Survey, has made a careful study of the timbers along this valley to the Virginia line. The following extracts from his report show the value of the timbers of the section between the Middle and North Forks of the Kentucky River:

"The forests of white oak are as fine along the rich hill-sides as I ever saw. Hickories are splendid also; and walnut, yellow poplar, chestnut and linden are unsurpassed. The tops of the hills are crowned with black oak, scarlet oak, chestnut oak, rock maple, scrub hickories, and pines. A considerable amount of fine old forest walnut, black birch and cherry still stand in these fastnesses, and gigantic yellow poplar, white oaks, ashes, lindens, locusts, chestnuts, elms, buckeyes, magnolias, and maples have so far bid defiance to the axe that has laid waste these timbers in other parts of the State. * * * * A list of timbers noted in the Troublesome Creek region includes white, black, and pig hickory, white oak, holly, black, and blue ash, black walnut, yellow poplar, chestnut, black gum, black and gray birch, winged elm, white, rock, black, and mountain maple, mulberry, chestnut oak, beech, black cherry, black locust, linden, Timber.

water, beech, sycamore, pines, cedar, hemlock, elm (*race-mosa*), etc. * * * * *The great variety, and the richness in valuable timbers, of these forests, I think, can scarcely be surpassed.*"

The above will answer as a description of the general character of the timber along the entire route to the Virginia state line.

Too high an estimate can not be placed upon the forest resources of this region. The large demands for timber in Central Kentucky must be supplied from this source. To the north of Kentucky the demands are such that the home supply, already small, will soon be exhausted. That region is now mainly supplied from the pine forests around the northern lakes. Dr. George B. Emerson, who has given the subject of our forest resources much study, stated a few years since, that in twelve years the forests in the lake region of the Northwest—the present source of supply for the Ohio Valley—would all be gone. It was then estimated that the mills in the three states of Minnesota, Wisconsin, and Michigan depleted the forests at the rate of 1,380 square miles per annum, and the demands upon that region are larger now than then. It is evident that a large area must obtain supplies of timber for the future from the region to be penetrated by the proposed railway, and the fine quality and large supply of timber will insure a heavy freightage.

I have dwelt briefly upon some of the most important resources along the line of this road. There are others which, with the development following the construction of such a road, may assume equal importance with those mentioned.

## Salt.

Salt. Salt is found by boring in Perry, Breathitt, and Letcher counties, along the line of this road, and with the transportation large developments of that industry will follow.

## Petroleum.

Petroleum. I believe it is an established fact that the petroleum of this country is derived either directly or indirectly from the Devonian black shale. * * * * This shale is also quite thick—about 150 feet where this road will cross it before entering the coal field in Central Kentucky—and dips under the coal-measure rocks to the southeast. The shale from that section has been analyzed, and found to contain from 15 to 20 per cent. of petroleum, which, in a thickness of 150 feet, would be equal to from 20 to 30 feet of oil under that region.

*I do not believe that too high an estimate could be placed upon the*

*importance and value of the proposed road, combining, as it will, such a variety of advantages. It will be the great mineral road of the country.* It will penetrate the largest area of valuable timber. The direction is most favorable. The grain, live stock, manufactured articles, merchandise, etc., of Kentucky and the Northwest are in demand in the Carolinas, whilst the cotton, rice and tropical fruits of those states, the salt and gypsum of south-western Virginia, the iron ores, copper, feldspar, mica, corundum, etc., from North Carolina, and phosphates of South Carolina, will insure profitable return freights. The area treated of in this communication is so large, and the resources so varied, that only the briefest mention of a few of the leading resources has been possible. The completion of this road will bring others not mentioned into prominence. The entire region traversed is well watered, healthy, free from malaria, and the combined advantages of position and natural resources will insure, when transportation facilities are provided, a development equal to that of any portion of this country. Railway.

JNO. R. PROCTOR,
*State Geologist.*

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EXTRACTS FROM PAMPHLET ENTITLED "KENTUCKY" BY PROF. JOHN R. PROCTOR, KENTUCKY STATE GEOLOGIST.

Kentucky, one of the central states of the United States of America, is situated between 36° 30′ and 39° 6′ north latitude, and 82° and 89° 38′ west longitude, and is bounded on the north by Ohio, Indiana, and Illinois, on the west by Missouri, on the south by Tennessee and Virginia, and on the east by Virginia and West Virginia. It extends from east to west 458 miles, and its greatest width from north to south is 171 miles. Latitude and Longitude of Kentucky.

The eastern coal-field, with an area of over 10,000 square miles, has an elevation of 650 feet on the Ohio River, to 1400 feet on the south-western edge on the Tennessee line, and 3,500 feet on the southeastern border of the state. The great central, or **Blue Grass Region,** has an area of about 10,000 square miles, and an elevation of from 800 to 1,150 feet. Although elevated several hundred feet above the drainage level, the surface is that of a gently undulating plateau, with a pleasing topography. Elevation. Blue Grass Region.

## Rivers.

This state has a river boundary of 813 miles of navigable streams. Rivers.

## Climate.

The climate is very mild and salubrious. The mean annual temperature ranges in different parts of the State from 50° to 55° Fahrenheit.

Climate. The extreme range is less than in the states north and west. The lowest record at the United States Signal Service Station during the exceptionally cold months of December, 1880, and January, 1881, was 8° below zero. During the very hot summer of 1881 the maximum temperature was greater as far north as Chicago than in Kentucky. Cattle remain upon pasture during the entire winter, with but little additional food; and there is seldom a day, winter or summer, when a man may not perform a full day's work in the open air. The healthfulness of the climate is attested by the *low death-rate*, and by the

Physical Development of Men and Animals. strength and vigor of the population. The tabulated measurements of the United States volunteers during the Civil War, show that the soldiers born in Kentucky and Tennessee exceeded all others in height, weight, circumference of head, circumference of chest, and ratio of weight to stature. The speed and endurance of the Kentucky horse, and the superior development of all kinds of domestic animals, are well

Rainfall. known. The annual rainfall ranges in various parts of the State from 45 to 50 inches, and is probably still higher in the Cumberland Mountains.

## Soils and Agriculture.

The State was peopled almost exclusively with agriculturists from Virginia and Maryland, and agriculture has remained the favorite occupation.

Agriculture. In Kentucky a diversified agriculture is found to be most profitable. Especial care has been devoted to the importation and improvement of domestic animals, until the State has become the great center for

Live Stock. fine stock of all kinds. In arriving at this pre-eminence the breeders have doubtless been assisted by the climate, the water, and the perfection of pasturage. The blue grass attains perfection in this region, making a beautiful turf; it grows in the shade of woodlands, and affords an excellent winter pasture.

The production of the very fleet trotting horses of Kentucky is the result of intelligent breeding, under favorable conditions.

Tobacco. Kentucky is the principal **tobacco-growing State** in the Union. In 1870, of the total of 262,735,371 lbs. produced in the United States, Kentucky produced 105,305,869 lbs.; and in 1880 out of a total of 473,107,573 lbs., Kentucky produced 171,121,134 lbs.

Hemp. Hemp since the early settlement of the State, has been a favorite crop, more especially in the Blue Grass region. Contrary to an

accepted opinion it has not here proved an exhausting crop where rotted upon the land. Wheat succeeds almost as well after hemp as after clover sod. The yield of hemp for the year 1880 was about 15,000 tons.

Area Improved Land

Over 60 per cent. of the area returned as farms is unimproved, or in timber. The area returned as improved, or under fence, was less than one-third the area of the State.

Manufactures

Before the freeing of the slaves, domestic manufacturing on the farm was carried on to a large extent.

Railways.

In 1831–35 a railway was made from Frankfort to Lexington, being one of the earliest lines constructed west of the Alleghanies. On January 1st, 1881, there were 1,598 miles of railway in operation in the State. The number of miles constructed since 1870, has been greater than before for the same length of time, and many new roads are projected.

Internal Improvements.

* * * * * As early as 1827, the State began a system of internal improvements under which many miles of macadamized roads were made and the navigation of rivers improved. The State expenditure for these purposes, independent of the county and individual subscriptions has amounted to more than $5,000,000.

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EXTRACTS FROM REPORT OF PROF. JOHN R. PROCTOR, KENTUCKY STATE GEOLOGIST, FROM MAY 1st, 1880, TO JANUARY 1st, 1882.

* * * * The reports of Prof. Crandall will show a wealth of resources in the region examined as great as the most sanguine could desire. It was discovered that there was, just beyond the state line, in the divide between the headwaters of the Powell River and the waters of the Cumberland River, a coal suitable for the production of coke of superior quality. The importance of such a coal in determining the development of manufacturing in the Ohio Valley is very great. The entire region between Pennsylvania and Colorado is supplied with coke from the Connelsville region, Pennsylvania, and Quinnemont region, West Virginia. From the former region 600 car-loads of coke are sent away daily. Believing that this coke coal could be found in the drainage of the Cumberland and Kentucky Rivers, Prof. Crandall was sent there during the past season to make search for and trace this coal as far as possible. His success was greater than anticipated.

Coke.

Coking Coals.

This coal was found and traced over a wide area on the headwaters of the Cumberland, Kentucky, and Big Sandy Rivers, above drainage,

Coal Vein 7 to 8 feet thick

and averaging from seven to eight feet thick (on line of Kentucky Union Railway.)

For the purposes of comparison and enabling an estimate to be placed on the value of these coals, I give below analyses of one of the best of the celebrated coking coals of Pennsylvania. No. 3 is the coal at Connellsville. The following are analyses copied from volume L, page 63, Second Geological Survey of Pennsylvania:

| | No. 1. | No. 2. | No. 3. | No. 4. |
|---|---|---|---|---|
| Moisture | 1.260 | ..... | 1.260 | 2.375 |
| Volatile Matter | 30.107 | 22.380 | 30.107 | 32.565 |
| Fixed Carbon | 59.612 | 68.500 | 59.616 | 49.955 |
| Ash | 8.233 | 8.000 | 8.233 | 13.145 |
| Sulphur | .784 | 1.120 | .784 | 1.960 |

Here we have for comparison analyses from the best coals of Pennsylvania, so determined after years of working, and analyses from coals opened in a few weeks' exploration in Kentucky. We have reason to believe that this remarkable coal-bed can be identified and traced further north, and will prove one of the most valuable, if not *the most valuable, coal-bed in America.*

## Immigration.

Immigration

* * * * It is with a view to show how we have neglected our great, gifts, and what may be accomplished in placing Kentucky where she is destined to stand, as *the great centre of wealth and power in the Mississippi Valley*, that comparison with other States is instituted.

Kentucky has about the same area as Ohio. I believe the present survey will demonstrate the fact that the State has a greater area than

Fertile Soil.

40,000 square miles. The amount of fertile land is greater in Kentucky than in Ohio. The latter state has but a limited area of the blue limestone, and no soil corresponding to the great fertile belt of sub-carboniferous limestone lands surrounding the western coal-field of Kentucky; nor will the best of the coal-measure soils of Ohio equal in quality the very fertile lands of that formation. I know from personal observation that much of the land in Ohio in a high state of cultivation, and yielding large returns, is situated on the same geological formations and of like quality with lands which, in Kentucky, have been almost wholly neglected by the agriculturist.

We have a total production from agriculture, mining, and manufac-

turing of $146,612,428 in Kentucky, and $775,732,061 in Ohio. The gains from commerce are not to be taken into account, as commerce is not production; but we purchase largely from Ohio of those articles which should be produced at home; and, with an area of coal much larger than that of Pennsylvania, we purchase more coal annually from that State than is mined in Kentucky.

One reason for this disparity in production is, that Ohio, being situated on the great highways connecting the East with the West, the great stream of immigration which has passed through that State has brought wealth to it. But there are other reasons.

In the South the system of agriculture, which was the natural outgrowth of slave labor, and the ease with which that labor could be concentrated and mobilized, might well be termed a marauding agriculture. The richest lands were appropriated by the slave-owner, and often exhausted by improvident tillage; after which, new lands were occupied, the exhausted lands generally becoming waste places.

Past us has swept the great tide of immigration, bringing to the Northwest wealth; bringing great powers of production; bringing the industrial secrets of the high civilization of Europe. This great tide, and the resultant development following in its wake, has carried away thousands of our best men. Receiving no compensating accessions from without, the State has sent forth an army of her sons to build up the West. Thus a large area of the State has been neglected by our own people, although fertile lands were there unoccupied, and even the poorest would bring remunerative returns if a system of agriculture was practiced suitable to the requirements of the soil. That these soils are capable of a high agricultural development is easily demonstrable. The eastern coal field of Kentucky is a continuation of the southward extension of the Pennsylvania coal field, with the same character of rock; but the amonnt of fertile land, and land not too rugged for tillage, is much greater in the former; yet the value of agricultural products in ten of the counties of Eastern Kentucky, with an aggregate area of 4,960 square miles, was in 1870 $1,364,052; and in ten counties of the Pennsylvania coal field, with an area of 6,700 square miles, it was, for the same year, $29,807,000. Washington and Alleghany counties, Pennsylvania, having an area of 1,580 square miles, with a soil similar to that of many of the counties in our eastern coal field, returned farm products to the value of $8,959,282. Whilst the counties of Bourbon, Fayette, Clark, Nicholas, Harrison, and Jessamine, aggregating 1,580 square miles, returned for the same year agricultural products valued at $8,717,374. If such returns may be had from our poorer soils, what may be expected from the vast

area of fertile lands in the state, with an increase of our agricultural population? I believe the highest civilization, and the greatest boons of civilization, can only be attained by a dense agricultural population.

Swiss Colonists.

I am assured from letters received from Switzerland that there will be many additions to the colonies from that country in the spring, and there are also indications that many Swiss will come from the north-western states.

* * * The superior advantages possessed by Kentucky have already brought British farmers to this state; and there is every indication of a very desirable emigration of English and Scotch farmers to Kentucky. And from letters recently received from France, I am assured that a large colony of French farmers and wine-growers will follow. A colony of Germans and Scandinavians, is now organizing under the direction of Mr. Emil Lindburg, who has had large experience in the business of colonizations, and has established an office in New York City for this purpose. A colony of Saxons has been organized, and the leader will come to Kentucky to select a location.

British Farmers.

French Wine Growers.

Saxons.

Coal.

The state line between Kentucky and Virginia leaves the Cumberland Mountains about forty miles east from Cumberland Gap, and traverses the crest of one of the ridges of the Black Mountains, the divide between the waters of the Upper Cumberland and Powell's river, so that there is an area of coal-measures in South-western Virginia. A portion of this region was explored by Prof. J. P. Lesley, and his report attests the value of the coals of that section. He says, speaking of the six-foot bed: "At one place, where the bed had been dug a little into, it yields the best kind of bituminous coal, fat and caking, but friable, with no appearance of sulphur, and making no clinker. It is a good blacksmith coal, and no doubt will make a good coke. A piece of ill-made coke shows that the best coke can be got from it."

Coke.

Prof. John J. Stevenson has recently made explorations on the head waters of Roaring and Pigeon Forks of Powell's river, near the Kentucky line, and reports coal of great thickness and superior quality.

The coals were analyzed by Mr. A. S. McCreath, Chemist to the Geological Survey of Pennsylvania. Referring to these analyses, Mr. McCreath says: "The analyses speak for themselves, and indicate coals of remarkable purity."

8-foot seam coking coals.

Prof. Stevenson adds: "This eight-foot seam will yield a coke with considerably less than *three per cent. of ash*, and with little more than five-tenths per cent. of sulphur. Such would be a marvelously rich coke, the percentage of fixed carbon being somewhat more than ninety-six. The Connelsville, Penn., coke has somewhat less than ninety per cent. of fixed carbon, the ash is between nine and ten per

cent., whilst the average sulphur is about eight-tenths per cent." I have a sample of coke carelessly made from this coal which is excellent and of great strength.

An examination of the iron ores contiguous to the above-mentioned coals will convey an appreciation of their value. * * *

## Iron Ores.

Iron.

The Clinton ore extends irregularly along the eastern escarpment of the Alleghanies from Canada to Alabama. It is the principal source of local supply for the furnaces of Pennsylvania, and is the source of supply for the furnaces of the Roan Iron Company, Tennessee; the furnaces in the Sequatchie Valley, and most of the furnaces in eastern Alabama. This ore is very persistent, and of good workable thickness along the entire eastern edge of the region under consideration.

This excellent ore can be delivered to furnaces along the eastern border of the Kentucky coal-field at prices ranging from 50 *cents to* $1.50 *a ton.* Prof. Stevenson estimates that pig iron can be made in this vicinity *at* $8.25 *per ton.* The above is but a small part of the ore supply to be relied on in this region.

In addition, the great thickness of coal-measure rocks will undoubtedly yield a large supply of *carbonate ores.* Little search has been made for iron ores in this region, and the rocks are so covered with the deep soil and luxuriant forest growth that outcrops of such ore would seldom be seen. The fragments of such ores are numerous in the streams, and some workable beds have been discovered.

It is evident that this region has an abundant supply of ores, and that only transportation to the markets of the country is needed to insure the building up of an extensive iron industry. *In no region of the United States can iron be produced cheaper.* A discussion of the advantages as an iron-manufacturing center would be incomplete without reference to the very rich and pure ores of the East Tennessee and Western North Carolina section.

* * * The nearness of the very pure ores of East Tennessee and western North Carolina to the pure coals of eastern Kentucky are an assurance that, with transportation secured, that region will be one of the great iron and steel-producing centers of the world. As it requires about five tons of coke to produce a ton of finished bar-iron or steel, it is evident that these ores will be brought to the coal, and for this reason you have an interest in the quality, quantity, and future development of these ores. I believe it will be found that *no ores of like richness and purity are to be found so convenient to pure, cheap coals as are these ores.*

The scope of this report will not permit anything beyond a mere

Celebrated Iron Ores.

mention of some of the principal ores of the Unaka and Blue Ridge section. The ore of most importance is probably the celebrated magnetite ore near Cranberry, North Carolina, and the extension of the same ore in Carter County, Tennessee. Prof. W. C. Kerr, State Geologist of North Carolina, says of this ore: "In quality this ore is unsurpassed by any iron in the world, and in regard to quantity, the bed much exceeds the great deposits of Missouri and Michigan, and at least equals anything in the Champlain region, so that it has not probably an equal in this country."

Prof. J. P. Lesley, in summing up the results of his investigations of this ore belt, says: * * * * "It is an advantage, therefore, that while many Canada ores hold 25 and 30 and 35 per cent. of titanic acid, this ore has less than 15, leaving the percentage of metallic iron over 50. At the same time you have all the advantages which the presence of titanium affords: 1st. Making the *ore* so firm that it is the best possible for lining puddling furnaces; 2nd. Making the *iron* tougher and harder, like the best Sweden iron; and 3rd. Imparting a certain quality (the cause of which is not yet understood) which adapts the *iron* especially for the manufacture of *steel.* * * * The quality of ore, although various, and suited to at least two branches of the iron manufacture, is of the very first rate; *none better in the world.*

Advantages Presence Titanium.

Very Best Iron.

"The soft ores will smelt easily and make magnificent iron; absolutely the very best—perfectly malleable, tough and strong.

"The hard ores will command a high price for puddlers' lining; will be in demand for mixing with poorer ores of other regions in the blast furnace, to increase the quantity and quality of their pig metal, and will have an especial value for the Siemens and Bessemer processes and the steel manufactures generally. The quantity of the ore is limitless.

## Transportation Routes.

Transportation.

At present this district is without railway transportation.

I have in the foregoing report but glanced briefly at some of the valley tributary to the Kentucky Union Railway. There are others which, with the development of the future, may assume equal importance with those mentioned.

The central valleys are surrounded with gently sloping hills and mountains, covered with a grandeur of forest *nowhere surpassed.* There is no more grand or beautiful scenery elsewhere in the Alleghanies. The genial summer climate is due to the high elevation of this entire region above the sea level.

Climate.

The summer rainfall is greater than elsewhere in the Ohio Valley. This combination of advantages—*healthfulness of climate, good soil, valuable timbers, abundance of coal and iron of excellent quality,* so situated as to be cheaply mined, and the certainty of transportation facilities in the near future—certainly renders this country peculiarly adapted to persons seeking new homes. Lands can be purchased in large tracts at a low price. Rainfall.

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EXTRACTS FROM THE REPORT OF PROFESSOR DAVID F. ANSTED, OF ENGLAND.

"I have been occupied in practicing engineering, as conneted with geology, for the last twenty-eight years.

"I have been accustomed to visit different coal fields, and iron fields especially, in all parts of Europe, I may say, and in some parts of Asia and America. I have seen most of the important coal and iron fields in the world.

"In England we are now mining about a hundred and twenty million of tons per annum. Coal.

"*There can be no doubt whatever that the general coal fields west of the Alleghanies will have to supply all the manufacturing parts of America before long.* But the western coal field of the Alleghanies is *the great coal field of America.*"

With regard to the mining of the iron ores, that can be done *at a cost below the price of mining similar ores in any part of the world which I ever visited.*" The cost of the manufacturing of the best qualities of iron, which ought to be made from ores of such very high values, would not be much more than one-half at the present prices of labor here. *The actual cost of making Bessemer steel, for instance, would be considered below half the cost in any part of England at the present time.*" "There are no workable coal-fields in England, of the ordinary kind, in which 40,000@50,000 tons per acre could be taken out without going to a very much greater depth than here, and the total thickness of seams in the English coal-fields in any one district is not so great as it is here." "The quality of the coal is quite unexceptionable. There are three kinds. The kind which is called bituminous is remarkably free from any troublesome ash. It has a certain quantity of ash, and, perhaps, a little more than the most of the English coals, but it is capable of being coked, I am quite sure." Iron Ore. Coking Coals.

"Besides this, there are seams of splint coal—a hard coal—very

valuable, also, in the manufacture of iron, because it is so singularly free from those things which are injurious in the making of iron. It is a perfectly good coal, used in the furnaces raw for the making of the best qualities of pig iron."

Cannel Coal.

"There is another, called cannel coal, which is exceedingly valuable, is the most valuable of coal for the making of gas. It has a very high gas-producing power—a very high illuminating power. It is quite equal to our best English coals for gas, and I should think the better qualities of it are superior to our qualities of coal, say the Wigan cannel, which has always been regarded as the most useful and available of the cannel coals which have been reported. There is one coal, which is hardly a coal, either, found in Scotland, called the boghead, a sort of shale, containing an enormous quantity of gas, which yields, perhaps, a thousand cubic feet of gas per ton more than any other cannel known. That is the only exception. This would, I think, compete with the Wigan coal, which has been used generally in New York, and in large cities on the coast. This coal could be transported to any place on the eastern coast on terms much more favorable than any English coal at the present time. There is no doubt about that."

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EXTRACTS FROM REPORTS OF PROFESSOR WM. B. ROGERS, VIRGINIA STATE GEOLOGIST. THE GREAT COAL, IRON, AND TIMBER REGION OF AMERICA.

By far the greater portion, if not all, of its strata belong to a group of formations distinguished not only in America, but throughout the world, as being the chief depositories of bituminous coal.

Mineral Wealth.

It is in widely spreading strata of sandstone that nearly all the boundless treasures of this country are enclosed, and the continuous character exhibited by them give the strongest possible assurance of a like uninterrupted extension of the various beds of valuable materials which they include. In this view, how magnificent is the picture of the resources of this region, and how exhilarating the contemplation of the happy influences upon the enterprise, wealth, and intellectual improvement of its inhabitants, which are rapidly to follow the successful development of its inexhaustible mineral possessions. In this country, where the channels of nearly all the principal rivers have been scooped out in part through beds of coal, where some of them are found with the richest ores of iron, and where the very rock itself, the sterile sandstone of the cliffs and mountains, is enriched at certain depths with abundant stores

of salt, what more is needed to fulfill the happy and glorious destinies that await it than *to awaken enterprise to a due appreciation of the golden promises it holds out*, and to direct industrious and active research to the thorough investigation of the character, position, and uses of the treasures it contains?

Coal.

The coal area occupies all or part of twenty counties in Eastern Kentucky, and embraces an extent of 10,000 square miles. The western margin of the field enters Kentucky near Portsmouth, on the Ohio, and leaves it near Monticello, a short distance below, and east of which it crosses into Tennessee, the general course being south-west.

The evidence of regularity and uniformity in the coal seams of this field is too great to be doubted.

"With this fertile soil, with a good climate, with excellent water, that always belongs to coal strata, and with unsurpassed healthfulness, this country, mountainous and hilly as it is, would have been filled with a hardy, industrious, and thrifty population, instead of a few settlements now met with, were it not for two causes; the principal one of which has been want of communication and market, the other the magnificent growth of timber with which the land is covered."

Want of Communication.

The mountain sides and valleys of eastern Kentucky and Tennessee, northern Georgia, western North and South Carolina and south-western Virginia, in many regards a *terra incognita*, is a territory larger than Great Britain, and contains more and purer iron and coal, equal deposits of copper, lead, zinc, and salt. It enjoys what is, probably, the finest climate on this continent. It is permeated by the most fertile valleys, and bears upon the hills and mountain sides the heaviest growth and greatest variety of hardwood timber.

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FURTHER EXTRACTS FROM THE KENTUCKY GEOLOGICAL REPORTS, BY DAVID DALE OWEN AND PROF. N. S. SHALER.

## Coal.

Coal.

In Eastern Kentucky, fifteen counties and a large area of five more counties, are included in the great Appalachian Coal Field, which counties constitute one-fifth of the whole area of the State.

In number and thickness of the beds of workable coal, the Kentucky coal measures are fully equal to the average in the most productive regions of Great Britain, hitherto considered the greatest coal country of the world. Since, in our lower and middle divisions alone, there are seven workable beds, having a united thickness of twenty-eight feet.

It has been said: "From the Grampians to Sussex, and from the German Ocean to the Irish Sea the predominating geological feature of the British Islands is the carboniferous series with the most magnificent coal deposits accessible in every direction. These have been the source of Britain's internal riches, and the great cause of the development of the mechanic arts which distinguish her above all other countries."

It will be seen *that many of these coals of the eastern Kentucky coal-field are of superior quality—equal or superior to the best Pittsburg. The best of these coals contain several per cent. less ashes and more fixed carbon than the Youghiogheny coal.* The screenings from these coals which are richest in fixed carbon, and at the same time freest from sulphur are found to be nearly as good for generating steam as the lump coal of many mines.

Coal.

The area of the eastern Kentucky coal field, as determined by the survey of Topographical Assistant Joseph Lesley, is 8,983 square miles. Great Britain has 8,139 square miles. The eastern coal field of Kentucky contains, therefore, 844 *square miles of coal area more than Great Britain; nearly double that of Spain; more than three times greater than France, and nearly twelve times greater than Belgium.*

## The Coal Mining Advantages of the Kentucky River.

The coal mining advantages of the Kentucky River arise from the great number of seams found accessible above water level, and from the fact that they contain coals of various composition, adapted to all the requirements of trade and manufacture.

The fat coking, gassy bituminous, the hard and valuable splint, and the rich and oily cannel in this highly favored region are found in great purity, and made easily accessible to the miner through the agency of running water, which has exposed the seams in innumerable places, and in consequence of this, and the thickness of the seams, as a general rule, can be mined cheaper and with more economy under the same rates of labor than in any other part of the Alleghany coal-field. Water has cut and counter-cut the country by deep and narrow valleys, thus preparing this field with numerous objective points for safe and economical working. Vast areas of the coal measures are above water, accessible at many points by simply reforming from the outcrops of the seams the alluvium that has formed there by the decaying work of ages.

This will more clearly appear by a comparison of the positions of the coals here and in Great Britain in this respect. There the coal is deep below the water level, and to reach it requires years of labor and

Coals.

vast sums of money. In its great northern coal-field the shafts are rarely less than 150 feet deep, and many have the depth of 1,800 feet, sunk at an expense, in some cases, of $240,000.

The Dukenfield Colliery was taken down 2,600 feet at a cost of $500,000 to reach the "Black Mine Coal," a seam of four feet eight and a half inches thick.

Here mighty natural forces have sunk pits, which need neither repair nor removal. The inclination of the strata coupled with the laws of gravity have provided the most costless, perfect, and permanent pumping machinery, and the perfect ventilation of the mines, is but a matter of the most simple and ordinary care. The noxious gases to be dealt with in shaft mines are not to be encountered.

When the number of seams over three feet thick above the drainage of the country is considered, and that such a seam yields about 4,800 tons per acre, it will be seen that the deeper ones need not be taken into account.

It will be a long time before shafts need be sunk at all.

Coals.

In all cases the coal entries can be made at such altitudes as will furnish all the height required for the "dump" and screenage, and disposal of the waste. The slate and sand rock directly over the coal will make a roof that will be firm and require no support except from the usual pillars, and these may be drawn with far less than the usual danger.

All along the valleys of eastern Kentucky in munificient abundance may be found the different varieties of cannel, splint, block, and common bituminous coal, located by nature in the most favorable position for mining and shipping, the seams varying from three feet to eight feet in thickness, and lying nearly horizontal, and from a few feet to three hundred feet above the bottom of the ravines, in which they are exposed.

One feature about the coal deposits of this region, which is particularly favorable to mining, is the fact that the roof to the seams is a compact slate several feet thick between the coal and sandstone.

## Facts proven.

Facts.

1. The supply of coal is abundant to meet all the demands for many generations.
2. The quality is unsurpassed.
3. Mining operations can be carried on easily, safely, and cheaply.

## Iron.

It appears to be the case in the Kentucky coal-fields, as well as in those of Great Britain, that the thickest, most extensive and best iron
Iron. ores occur towards the base of the coal measures. The hydrated oxides of iron are most prevalent in Kentucky at the junction of the millstone grit and sub-carboniferous limestone, and of the best quality when they repose on the limestone, or occur in fissures, veins, and cavities in this rock.

## Fire-clay.

The value of the fire-clay deposits in this valley can hardly be estimated at present. It is reasonable to suppose that this deposit will in time become one of the important sources of wealth to this part of Kentucky. But the fire-clays and plastic clays of the coal-fields are especially deserving of attention; and these, from their abundance, superior quality, and vicinity to fuel should form the basis of extensive industries. Amongst them may be found some of the best fire-clays,
Clays. as well as some well-fitted to the manufacture of pottery-ware of various kinds, including the better sorts of delf, stone, and china or queensware. Skill, capital, and enterprise are all that are needed among these somewhat neglected deposits to make them of very great value to individuals, as well as to the public. Only the want of these essentials causes us to pay a heavy tax to foreign nations for our pottery-ware, while the material for their manufacture lies neglected at home.

The composition of these clays indicate that most of them are highly "refractory," and that all could be used for the manufacture of stone-ware, *terra cotta*, etc. Those which burn white might be used for "delf ware" or "queensware" so called.

## Soil Products of the Kentucky Valley.

Corn, wheat, oats, rye, barley, buckwheat, and tobacco, together with the native and meadow grasses and all kinds of vegetables, grow well wherever the land is not too hilly or abrupt for cultivation. The creek and river bottoms are especially productive. Sorghum for making molasses and sugar is grown over the whole area.

## Grapes.

The soil of this valley is admirably fitted for the growth of fruits of all kinds. The season is rather later than that of the other river basins of the State, and the liability to frosts possibly rather less than in the central region.

Grapes flourish here as well as they do in the mountainous countries of Switzerland, France, Spain, or Germany, and wine-making might be as cheaply conducted on these highly fertile calcareous, limestone soils, as on any other part of the earth. The warm climate, too, imparts to the grape a richness that is rarely met with, except in the south of France. Grapes.

## Fruits.

Owing to the difficulties of transportation, fruits have been as yet but little grown for exportation. Fruits.

Apples, pears, and peaches are largely cultivated, and are a sure crop, never being injured by frosts or extreme cold weather; but the absence of speedy and reliable means of transportation compels the drying of these fruits, the exports of which every year are enormous. In one year there was shipped from a small section of eastern Kentucky sixty thousand bushels of dried peaches alone, and, as it takes at least five bushels of ripe fruit to make one bushel of dried, it will be seen that over three hundred thousand bushels of peaches were raised there that year, an item of considerable importance to the business of this road.

## Sheep.

Sheep husbandry can nowhere be followed with greater success than in this part of Kentucky, where the native and imported grasses on the ridge lands afford the best of pasture for all kinds of stock. Sheep.

Some of the farmers are already beginning to import the better breeds of sheep and hogs.

## Horses, Mules, Cattle, and Hogs.

The valley is admirably adapted for the breeding and rearing of horses, mules, cattle, and hogs.

The wild or unfenced lands covered with forests and with an undergrowth, wild pea-vines and grasses afford ample sustenance for stock for about nine months of the year. Hogs and cattle, with little or no care, thrive and fatten on the acorns, nuts, and grasses produced by these wild lands. With some attention and the introduction of new and improved breeds, stock-raising would prove immensely renumerative. Stock.

## Markets for Coal.

From the best attainable information it appears that the consumption of coal in the Blue Grass Counties amounted for the past year to from

ten to twelve millions bushels. The consumption in the city of Cincinnati amounted to from two to three millions of tons, while Louisville and the markets dependent upon it consume even a larger amount.

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MR. JOHN GRAY, C. E., IN HIS WRITTEN REPORT TO THE SENATE, SAYS:

Having better coal in greater variety and abundance, more iron and of better quality within sixty miles of our capital and 135 to 150 from the large markets of Cincinnati and Louisville; having a fine river running into the centre of this region, which, when improved, can carry to the Ohio and southward 70,000,000 bushels of coal yearly, while the building of one railroad 100 miles into it will bring away 50,000,000 more, and develop all other kinds of business and place that region within six or seven hours' time of the market, why should we continue to pay, year after year, for a lifetime, ruinous tribute to Pennsylvania for these things, and bring them six times as as far?

Why should we pay in this way every three years, enough from the product of our soil to lock and dam the river and build the railroad to abundant coal?

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## CONCLUSION.

A glance at the map will show the observer that the Kentucky River valleys are to be the future great thoroughfares through which the industrial products of an immense extent of territory are to reach their markets, and in turn be served with the merchandise for which its products will be exchanged.

There is no parallel valley within a competing distance in which a railroad can be built, and the mountainous character of the country would make the cost of building a road across the valleys too expensive ever to be remunerative to its owners; but the Kentucky Union Railway can, by short lines up the principal tributaries, accommodate the demands of the entire region, including both the North Fork and Middle Fork of Kentucky River, above Jackson, Breathitt County, and thus open up an empire of wealth, where enterprise can embark in schemes of solid merit, and capital expand on a basis as secure as the hills out of which the skillful hands of industry will be drawing the rich stores of coal and iron, and all in a country that posesses, in addition to its minerals, a fertile soil, a genial and healthful climate, and stately forests of timber.

M. C. JOHNSON, PRESIDENT. W. D. BOSWELL, CASHIER.

# NORTHERN BANK OF KENTUCKY.

LEXINGTON, June 2, 1882.

*To whom it may concern:*

I am acquainted with the gentlemen who compose the Board of President, Vice President, and Directors of the Kentucky Union Railway Company. They are T. J. Megibben, President; William Tarr, Vice President, and James M. Thomas, William Shaw, George W. Bowen, John H. Goff, Richard T. Stoll and Samuel Clay Jr., Directors. They propose to build a railroad from some point on the Lexington & Big Sandy Railroad to the Virginia line in the direction of Abingdon, where it will meet a railroad which will connect it with the Eastern System of Railroads. This Railroad will cross about the centre of the Great Eastern Coal-field of Kentucky, where there is great abundance of the finest iron ore, cannel and bituminous coal, and timber.

I understand that the Company will own some five hundred thousand acres of the land through which the road will pass abounding in the ore, coal and timber above named.

The gentlemen composing the Board are of the first respectability and most of them are of considerable wealth, and all of them active business men.

They have employed Wm. A. Gunn, Engineer, to run the line of the road, and make out the profile, with the exhibition of the work of construction and an estimate of its cost.

I have known Mr. Gunn intimately as an engineer for twenty years. I regard him as a first-rate engineer and perfectly reliable both as an engineer and a man.

I believe that full confidence can be reposed in the integrity and trust-worthiness of the Board and of the Engineer, and that upon their representation, with such precautions and verifications as men of business adopt in all large transactions, business relations on a large scale may be entered upon with them, with safety.

M. C. JOHNSON.

We do most cheerfully and unreservedly endorse all that has been said above by Hon. M. C. Johnson, President of the Northern Bank of Kentucky, as to the President, Vice President and Board of Directors of the Kentucky Union Railway Company, all of whom are personally known to us.

June 2nd, 1882.

J. D. HEARNE.
G. STOLL, JR.,
Cashier Lexington City National Bank, Lexington, Ky.
THOMAS MITCHELL,
Cashier First National Bank, Lexington, Ky.
JOHN C. BRENT,
Cashier Citizens' Bank of Paris, Ky.
HENRY SPEARS,
Cashier Agricultural Bank of Paris, Ky.

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TO THE PRESIDENT AND DIRECTORS OF THE KENTUCKY UNION RAILWAY COMPANY.

I took charge of the surveys for your road in September, 1881, and have run the line from Winchester, Kentucky, through eastern Kentucky into Virginia, to Meadow View Station, on the Norfolk & Western Railway, seven miles east of Abingdon, using part of the surveys previously made.

The distance from Winchester to the Kentucky and Virginia line at Pound Gap by this survey is 137 miles, and from Pound Gap to Meadow View Station is sixty-nine miles, a total of two hundred and six miles.

The line passes over a rolling piece of limestone country for about ten miles from Winchester and then for five miles over a rather level country composed mainly of the black shale lands and descends into the valley of Red River. This is a wide flat valley extending eastward across Powell County, and affords an excellent route with very easy grades and light work for this twenty miles.

Following up the Middle Fork of Red River the line ascends with a sixty feet grade (here used for the first time on the route) to the first plateau of the coal field in Wolfe county.

The line then keeps a general south-east direction by Campton and Jackson, running here for several miles along the North Fork of Kentucky river, and passing a little north of Hazard and Whitesburg to Pound Gap in Pine Mountain, which is here the boundary line between Kentucky and Virginia.

The crossing of the Pine Mountain, which is the main barrier on the entire route, requires a tunnel one and a quarter miles long, but with

very easy approaches. The maximum grade required in Kentucky is sixty feet per mile.

The line in Kentucky is situated almost entirely in valleys, and requires considerable curvature, though the general direction of the line is very good.

The surveyed lines from Winchester to the mouth of Troublesome are only 10 to 20 per cent. longer than an air line.

The country is rough and an unusual number of tunnels is required to get through it. There is not a large river on the entire route and the expense for building is very light. A moderate amount of trestle work will be used, which will be made of wood, which is very abundant and cheap.

I think about one half the tunnels will require timbering and have so estimated.

I have estimated for five bridges over Red River, and two over the North Fork of Kentucky River of iron, and the rest wood and iron combined.

The estimate has 63 lb. steel rail with a track sufficiently ballasted to begin the operation of the road; and is based upon prices now current in Kentucky for such work and material; and provides for sidings and ten per cent. of the length of main track, with depots, water stations, etc., such as would be suited to the business of the line. There is also a small allowance for right of way, which will, in nearly all cases, be donated; but in cases of estates, etc., some will of course have to be obtained by legal process.

General expenses, engineering, and an equipment sufficient to open the line for business are included. The estimate for grading, masonry, bridging, etc., includes a percentage for contingencies, such as always occur on heavy work.

### Estimate of Cost of the Line in Kentucky.

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| Grading, masonry, bridging, trestling, tunneling, and contingencies; average cost per mile, from Winchester to Pound Gap, 137 miles | $25,000 |
| Track per mile | 7,000 |
| Depots, water stations, side tracks, etc | 2,000 |
| Right of way and general expenses | 1,000 |
| Engineering, etc | 1,000 |
| Equipment per mile | 4,000 |
| Total cost per mile | $40,000 |

The line from Winchester to the Wolfe County line, thirty-five miles, can be built for $30,000 per mile, and the line from Winchester to the mouth of Troublesome sixty-eight miles is estimated at $35,000 per

mile. The line from Winchester to Lexington, nineteen miles, would cost about $30,000 per mile.

### The Line in Virginia

Runs by the Pound Gap on Pound River, thence by the waters of Bowlcamp, Cranenest. Toms Creek, and Guest River, crossing Clinch River, and ascends to Copper Ridge at the head of Cove Run; thence crossing Moccasin Ridge where the Abingdon road crosses it, passes up Moccasin Creek to Little Moccasin Gap in Clinch Mountain, thence along the slopes of Clinch Mountain and through Poor Valley and Wolfe Gap, crossing the North Fork of Holston River just above the mouth of Logans Creek, up Logans Creek to a low gap in Walkers Mountain and through this to Meadow View Station on the Norfolk & Western Railway seven miles east of Abigdon and sixty-nine miles by this survey from Pound Gap.

This is a very rough, mountainous country. This route though is favorable, considering the difficulties to be overcome. It flanks the Black Mountain, which is a very heavy obstruction to any line south of this.

And it passes Clinch Mountain where it is really cut asunder by Little Moccasin Creek, and the tunnel required is only through one of the foot hills of that range. While this route is expensive it will not be more costly than the corresponding parts of the railroads which cross these mountains further north. I estimate the cost of the line from the Kentucky and Virginia State line to Meadow View at $55,000 per mile.

There is a portion of this route commencing thirteen miles from the state line and extending thirty miles eastward on which it will be best to use a maximum grade of 105 feet per mile.

The load which would make two freight trains on other parts of the road would here make three, and by operating the trains in pairs as far as possible on the line, one assistant locomotive could help two ordinary trains over these grades.

A high grade is also required to cross the Holston and ascend to Rich Valley. I think it best to use a grade of 132 feet here for two miles. This grade would require an assistant engine for each train eastward. But the grade being short one engine could aid all the trains passing here for some years. This grade is within six miles of the junction of this road with the Norfolk & Western Railway. On all other parts of the line in Virginia a grade of sixty feet per mile can be maintained.

It is a matter of some difficulty to determine the best point to strike the Norfolk & Western Railway. Another route has been surveyed

from Wolfe Gap up Holston River about three miles and then through Rich Valley to the Saltville Branch of the N. & W. Railway, about six miles from Glade Springs. It is reported that this route can be built without exceptional grades. It is about two and a half miles longer than that to Meadow View, making that much more road to be constructed and increasing the through distance by that amount.

If it should be thought best to adopt that route an arrangement should be made to use the Saltville Branch and make your junction with the N. & W. Railway, at Glade Springs. Your connection should certainly be on the main line.

Various improvements can doubtless be made in both Kentucky and Virginia by further surveys.

If this were built, your line and the Norfolk & Western Railroad would give the shortest route from Central Kentucky to tidewater at Norfolk, which is conceded to be one of the best harbors on the coast. You would thus make the sixth great East & West Trunkline and have the shortest route of any of them, and very favorable grades. You would also have the shortest route to Petersburg, City Point, and Richmond. Your line would make a very direct route to the eastern cities by the Shenandoah Valley line just opened for business and by the Virginia Midland road. And on the other hand your road would give to all Southern and Central Virginia, and a large part of North Carolina, (a region now containing largely over a million of people) their best out-let to Kentucky, Cincinnati, Louisville, Indianapolis, Chicago, St. Louis, and all the great West.

That the line would do a large through business no one can doubt. At the west end your line should be extended to Lexington, which would require about nineteen miles, giving you connection with the Cincinnati Southern, and the Louisville & Lexington Railroad, now a part of the Louisville & Nashville system.

This would give you altogether a line of 225 miles in length.

This makes the distance from

| | |
|---|---|
| Lexington to Norfolk | 611 miles. |
| Cincinnati to Norfolk | 690 " |
| Louisville to Norfolk | 705 " |
| Which will probably be reduced to | 695 " |
| Lexington, Ky., to Richmond, Va | 530 " |

## Local Business.

While this through business looks promising, it is secondary in importance to the local business which will be done on your road. But the road must be made a through line to find markets for the material wealth so largely stored in the mountains of eastern Kentucky; and

to bring together the vast and varied ore deposits so abundant in southwestern Virginia, and the fuel to smelt them.

In twenty miles from Winchester your road reaches the Red River Mills and the Old Forge, where you will at once open a large lumber business and receive large shipments of iron from the two furnaces now in operation near that place.

Red River is about a hundred miles long with numerous branches and a large amount of splendid timber. "The only considerable forest of white pine in the State is found on the waters of this river." Poplar, oak, ash, walnut, chestnut, cedar, chestnut oak, maple, and many other kinds of timber are very abundant and of fine quality. These would come to the road by the river and make a large business.

The Red River iron ore makes very superior car-wheel iron. It is found on top of the sub-carboniferous limestone which here forms a wide ridge between the Red River and the Kentucky River, with long spurs running out to each stream, giving a very extensive field covered with ore.

They use charcoal for fuel and have cut away most of the timber in the vicinity of the furnaces.

With the road extended up into Middle Fork of Red River good coal could be supplied to them, and would lead to a greatly increased production of ore.

The quality of the ore is so good that it has been made here without transportation facilities ever since the State was settled.

The shipment of the ore might also be expected on a large scale.

In addition to this well known Red River iron ore, large deposits of Kidney ore are found all along Red River and its tributaries, and excellent quarries of limestone and free-stone, fine building material. Nowhere could white lime be more cheaply produced than on Red River. Hydraulic limestone is also found here, and salt was formerly made in this valley. With such local resources a road can not fail to pay here from the start.

When the line reaches the Middle Fork of Red River, near the line of Powell and Wolfe counties, coal is found of good quality and in veins of workable thickness. This is 30 to 35 miles from Winchester and is about the nearest good coal to Central Kentucky; a good trade will be opened as soon as this is reached. The line will then extend across the coal field over 100 miles to the State line and about thirty miles in Virginia, or about 135 miles in all.

As the line passes into the coal field the strata dip gradually to the southeast and soon carry the conglomerate and the lower coals below the drainage.

Then comes the coal which has been so long and favorably known as the Kentucky River coal; a few miles further on the hills become higher and hold the great beds of cannel coal, while the other veins thicken up and improve in quality. The strata of this region then run nearly horizontal and undisturbed to the State line. Pine Mountain is upheaved, dipping at a high angle to the southeast. But on the Virginia side the strata again resume a position nearly horizontal but dip slightly northwest, and about Clinch River the coal field gives place to the upheaved Silurian Limestone.

For more than half the width of the coal field these fine cannel coals and others of choice quality are found, while good coal is found across the entire field. These coals will bear transportation for long distances and will find a large market both east and west.

The cannel coal from this line took the premium at the Centennial Exposition in Philadelphia as the finest in the world.

It can be placed in all the large eastern and western cities with less than half the rail transportation required to carry the Anthracite coal of Pennsylvania to many of the western cities, where it is very largely used. The supply of it is inexhaustible, as is also that of other varieties of superior coals, such as splint and coking coal. All these are found above the drainage and most of them above the grade of the road, so they can be easily loaded on the cars, while still other coals can be found by shafting.

An extensive trade may be made in coking these coals and shipping them in each direction.

## Iron Ore.

In addition to the Red River iron ore and Kidney ore already mentioned Black Band ore is found in the coal field, the Dyestone ore along Pine Mountain, Clinch River and the ridges east of it.

Red and brown Hematite and many other varieties of ore are found in this vicinity; and near the junction of your line with the Norfolk & Western Railway and eastward along that road through several counties are found the purest of specular and magnetic ores specially adapted for making the highest grades of iron and steel.

These ores are considered fully equal to Lake Superior and Iron Mountain ores so largely used in the North.

It is stated by good experienced men that pig iron can be made here as cheaply as the above named ores can be delivered in Cincinnati or Pittsburg, when you furnish the fuel.

Furnaces, rolling mills, etc., might therefore be expected to grow up along your line and near its termini; and heavy shipments of these

high grade ores would be made over your line to the northwest cities. In addition to iron there is found in Southwest Virginia, Salt, Gypsum, Lead, Zinc, Copper, Baryta, Marble, and many other valuable minerals.

A fuel supply will bring these things out and should make industries and developments in that region equal to anything known in our great and growing country.

But some of these things may require considerable time for development. You have, however, one resource which will tax your capacity to furnish transportation from the start, which is your fine

## Timber.

Four-fifths of your line is through a finely wooded region, and on one-half of it the timber is the best of any part of this country I have ever seen, and I have been engineering in Kentucky and Tennesee for over thirty years.

Besides the Red River supply, already spoken of, the Kentucky River region is over four times as large, and here are the finest Walnut, Poplar, Oak, Hickory, Maple, Ash, Cherry, Locust, Chestnut Oak, etc., to be found in any country.

The most prominent feature of this great forest is the large yellow poplar, generally from three to six feet in diameter and from sixty to eighty feet to the first limb, sound, thrifty growing trees; and they are found in unlimited quantities. Not only the timber close to the line will reach the road, but the tributary streams and their numerous branches are well adapted to bringing out the supplies of lumber and hundreds of good water powers on these streams would be able to cut the lumber and prepare it for market, during a good portion of the year. There is also a fine timber region on the line in Virginia.

## Markets.

This coal and lumber will find good markets both east and west. Lumber is now supplied to Central Kentucky from Michigan and Alabama, and coal from Pennsylvania, Ohio, Virginia, and Tennessee, besides that obtained from our own State. This market you can take the lead in, because of the quality of your coal and lumber and its proximity to your field.

Louisville and Cincinnati will take all the lumber you can send them at good prices, and as soon as they can learn the value of your coals and iron ores they will use them largely.

An equal market will probably be found along the Norfolk & Western Railway in Virginia, and a special demand at Norfolk for shipment to the larger cities and foreign countries, and for ship-building.

Manufacturing establishments should, and doubtless would be soon built along your line, such as furnaces, rolling mills, works for car building, cooperage, and all kind of wood works, tanneries, wagon-works, mills, &c.

Colonies should be established upon a comprehensive plan, with skilled artizans who would find the raw material here at its lowest cost, and a far healthier home for their families than in the crowded cities.

## Agriculture.

Beside all the coal, iron, and timber, this country has some good features as an agricultural region. The growth of timber, poplar, walnut, sugar maple, ash, beech, dog-wood, grape vines, and pawpaw bushes or trees, is always found in Kentucky on a good soil.

The north hillsides here are always rich, and they are specially adapted to raising tobacco, grass, and fruit. Crops of tobacco could be raised on these lands worth from one to two hundred dollars per acre at present prices.

The climate being good, fruit does remarkably well.

Trees of all kinds grow rapidly, and while the woodsman is clearing off the larger timber he may, with a little care, have fine young forests, orchards, vineyards, and grass lands to be perennially productive. I am one of those who believe it is time for our people to take care of, and produce more timber.

## Estimate of Business.

As soon as your road is open for through business, I believe you may safely count on sending westward per day one hundred cars of lumber, one hundred cars of coal and iron, and a like amount eastward. This, with the local travel and supplies sent on return trains, would yield an income of about $6,000 per mile of road per annum.

I should then estimate the through business at $4,000 per mile, giving gross earnings of $10,000 per mile and a probable net revenue of $4,000 per mile; and you might expect this to increase steadily for many years.

You will see from this estimate that the local trade would pay interest on the cost of the line. You might begin your line at either or both ends and this result would follow.

And it would greatly assist the building of the heavy mountain work to have the line built from each end so as to keep up supplies.

## Feeders.

It will pay you to provide several branch lines to reach business

within a few miles of your line at each side. If the survey now made proves to be the best to be found, a short branch should be run over to the Middle Fork of the Kentucky River so as to get the coal and lumber from that stream, on which you have large tracts of valuable land.

This line strikes the Keutucky River above the narrows of that stream where the greatest difficulty in its navigation occurs, and both the river and its large tributaries above that, some of which are fifty miles long, will bring great quantities of material to the road when it could not be shipped down the river.

The coal fields of Kentucky are larger than those of Pennsylvania and larger than all the coal-fields of England, and your line passes right through the very heart of the best part of it, and will no doubt make a business here equal to that of any region in this country.

Respectfully,

W. A. GUNN, Chief Engineer.

Dated LEXINGTON, KY., February 23, 1883.

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LEXINGTON, KENTUCKY, January 27, 1883.

TO THE PRESIDENT AND DIRECTORS OF THE KENTUCKY UNION RAILWAY COMPANY.

In answer to inquiries regarding my views as to the resources of the country adjacent to the line of survey made for your road and the probable business as compared with other railroads of the state I would say: The Kentucky Union Railway will open up an entirely new and undeveloped portion of the State. From my observations, as an engineer, extending over a period of fifteen years, (the greater portion of which time has been spent in examinations, surveys, and the construction of railroads through Kentucky, Tennessee, Virginia, and North Carolina), I do not hesitate to say that the resources of the counties through which this line of road will pass are unsurpassable in mineral wealth. You have only to build about thirteen miles of road (from the Chesapeake & Ohio Railroad, at Hedge's Station) before reaching the great valley of Red River where the only large area of white pine in the state is to be found. Besides this there are extensive forests of white oak, yellow poplar, black walnut, black locust, and other valuable timbers. The white oak timber is particularly valuable for ship building purposes.

New Country

Timber.

Upon the ridges and uplands are to be found large amounts of chestnut oak, enough to yield a vast supply of tan-bark.

The celebrated charcoal iron known as the "**Red River Car Wheel Iron**" is made here. Red River Car Wheel Iron.

Mr. John Gray an eminent civil engineer on the subject of minerals and transportation from the Red River valley says: "One acre of this ore skillfully worked will produce 4,000 tons of pig iron. Herein lies great wealth and prosperity; on this all the labor of an entire population can be steadily and profitably employed; precisely in this way England has in a century raised herself from poverty to be the richest nation on the globe. This is the mainspring of her power and greatness to-day."

At a short distance from the line of your road, there have been erected three furnaces, two of them large and well constructed; and the building of this road would certainly insure the erection of others, and the superior coal to be found convenient will insure the manufacture of a much larger quantity of iron at considerable less cost. About twenty miles further you reach the head of Middle Fork of Red River to which point this road may be cheaply constructed with easy grades and curvature. Here is to be found coal in abundance of the very best quality and situated so that it can be mined very cheaply—the veins lying above the grade of the road. These veins range from thirty to forty-eight inches in thickness, from which a sufficient supply can be had to satisfy the demands of the entire blue grass region of Kentucky, as well as the cities of Louisville and Cincinnati. Furnaces.

The soil of this valley is very fertile and covers a large area capable of supporting a large agricultural population. Soil.

On account of its excellent climate so conducive to health with an abundance of pure water it is most admirably adapted to immigration and upon the completion of the Kentucky Union Railway would be rapidly settled. In fact this may be said of the country along the entire line of this road. The valleys of North Fork of Kentucky River, Troublesome Creek, Lost Creek, and other tributaries afford many advantages for stock-raising and agricultural purposes as well as tobacco and fruit-growing. Immigration Stock, Tobacco, and Fruit.

I have seen fruit growing along this line equal in quality and quantity to that of any country.

From twenty to twenty-five miles more of road built places you well into the centre of the great coal belt of the state, that of Breathitt County, where cannel and bituminous coals are to be had in inexhaustable quantities and in quality inferior to none. Above the mouth of Troublesome Creek there is one vein which measures *seven and a quarter feet thick* with one foot parting of slate. Coal.

On Wolfe Creek there is a solid vein of bituminous coal measuring

*seven feet* in thickness. In fact this whole country for miles around abounds in coal and minerals, and your road, as Prof. Proctor, State Geologist, says, "passes through the centre and widest portion of this great coal-field," and it strikes it at a *point nearer to the coal consuming counties of Central Kentucky, and to Cincinnati and Louisville and other towns along the Ohio River, than can be done by any other line.*

Thereby supplying the demands at a much less cost than at present.

I have never seen a region where facilities for easy and cheap mining so greatly abound.

There are many other resources that the construction of this road will develope, some of which may assume equal importance with that of coal, timber, etc.

Salt Wells.

The boring of salt wells in Breathitt, Perry, and Letcher Counties, has developed an abundance of salt brine from which, with assured transportation, large industries and freightage will follow.

The drainage along the entire route of Red River and Kentucky River furnishes unsurpassed facilities for water power, and the new mills and furnaces that will be established upon the completion of this road will necessarily insure a very large freightage of manufactured articles, iron, etc., as well as a heavy passenger business.

There can be no gainsaying that the proposed line of the Kentucky Union Railway posesses *a combination of advantages as to resources, etc., unexcelled by any other road built or projected* (*in this State at least*).

It must ultimately be *the great mineral road of the country.*

There is no doubt, whatever, in my mind but that the Kentucky Union Railway when built will open up with larger business than any other railway yet completed in the State.

The Cincinnati Southern Railway which commenced with a good business, having paid from three to four per cent. dividend since the beginning of operations, merely skirts the main belt of the great coal-fields; and the timber is in no manner to be compared with that of the eastern portion of Kentucky through which your road will pass.

The line of your road passes through the centre and the widest portion of the great timber and coal-fields of the State.

It is very doubtful if a single track will accommodate the business.

The increasing necessities demand the building of this road. And it is now a question, Will the people of Kentucky do it or will they *lie idle* and let eastern capitalists come in and *reap the benefits?*

Yours very respectfully,

WM. McCLOY.

# CHAPTER 1011.



## An Act to Incorporate the Kentucky Union Railway Company.

§ 1. *Be it enacted by the General Assembly of the Commonwealth of Kentucky*, That Daniel Breck, Addison White, Thomas Turner, Jr., John Speed Smith, and Henry T. Allison, of Madison county; Garret Davis, and John Cunningham, of Bourbon county; J. H. G. Bush and H. G. Poston, of Clark county; George P. Brown, Levi Jackson, and Wm. H. Randall, of Laurel county; Jesse Fish and Jonathan Newcum, of Rockcastle county; C. M. France and George M. Adams, of Knox connty; John W. Stevenson and John P. Winston, of Kenton county; J. M. Caldwell, George B. Hodge, and Thomas L. Jones, of Campbell county; Sidney M. Barnes, William P. Chiles, and Lewis M. Wilson, of Estill county; Luther Brawner, M. C. Hughes, and Julius Hacker, of Owsley county; Theophilus T. Garrard, William Woodcock, and Daugherty White, of Clay county; and James Hall, Edward D. Mansfield, Larz Anderson, Stephen S. L'Hommedieu, John Kilgour, William Y. Gholson, and Rufus King, of the city of Cincinnati, be and they hereby are appointed commissioners, under the direction of any two of whom subscriptions may be received to the capital stock of the Kentucky Union Railway Company hereby incorporated; and they may cause books to be opened at such time and places of opening the same, as they may direct, for the purpose of receiving such subscriptions, after having given such notice of the times and places of opening the same, as they may appoint; and after opening said books, they may continue them open, or from time to time, for such time as they may deem expedient. And if any of said commissioners shall die, resign, refuse or neglect to act, another may be appointed in his stead by the remaining commissioner or commissioners of the county or city for which such commissioner was appointed.

Names of Commissioners, &c.

§ 2. That the capital stock of said Kentucky Union Railway Company shall be five million dollars, in shares of one hundred dollars each, which may be subscribed for by any individual, corporation, or county; and as soon as five thousand shares of said capital stock shall have been subscribed, the subscribers of said stock, their successors and assigns, shall be and they are hereby declared to be incorporated into a company by the name of "The Kentucky Union Railway Company," and by that name shall be capable, in law, of purchasing, selling, holding, leasing, conveying, receiving by gift or devise, and disposing of all real and personal estate; making all contracts and by-laws, and doing all lawful acts necessary and proper for the business and powers hereby conferred upon them, or properly incident thereto; and of suing and being sued, and to have a common seal, which they may alter, abolish or renew at pleasure; and the said Kentucky Union Railway Company, as such, shall have perpetual succession, and have, enjoy, and exercise all the rights, powers, and privileges which corporations may lawfully have.

Capital Stock.

1854.

When and how subscriptions are to be made.

§ 3. That at every subscription of stock there shall be paid to the commissioners the sum of one dollar on every share subscribed, and the residue thereof shall be paid in such installments, and at such times and places as may be required by the board of directors of said company: *Provided*, that no payment shall be demanded until at least thirty days notice of such demand shall have been given in one or more of the newspapers published, and of general circulation, in the counties and city named in the first section of this act; nor shall any subscriber be required to pay more than fifty per cent. of his stock in any one year; and if any subscriber shall neglect or refuse to make payment according to the requirements of the directors, the stock of subscribers may be sold by the directors at public auction, any time after the lapse of ninety days from the time such payment became due, and the surplus, if any, after deducting the payments due, with interest and expenses of sale, shall be paid over to such delinquent subscriber, but if there be a deficiency, such subscriber shall be liable to said company therefor; and said directors, for the purpose of equalizing stockholders, may allow and pay interest on payments upon stock, on just and equitable principles; but if the exigencies of said company should require the payment of the stock to be made more rapidly than is provided for herein, or should the stockholders of the said company, holding a majority of the stock, at any time consider it expedient, for the purpose of completing or furnishing the works hereby contemplated, and authorize the president and directors of said company by vote so to do, the president and directors of said company may borrow on the credit of said company any sum or sums of money, not exceeding in all the capital stock of said company, and may and shall have full power and authority to issue and sell the bonds of said company, in such form and to such amounts, and payable at such times and places, with interest yearly or half yearly as they deem proper and convenient, and at such rate of discount as they they may deem expedient; and also, if they deem it proper to secure the same by mortgage or deed of trust upon said road and its machinery, and all the property and assets of said company, conditioned for the punctual payment of the interest on said bonds as the same may become due, and the principal when due, with authority for the trustee to sell said road, and all property or assets so mortgaged or conveyed for the purpose of raising the amount due for such interest or principal, if not punctually paid, upon such terms and notice as shall be declared in the deed, without suit, foreclosure, or decree, and in order to enable said company to guarantee the punctual payment of the interest and principal of such bonds, it is hereby expressly declared that the guarantors of such bonds, shall be entitled to all the benefits of such mortgage or deed of trust made to secure such bonds, to the same beneficial extent that the holders of said bonds may be entitled: *Provided*, that should said road be sold under said mortgage or deed of trust, the purchaser shall be entitled to all rights and privileges of this charter, and of any amendments to the same, and subject to all the obligations and restrictions of the same.

How subscriptions may be made.

§ 4. That if any of the stock created by this act shall remain unsubscribed after the election of the president and directors of said company, the president and directors may open books and receive subscriptions, by themselves or such agents as they may appoint; and should the stockholders of said company, holding a majority of the capital stock thereof, deem it expedient for the purposes of this incorporation, to increase the capital stock, the president and directors of said company may, upon the vote of such stockholders, increase the capital stock of said company, to any sum not exceeding double the amount prescribed by the second section of this act; and the subscribers of such increased stock shall have and enjoy all the rights and privileges of any original subscribers to the capital stock of said company.

§ 5. That the said Kentucky Union Railway Company shall have the same right and privilege of prosecution, and any person or persons shall be liable to the same penalties or forfeitures for injuries, intrusions, obstructions, and hindrances done and committed upon the road or other property of said company, or otherwise, to the prejudice of said company, as are provided in the laws incorporating the Louisville and Frankfort railroad company, and amendatory thereto, or any and all other railroad companies incorporated in this commonwealth. Rights of the Company.

§ 6. That when five thousand or more shares of the said capital stock shall have been subscribed, such commissioners, or a majority of them, shall call a general meeting of the subscribers at such time and place as they may appoint, and give twenty days notice thereof in some one or more newspapers published, and of general circulation, in the counties and city named in the first section of this act; and at such meeting the commissioners shall lay the subscription books before the subscribers then and there present, and if there be a majority, in value, of all the subscribers present, or represented, such subscribers, or a majority of them, in value, shall have the power to elect from among the stockholders nine directors to manage the affairs of said company, and those nine directors, or a majority of them, shall have power to elect a president of said company from among the directors; and in such election, and in all other elections or proceedings by stockholders, every stockholder shall be entitled to one vote for each share owned and held by him, her, or it; and every stockholder may depute, by writing, any other person to vote and act as his, her, or its proxy; and the commissioners present shall appoint the judges of the first election of directors; and the president and directors shall hold their offices until their successors shall be elected, subject to the by-laws of said company. President to be elected, etc.

§ 7. That the directors shall be chosen annually by the stockholders of said company, at such place as the president and directors may designate, on the first Wednesday in June in every year, and the president and directors may fill any vacancy in their board: *Provided*, that all elections which are to be made, may be made thereafter upon thirty days notice being given to the stockholders. When Directors are chosen, and how.

§ 8. That the president and directors of said company shall have power to elect a treasurer, or any other officers or agents that they may deem proper and necessary; and may require of their treasurer, or any other officer or agent, such bond and security, under such penalties as they may deem proper, upon which recovery may be had for a breach of the conditions thereof. Treasurer elected.

§ 9. That the said Kentucky Union Railway Company, their president, directors, and agents, are hereby vested with all the powers and rights necessary for surveying, locating, and constructing a railway from a point at or near Newport or Covington on the Ohio river, by the nearest practicable route, to a point at or near the Cumberland Gap, and also a railway from any point on said route to such a point on the southern boundary line of this State, in a direction towards Knoxville, in the State of Tennessee, as shall be necessary for a connection with any railway from that direction; and also for a branch or branches from said route eastwardly, if deemed desirable by the president and directors of said company through the mineral regions of Kentucky, to the boundary line of the State of Virginia; which railway or branches may be constructed with as many sets of tracks, side tracks or turn outs, as the said president and directors may deem necessary, and in such a manner as to secure a road bed not exceeding sixty-six feet in width. And the said company, their officers agents, engineers, and servants, may enter upon, survey, use, and excavate any land which may be required for the site of said road and branches, or the depots, warehouses, and machine shops thereof, and for the con- Powers vested in Officers.

1854. struction, use, or repair of the same, or its works and appurtenances; and may take and use any earth, timber, stone, or gravel, or other materials which may be necessary and useful for the construction, completion, use, or repair of the same and may construct and have turrets and bridges: *Provided*, that in building any bridge or bridges the same shall be constructed as not to obstruct the free navigation of any navigable stream.

Engineer to be appointed, and by whom.

§ 10. That upon the application of said company, or its agents, to the county courts of the several counties through which the road or its branches may be surveyed, such court shall appoint a civil engineer and two impartial commissioners, whose duty it shall be to take from the owners and proprietors of land, or those having an interest therein, and through which it is proposed that said road, or any part thereof, shall pass, a grant of the use and right of way through the same, and of grounds for depots, warehouses, machine shops, and buildings, and said engineer and commissioner, or either of them, shall have the same power to take acknowledgements of the grantors, that clerks of the county court now have, also to take privy examinations of married women, and certify such acknowledgements; and it shall be the duty of the county clerk to receive and record the said grants and certificates the same as other deeds; and such grants, so certified and recorded, shall vest in said company all the rights thereby expressed or intended; and any or all grants to the said company may be for the fee of the lands granted, any lesser estate, and may include the full and absolute right and disposal of all the stone, earth, gravel, timber, fuel, and materials so granted to said company: *Provided*, that said company may acquire said grants by contract or purchase on such terms as may be agreed with the proprietors.

§ 11. That in all cases where the owners and proprietors of lands shall fail or refuse to grant or sell the right of way, or grounds for the depots, warehouses, work shops, side tracks, turn outs, bridges, &c., required for said road, it shall be lawful for said engineer and commissioners, or any two of them, and it shall be their duty, from their own view, and such proof as shall be presented, to value the land required for the road separately, and the advantage the road will be to the adjoining lands of the proprietor separately, and the disadvantage to the adjoining lands separately, and make report of the same, together with a description of such land so required, and a map of the road through such county, to the clerk of the county court of such county, with the names of the owners of such land, and their residence if known, and whether they are adults or infants; and it shall be the duty of the clerk of such county court to issue a summons against all such owners, to show cause why the grant of the right of way, or use of such lands for the purposes aforesaid, shall not be made on the payment of the balance, if any, of the value of the land so reported; and upon the service of such summons upon the owner, if in the county, and if not, upon the agent in the county, if such owner have any, ten days, the county court shall have jurisdiction on said report to order the balance, if any, of the assessed value of the land to be paid, and a grant of the right of way or use of the land for the purposes aforesaid to be executed to the company by a commissioner to be appointed by the court for that purpose: *Provided*, that if the owner is out of the county, and have no known agent in the same, it shall be lawful to send the summons to any county in the State, where the owner or his authorized agent may be; but if said owner be not a resident of this State, and have no known agent in it, the court shall make an order of appearance by a day named, not less than four weeks, and appoint an attorney to correspond with the owner and defend for him; and when the owner is an infant or lunatic, the court shall appoint a guardian ad litem to appear for such infant or lunatic and make defense; and it shall be lawful for the court to take up the case as to any one owner who is

before the court without waiting until all are served: *Provided*, in no case shall the actual value of the land taken be set off by the estimated advantages to the balance of the land.

§ 12. That it shall be lawful for the company or for the owner to traverse the report, or for both to traverse it, and claim a jury to value the land required for any of the purposes mentioned in the foregoing section, and to assess the damages to the adjoining lands, and the advantages the road will be to the same—all which shall be returned separately—and, thereupon, the court shall cause a jury to be impanneled to try the traverse or traverses in open court and under its direction, and it shall be the duty of the court, on motion of either party, to order an actual view by the jury, under charge of the sheriff, of the premises required, and to order the damages assessed by the jury to be paid, and also the damages to the adjacent land of the proprietor—first deducting therefrom the amount of estimated advantage so assessed—to be paid upon the taking of the same by said company; and the court shall have the right to grant to either party a new trial for the same causes for which new trials are ordinarily granted at law; and either party may appeal to take writ of error, but no appeal or writ of error shall prevent the company from proceeding to locate and construct their road or branches: *Provided*, that if the president and directors of said company, after having selected a route for said railway or its branches, find any obstacle to continuing said location, either by the difficulty of construction or procuring right of way at reasonable cost, or whenever a cheaper or better route can be had, they shall have power to vary the route, and change the location.

When toll may be charged.

§ 13. That so soon as the company shall have completed five miles of said road at any one point continuously, they may commence and prosecute their business as though the whole work were completed; and they shall have the right and power to charge and collect for toll, and the transportation of persons and property of any kind along said railway or its branches, any sum or rates which the president and directors may from time to time establish: *Provided*, the rates do not exceed the following, to-wit: On all goods, merchandise, or property of any description, transported by them, a sum not exceeding one and a half cents per mile for toll; five cents per ton per mile for transportation, and for the transportation of passengers not exceeding four cents per mile for each passenger.

Dividends to be declared.

§ 14. That the said president and directors shall annually, or semi-annually, declare and make such dividend as they may deem proper, of the net profits arising from the resources of said company, after deducting expenses, to be divided among the stockholders in proportion to their respective shares. But said president and directors shall annually pay into the treasury of this commonwealth such tax upon the road and property of said company as shall be provided by law, which tax shall never be greater than the rate of tax imposed upon other railroad companies in the State, and to be estimated upon the prime cost of the road and works, deducting wear and tear.

May pass By-Laws.

§ 15. That the president and directors shall have power to enact such by-laws, rules, and regulations, not inconsistent with the laws of this commonwealth or of the United States, as they may deem necessary and proper for the government of said corporation, and the regulation of the duties and responsibilities of its officers and agents, directing the manner of settling accounts against said corporation, and prescribing the manner and form in which transfers shall be made of the capital stock of said company.

Meeting may be called at any time.

§ 16. That general meetings of the stockholders of said company may be called at any time in the intervals between the annual meetings by the president and directors, or a majority of them, or by stockholders owning at least one-fourth of the

1854. whole stock subscribed, upon giving thirty days public notice of the time and place of holding the same, which shall be at the place where the principal office of said company is kept, named in such advertisements, and when any such meetings are called by stockholders, the advertisements shall specify the objects of the call; and if at any such meetings a majority, in value, of the stockholders are not present in person or by proxy, such meeting shall be adjourned from day to day, without transacting business, for any time not exceeding three days; and if within that time stockholders, holding a majority of the stock, in value, shall not so attend, such meeting shall be dissolved.

Exhibit of Affairs to be made

§ 17. That at the regular meetings of the stockholders it shall be the duty of the president and directors, in office for the preceeding year to exhibit a full, clear, and precise statement of the affairs and finances of said company; and at any called meetings of the stockholders, a majority, in value, of the attending stockholders may require similar statements from the president and directors, whose duty it shall be to furnish them when required; and at any general meeting of stockholders a majority, in value, of all the stockholders in said company, may remove from office the president or any of the directors of said company, and fill the vacancies so created in the same way and to the same extent that they might by election at any stated meeting.

May unite with any other road.

§ 18. That it shall be lawful for the said company to unite their said road or branches with any other railroad, with the consent of the directors of such other railroad, and it shall in like manner be lawful for any other railroad company, now or hereafter incorporated, to unite with this road or its branches, with the consent of the directors of this company, which union shall and may be consumated upon such terms and conditions as may be agreed by and between the directors of the respective companies; and the company shall have full right and power to run their railway of branches through or across any highway, without injuring the same, or the streets or any town or city on the route thereof, and to such point in any such city or town as they may deem advantageous: *Provided*, such city or town, by their authorities, consent thereto.

Who may subscribe to the stock.

§ 19. That it shall be lawful for the county court of any county, or the mayor and council of any city, or the trustees of any town, through which said railway or its branches may be located, and they are hereby authorized to subscribe and hold stock in said company upon the same terms and conditions and subject to the same restrictions as other stockholders: *Provided*, it shall first be submitted to vote of the legal voters of such county, city, or town, to be held and taken at such times and places and in such manner as said authorities respectively may appoint, whether or not stock shall be subscribed and taken; and if when the vote be thus taken it shall appear that a majority of the votes shall be in favor of such subscription, it shall thereupon be lawful for such county court, city, or town authorities, by agents by them appointed, to subscribe and take in said company such amounts of stock as they shall determine; and to issue the bonds of such county, city, or town, payable with interest, at such times and places as they may deem proper, and dispose of the same for the payment of such subscription, and pledge the faith and resources of such county, city, or town for the payment of such bonds and interest; and they shall from time to time levy and collect such a tax, *ad valorem*, upon all taxable property in their respective jurisdictions as shall be necessary to pay said bonds and installments of interest as the same become due, or to create a sinking fund for the gradual reduction of the same: *Provided*, that the rate of interest on the bonds so issued shall not exceed ten per centum per annum. Or the funds to pay for such subscription of stock may be raised by court, city, or town authorities, by an *ad valorem* tax on the taxable property in their

respective jurisdictions in such sums or installments as will meet subscriptions; and the receipts for the payments of said tax shall entitle the payers thereof for every one hundred dollars so paid, to have one share of the stock so subscribed by such county, city, or town in said company, and which receipts shall be assignable: *Provided*, that no subscription shall be made by Fayette county, or the city of Lexington, except by a majority of the votes cast at a general election, or of all the legal voters of the county, or city (as the case may be), at a special election: And *provided* further, that the provisions of this section shall not apply to the city of Covington, or Kenton county.

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## CHAPTER 706.

AN ACT to amend an Act to Incorporate the Kentucky Union Railway Company.

APPROVED MARCH 10th, 1854.

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WHEREAS, Those counties in Eastern Kentucky through which it is designed to construct the Kentucky Union Railway are unable to assist in the construction of said railway, and owing to a want of transportation facilities, are undeveloped and non-revenue paying counties; and

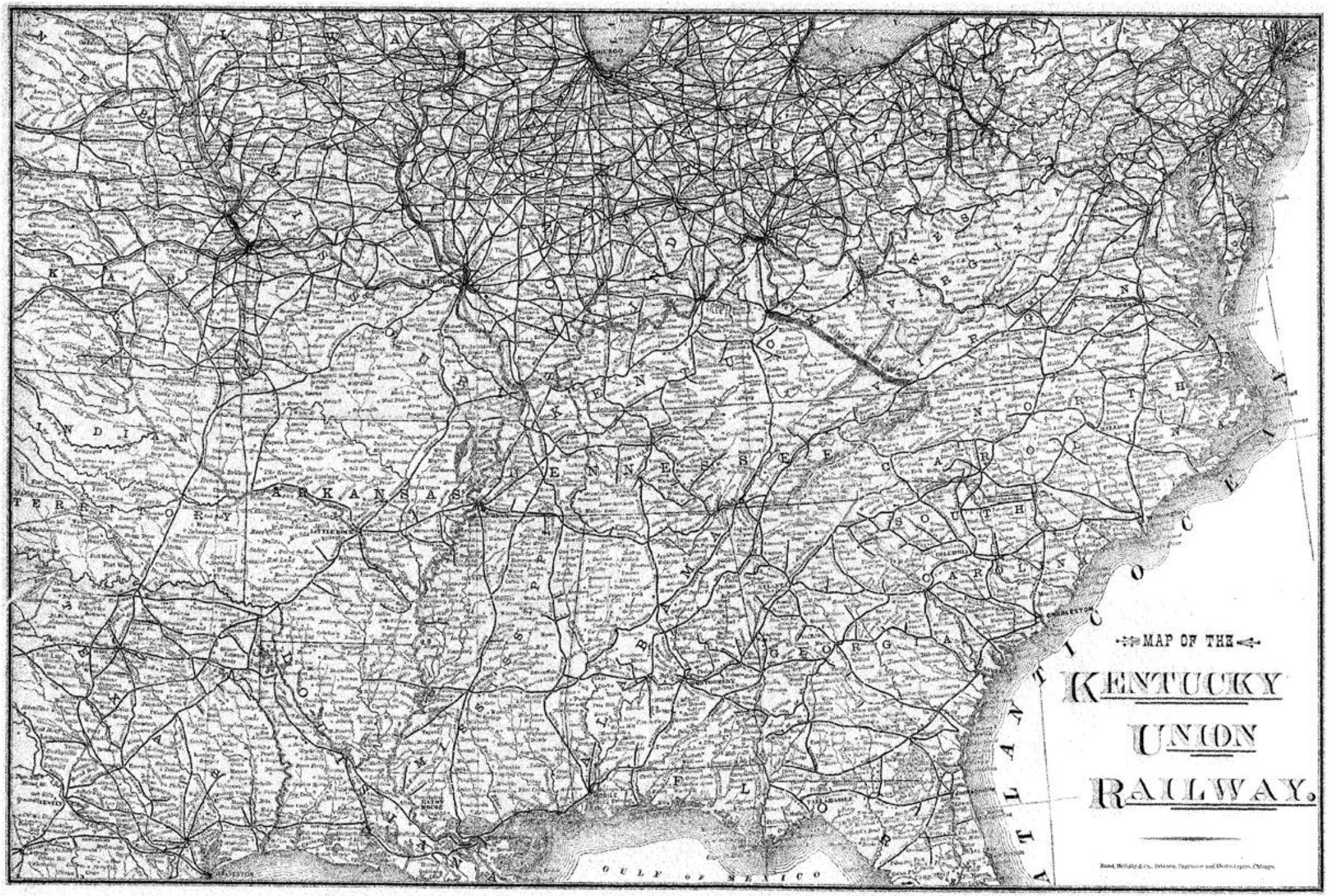
WHEREAS, The construction of said railway would aid in the development of said counties, and add largely to the taxable property of the State, therefore,

*Be it enacted by the General Assembly of the Commonwealth of Kentucky:*

§ 1. That that portion of said Kentucky Union Railway, which may be constructed from a point on the Kentncky and Virginia State line, in the county of Letcher, to a point on the Lexington and Big Sandy Railway west of Mt. Sterling, with its road bed, bridges, depots, shops, and appurtenances belonging thereto, shall be and are hereby exempted free from taxation, State, county, or municipal, for the period of ten years from the passage of this act: *Provided*, said company in good faith commence the construction of said road within five years from the passage of this act.

§ 2. This act shall take effect from and after its passage.

Approved April 1st, 1880.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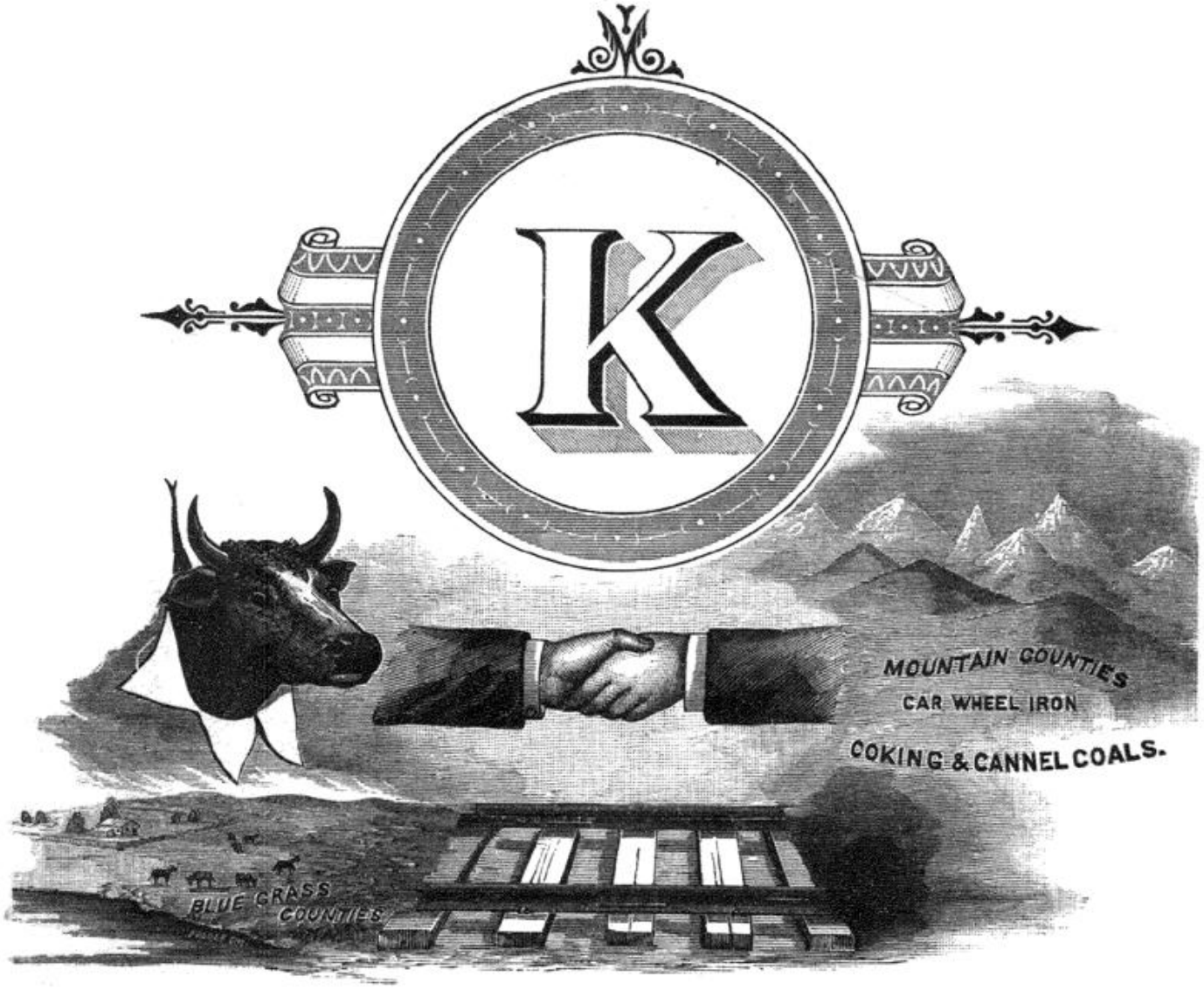


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