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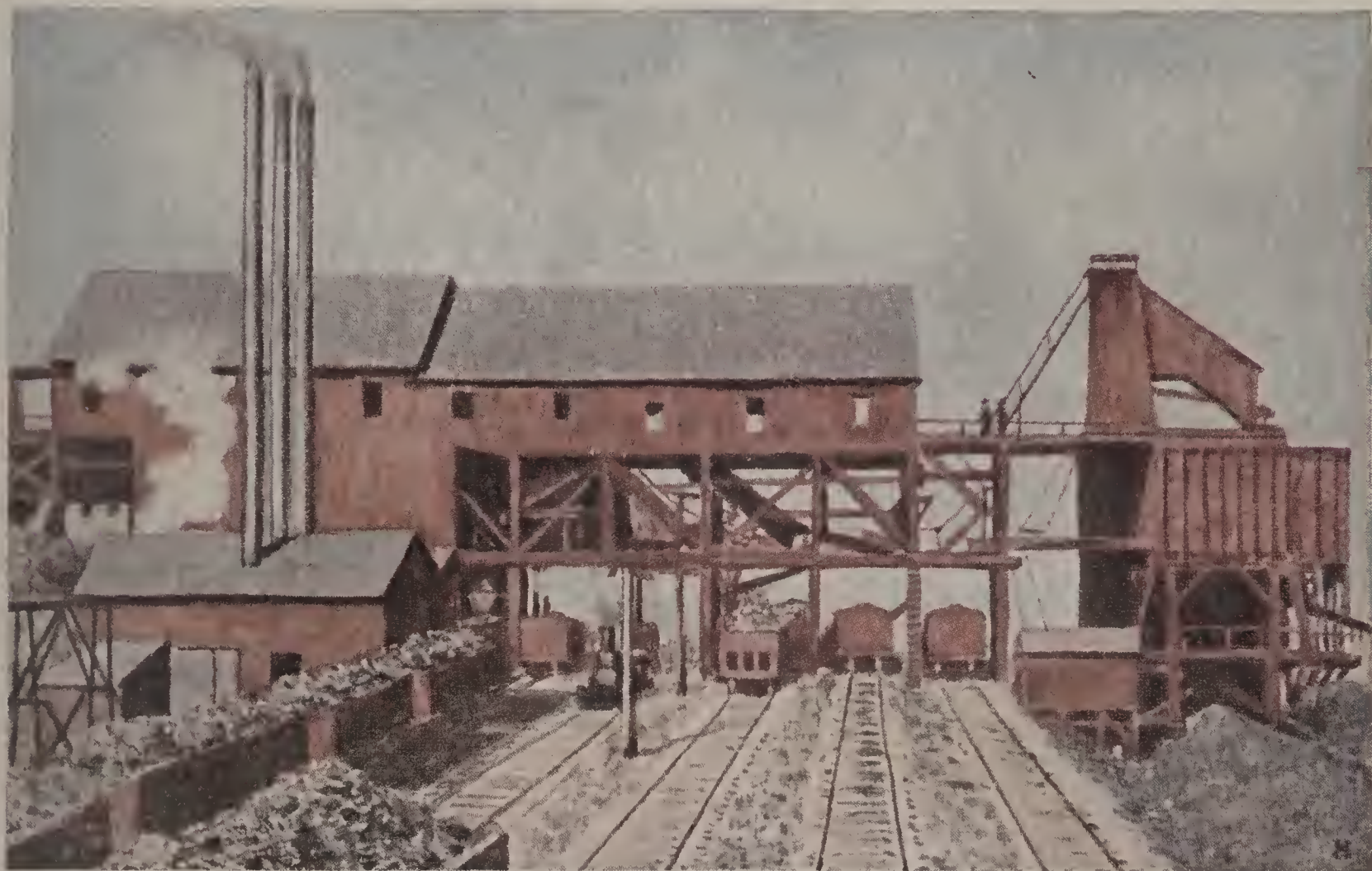
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THE COAL TO BUY

AND

HOW TO BURN IT



PRACTICAL HINTS ON
THE SELECTION OF
COAL FOR PRESENT-
DAY REQUIREMENTS





Class TN 805

Book Z 6 C 72

THE COAL TO BUY AND HOW TO BURN IT

Being *Practical Hints* on the *Selection*
of Coal for *Present-Day* Requirements



THE CONSOLIDATION COAL COMPANY
FAIRMONT COAL COMPANY
SOMERSET COAL COMPANY

GENERAL OFFICES
BALTIMORE, MD.

W. G. SHARP, General Manager of Sales
1 BROADWAY, NEW YORK

E. M. MANCOURT, Western and Southwestern Mgr.
MAJESTIC BUILDING, DETROIT

NEW YORK

ERNEST S. GREEN, Mgr.
1 Broadway

PHILADELPHIA

F. W. WILSHIRE, Mgr.
Land Title Bldg.

BALTIMORE

CHAS. VON H. KALKMANN, Mgr.
Continental Trust Bldg.

BOSTON

R. C. GILLESPIE, Mgr.
State Mutual Bldg.

CINCINNATI

W. C. ROGERS, Mgr.
Traction Bldg.

CLEVELAND

NORTHWESTERN FUEL CO.
Western Reserve Bldg.

CHICAGO

NORTHWESTERN FUEL CO.
Northwestern and Chicago Agents

WASHINGTON, D. C.

W. A. LEETCH, Mgr.

Foreign Representatives: SANDERS & CO., 110 Cannon St., London, E. C.

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U. S. S. "NEW YORK," OF THE NORTH ATLANTIC SQUADRON, AT NEWPORT, RECEIVING GEORGE'S CREEK BIG VEIN COAL FROM BARGES OF THE CONSOLIDATION COAL COMPANY

JAN 10 1905
D. of D.

“COAL MOVES THE WORLD. THE SPIRIT OF PROGRESS COMES FROM IT. RAILROADS, STEAMBOATS BORROW FROM IT THEIR WONDERFUL STRENGTH. EVERY MACHINE THAT IS AND WORKS HAS ITS EXISTENCE FROM COAL. IT MAKES THE EARTH HABITABLE. IT GIVES TO THE CITIES THEIR MIGHTY BLAZE AND SPLENDOR. IT IS A TREASURE, THE LAST GIFT PRESENTED BY EARTH TO EXTRAVAGANT MAN.”—*JOKAI.*

The Consolidation Coal Company



IN a comparatively small area of about one hundred square miles, in the western part of Maryland, is contained the famous George's Creek Big Vein Cumberland Coal, which for more than sixty years has stood for all that is best in bituminous coals.

The operations of this Company are located in the heart of this celebrated region, on the line of the Cumberland and Pennsylvania Railroad. The first mines in this territory were opened in 1842.



OCEAN NO. 7 MINE

During that year its entire output amounted to but 1708 tons, while in 1903 the mines of this Company produced 1,753,783 tons, or forty-two per cent. of the entire output of the Cumberland region.

THE CONSOLIDATION COAL COMPANY



NORTH GERMAN LLOYD STEAMER "KOELN" COALING WITH CONSOLIDATION COAL

☪ Transportation Facilities

The Cumberland and Pennsylvania Railroad, which is owned, controlled, and operated by this Company, was originally built to develop the coal resources of the region above referred to, and operates in connection with the Baltimore and Ohio and Pennsylvania Railroads and their connections, thus reaching all markets advantageously. Consumers who are so situated as to have the benefit of the facilities offered by both these systems will find it greatly to their interest to draw their fuel from a region able to ship

THE CONSOLIDATION COAL COMPANY



EXTERIOR OF "CUMBERLAND AND PENNSYLVANIA" SHOPS

via either route, thus reducing to a minimum the possibility of an interrupted supply.

Tide-water shipments can be made over the following loading ports :

BALTIMORE

Locust Point, *via* Baltimore and Ohio Railroad.

Curtis Bay, *via* Baltimore and Ohio Railroad.

Canton, *via* Pennsylvania Railroad.

PHILADELPHIA

Jackson Street, *via* Baltimore and Ohio Railroad.

Port Richmond, *via* Philadelphia and Reading Railway.

Greenwich, *via* Pennsylvania Railroad.

NEW YORK

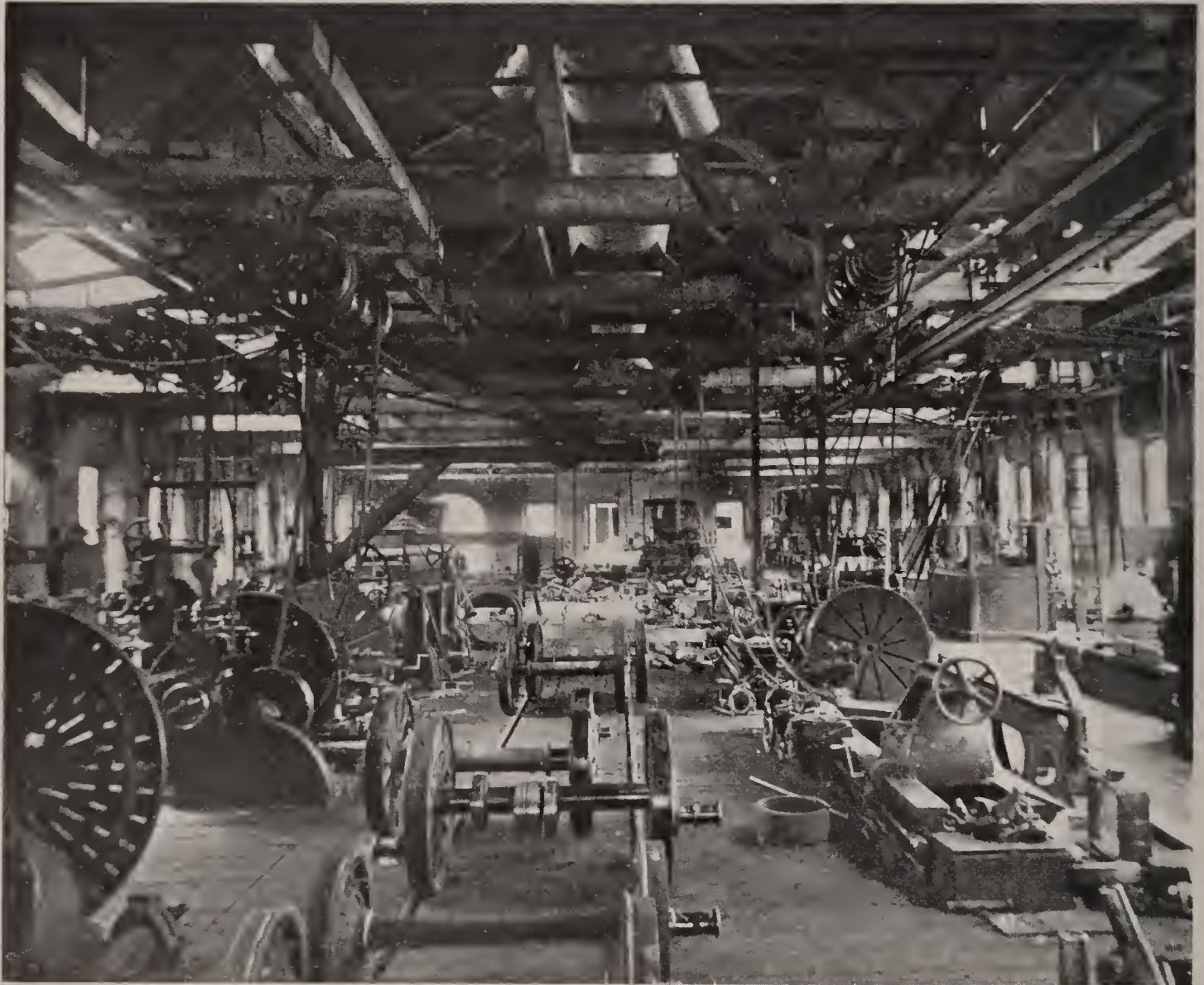
St. George, *via* Baltimore and Ohio Railroad.

Port Reading, *via* Philadelphia and Reading Railway.

South Amboy, *via* Pennsylvania Railroad.

To consumers taking their supply at tide-water the advantages offered by this Company must be apparent.

THE CONSOLIDATION COAL COMPANY



“CUMBERLAND AND PENNSYLVANIA” ERECTING SHOPS

☪ Markets

The most glowing tribute that can be paid to this superior fuel will be a brief mention of the scope of its markets, extending as they do from Maine to California.

It is specified by the United States Navy, where it is subjected to the severest test a fuel can be put to, and demanded by the potteries, makers of art ware, where one wheel-barrow of coal not up to the highest standard will ruin an entire kiln worth thousands of dollars. Overtaxed plants, or those without modern economical appliances, can only meet the extensive demands made upon them when using this coal.

THE CONSOLIDATION COAL COMPANY



THE FIRST CARGO OF COAL WHICH EVER LEFT BALTIMORE FOR JAPAN. STEAMER "OSBORNE" WITH CONSOLIDATION COAL FOR U. S. NAVY AT YOKOHAMA

This Company has on its books to-day the names of customers who have been buying coal from it for forty years, and are known to the trade as "George's Creek Customers."

This coal is not a low or medium priced fuel, but the highest priced fuel in the market; notwithstanding this fact, however, it is the most economical. There is no test to which a bituminous coal can be put that it will not fully satisfy.

A special feature of the George's Creek Coal is its smokeless qualities, which render it a very desirable fuel for use in municipalities where anti-smoke ordinances are in effect.

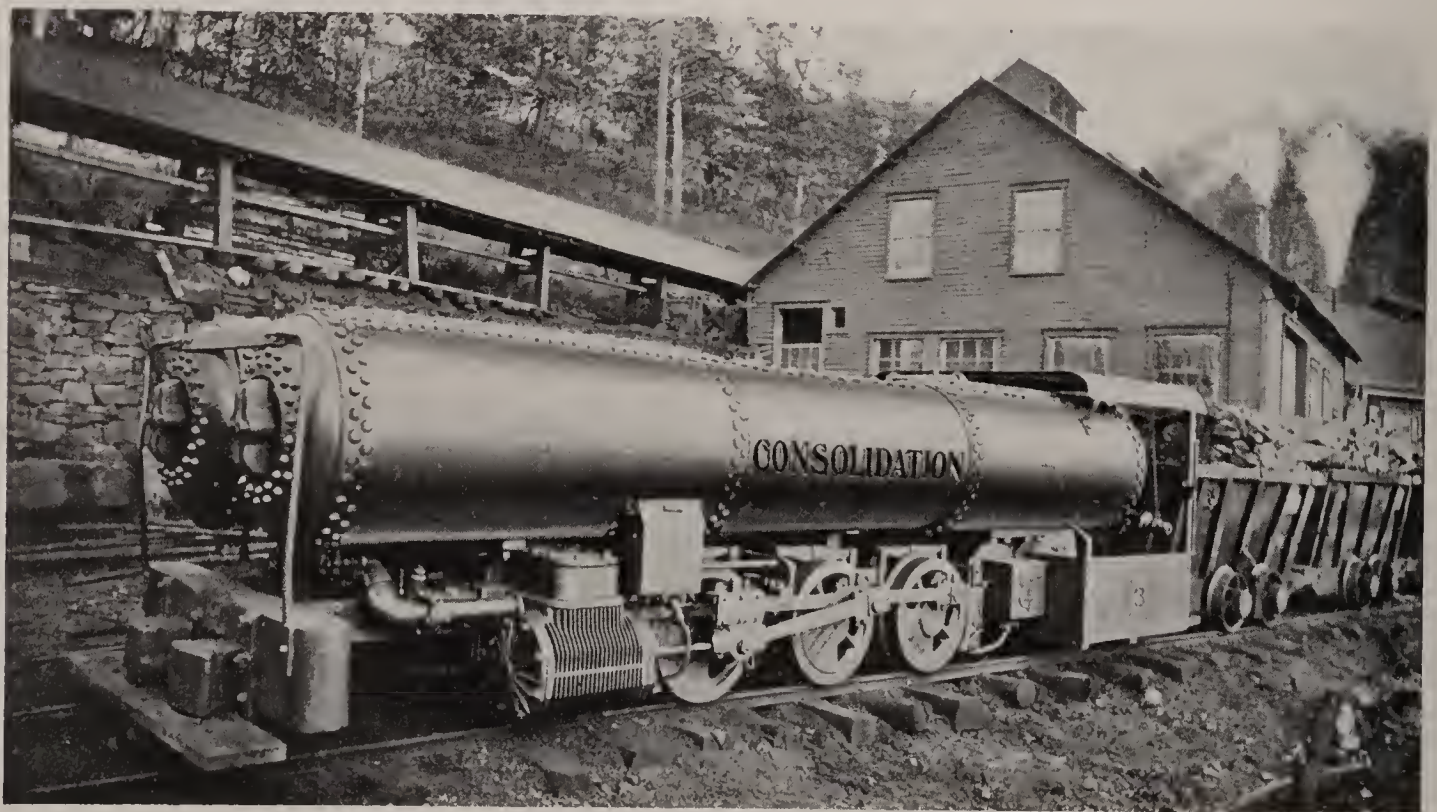


OCEAN NO. 4 MINE

THE CONSOLIDATION COAL COMPANY



C. & P. R. R. SHOPS, POWER-HOUSE, AND OFFICE OF SUPERINTENDENT OF MOTIVE POWER



A "CONSOLIDATION" COMPRESSED-AIR ENGINE

THE CONSOLIDATION COAL COMPANY



OCEAN NO. 8 MINE

☪ Smithing

As a smithing coal the product of this region leads the world. There is no fuel mined capable of doing the same amount of work or producing as satisfactory results in smithing practices, and it is universally conceded to be a perfect smithing coal.

Its high calorific value, furnishing probably as much absolute heat per pound as any known fuel, makes it very economical. In addition to this, it cokes promptly on the application of heat, making a strong, hard coke, rendering possible the formation of a very large arch in forging operations, sufficient to cover pieces of any size which can reasonably be handled on the anvil.

In the far Western States the orders for this coal for smithing have often been so great as to exceed the capacity of the Company to fill and at the same time supply the demand for it in the Eastern markets. Other coals go out to the Pacific Coast, but George's Creek smithing supplants them, when available.

Smithing coal for the Pacific Coast and Western States is loaded in the good old "clipper" ships at one of the three ports mentioned above, and starts on a voyage of fourteen thousand miles,—around Cape Horn, crossing the Equator twice, risking typhoons, spontaneous combustion, and other possible accidents. If all goes well, at the end of one hundred and twenty days (four months) the shipment arrives in San Francisco. There the coal is discharged on docks, loaded into cars, shipped to consuming and reshipping points, where it is sacked, loaded on the backs of burros, and sent in all

THE CONSOLIDATION COAL COMPANY

directions across the Rockies to the mining-camps, where it is used on the tools that are working in the almost impenetrable rocks.

Consider the cost of this coal at such points of consumption: rate transportation to San Francisco is often as high as \$9.25 per ton. Other coals are nearer and more available,—rates of transportation fifty to seventy-five per cent. lower; but George's Creek smithing, costly as it is, fills every requirement, and is pronounced the most economical coal for this purpose that can be procured. The West will continue, therefore, to draw its smithing coal from Maryland as long as it is obtainable.





MONONGAH MINE OPENING

Fairmont Coal Company



THE Fairmont Coal Company is the result of a nucleus formed by the late James O. Watson, in the year 1852, when he purchased in what is known as the Fairmont region, West Virginia, fourteen acres of coal land.

All the properties of this Company at present in operation are located on the line of the Baltimore and Ohio Railroad, whose valuable connections East and West give its output a market in all directions. Tide-water shipments are made over the following loading ports :

BALTIMORE

Locust Point, *via* Baltimore and Ohio Railroad.

Curtis Bay, *via* Baltimore and Ohio Railroad.

PHILADELPHIA

Jackson Street, *via* Baltimore and Ohio Railroad.

Port Richmond, *via* Philadelphia and Reading Railway.

NEW YORK

St. George, *via* Baltimore and Ohio Railroad.

Port Reading, *via* Philadelphia and Reading Railway.

FAIRMONT COAL COMPANY



ENTERPRISE MINE



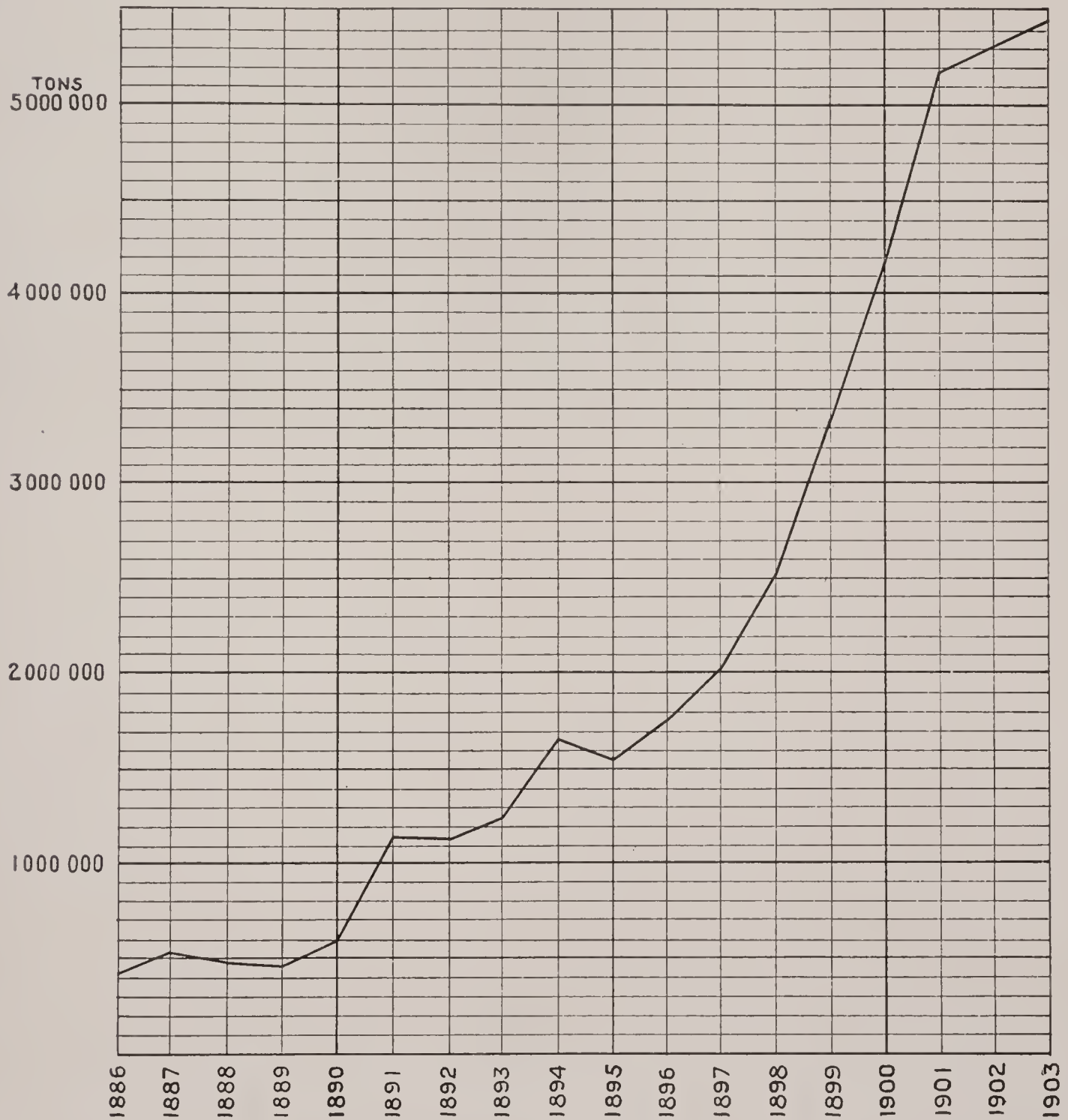
NEW ENGLAND MINE OPENING, SHOWING LOADED AND EMPTY MINE CARS

FAIRMONT COAL COMPANY

Output

The Company now owns, controls, and operates forty-five mines in this region, with an acreage of 61,800 and a producing capacity of 8,000,000 tons a year, also 1106 coke-ovens, with a capacity of 600,000 tons per annum.

The following table shows the output of the Fairmont region since 1886 :



FAIRMONT COAL COMPANY



GYPSY MINE AND MINERS' VILLAGE

☪ Markets

There are many uses for which Fairmont coal is especially adapted, and the progress made by the Company in extending its markets in all directions is evidence of the high regard in which it is held.

The Fairmont coal is prepared in seven different grades or sizes :

One and one-half inch, passing over a screen with a distance of one and one-half inches between the bars.

Three-quarter inch, passing over a screen three-quarters of an inch between the bars.

Run-of-Mine, as it comes from the mines.

Egg, Nut, and Pea, taken from the screenings remaining after the separation of one and one-half inch and three-quarter inch ; and

Slack, the residue of the screenings after taking out the three sizes just mentioned.

FAIRMONT COAL COMPANY

☪ Fairmont Coal for Illuminating Gas

As a gas coal, for illuminating purposes, Fairmont three-quarter inch screened has no superior.

The variableness of requirements in the operation of gas plants is such a predominating factor that this feature alone is liable to overshadow any superiority of one coal over another. The requisites of a good gas coal in their order of importance can be stated as follows :

1. A high yield of gas.
2. The candle-power of the gas should be high.
3. It must yield a firm, merchantable coke.
4. A high yield of tar and ammonia.
5. The coal should give up its gas freely and quickly.
6. The coal should be moderately low in sulphur.

Since the introduction of Welsbach lamps in recent years, the illuminating value of gas has become of less importance. If this feature of the gas is sacrificed, an increase in quantity is possible, or the illuminating value can be increased by a lower yield.

The yields from three plants in daily operation, using Fairmont gas coal, are as follows :

	Columbus, Ohio	Indianapolis, Ind. 4 per cent. cannel-coal used	Grand Rapids, Mich.
Yield of gas, per ton 2,000 lbs. . .	9,500 cu. ft.	9,600 cu. ft.	9,880 cu. ft.
Candle-power . .	17.75	17.76	14.85
Tar (gallons) . .	15.00	13.00	15.70
Ammonia (lbs.) .	3.75	5.00
Yield of coke . .	65.0	60.5	67.60



FAIRMONT COAL COMPANY

☪ Fairmont Coal for Producer Gas

As a proof of its merits for use in this particular direction, we can refer to practically every large manufacturer of iron and steel using producer gas in the Eastern market, many of whom have been consumers of Fairmont coal for years.

In the production of producer gas three-quarter inch screened coal is generally used with most satisfactory results.



CHIEFTON TIPPLE, BARN, AND RAILROAD CARS

Producer gas is made by a partial combustion of fuel, thus changing it from a solid to a gaseous state. The introduction of air brings in a large proportion of nitrogen, which is an inert gas and reduces the heating value of the resulting product. The coal which can be changed to a gas with the least amount of air would, therefore, yield the best quality of gas. Fairmont coal, containing thirty-six per cent. of volatile matter, will yield this amount of gas with simply the application of heat, leaving only the remaining fifty-five per cent. of fixed carbon to be gasified by partial combustion. The producer gas made from this coal has, therefore, a higher heating value than that made from a lower volatile coal. This kind of gas is largely used in steel-plants for heating ingots in soaking-pits, or reheating furnaces, and also very extensively in the open-hearth process of steel-making, and in furnaces where cast-iron and scrap are converted into steel.

FAIRMONT COAL COMPANY

☪ Fairmont Coal for Locomotives, etc.

In heavy steam practice and for use in locomotives Fairmont Run-of-Mine is unexcelled. This claim is substantiated by the number of railroads in this and other countries which are now using large quantities of Fairmont coal with satisfactory results, and for this purpose there does not seem to be a fuel that excels it.



NEW ENGLAND TIPPLE AND POWER-HOUSE

Particular features which make this a desirable locomotive fuel are the quickness and intensity with which the coal will respond when needed, and the natural lumpy character of its physical structure, which admits of its being transferred and handled without serious detriment.

European countries, Mexico, the West Indies, and South America provide a large and growing market for our coals, greatly due to the feature mentioned above.



FAIRMONT COAL COMPANY



INTERIOR OF TIPPLE AT NEW ENGLAND MINE, SHOWING DUMPS AND CAR-HOISTS

☪ Fairmont Coal for By-product Ovens

The Run-of-Mine coal has been successfully used in by-product ovens, being a very valuable fuel for this use, on account of the large yield of by-products.

Since by-product coke-ovens are slowly but surely becoming a factor in the production of coke, gas, and other products, the various coals have been more thoroughly tested for the respective yields of gas, tar, and ammonia, and the quality and structure of the coke.

The United Coke & Gas Company are probably the foremost among such experimenters, and a table of their results, taken from the "Mineral

FAIRMONT COAL COMPANY

Industry," shows some of the coal best suited for this purpose, with average computed and compared with a test on Fairmont coal.

	Coke, Per Cent.	Tar, Per Cent.	Ammonium Sulphate	Total Cu. Ft. Gas per 2,000 lbs. Coal
Cape Breton	72.83	4.99	1.010	9,000
Youghiogheny	75.60	5.07	1.100	9,000
Connellsville	76.34	6.14	1.223	8,924
Pittsburg	68.25	4.38	.908	8,884
Eastern Pennsylvania	85.00	2.00	.800	8,400
Virginia	66.01	4.70	1.070	10,090
Kanawha	73.60	6.40	1.000	10,289
Average	73.95	4.81	1.016	9,227
Fairmont	72.58	5.22	1.270	10,200

If there is anything in by-products, the above figures show that Fairmont coal is one of the best, if not the best for this purpose in the country.

Analysis of Fairmont coal used for this purpose :

Carbon	77.83
Hydrogen	5.18
Oxygen	9.13
Nitrogen	1.53
Sulphur72
Phosphorus013
Ash	5.61
Moisture	1.98
Volatile	45.21
Fixed carbon	57.20
B. T. U.	14402

Analysis of ash of above coal :

SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	SO ₃	P ₂ O ₅	K ₂ O	Na ₂ O
46.06	25.35	20.00	2.99	2.64	Trace	.36	1.50	1.05

FAIRMONT COAL COMPANY

☪ Fairmont Coal for Miscellaneous Uses

The Egg, Nut, and Pea coals resemble anthracite in size and appearance, and are used successfully in brick burning, heating furnaces, glass and other manufactories where especially clean and quick firing coal is desirable.

The Fairmont coal is unexcelled as a domestic fuel, producing a hot fire, easily cleaned and capable of quickly generating heat; is pleasing to look at, and in territories where soft coal is used for domestic purposes, the business of the Company is very large.

The Slack Coal is considered one of the most satisfactory fuels for burning clinker Portland cement that is mined, the peculiar practice in vogue in the cement industry requiring a high volatile coal, and of such fineness that it can be economically and quickly handled in the automatic conveying machinery so necessary in a plant of this kind. The coal is pulverized so as to pass through a sieve of one hundred meshes to the inch, and is blown into the lower end of the kiln, where its gases ignite and pass off through a heat vent in the top of the kiln.

Slack coal is also economically used in connection with various automatic stoking devices, and by some of the manufacturers of these appliances is recommended as being the most satisfactory fuel. It is also largely consumed in plants having plenty of draught and grate area, and on account of its low cost as compared to ordinary steam coals, is very economical.



MULE "DOLLY" AT XX OPENING, FAIRMONT

FAIRMONT COAL COMPANY

☞ Fairmont Coal for Coking Purposes

It has been the practice in this region, since coke-ovens were first built, to use nothing but slack for making coke. This made a product variable in ash and sulphur, and was remedied at some of the plants by the introduction of washers. Their use has made it possible to place on the market a coke of remarkable uniformity, which to a coke consumer is one of the most, if not the most valuable feature of a coke.

The structure of the coke is similar to that of the Connellsville region, —firm, bright, and strong.

The coke manufactured from Fairmont coal, both foundry and furnace, is well adapted for blast-furnaces and for various smelting and refining purposes, great quantities of it being shipped to the smelters of Mexico, Canada, and the western part of the United States.

The Company also operates a crusher which reduces the size of furnace coke to Egg, Stove, Nut, and Pea, and is able to dispose of practically all these grades of coke which it can manufacture to various chain-works and other industries engaged in special forging, requiring intense heat.



SCREENS AND BASKET AT NEW ENGLAND TIPPLE



ELK LICK MINE

Somerset Coal Company



THE properties of this Company are adjacent to the Baltimore and Ohio Railroad and its branches in Somerset County, Pennsylvania, and consist of 32,000 acres of coal lands and twenty-two mines owned, controlled, and operated by this Company, which was formed in the early part of the year 1902, their capacity being about a million and a half tons of coal per annum. We have installed at our mines, where coking coal is produced, three hundred ovens capable of turning out 135,000 tons of first-quality furnace coke per annum.

☪ Transportation Facilities

Shipments are made to all markets *via* the Baltimore and Ohio Railroad and its connections. Tide-water shipments can be made over the following loading ports :

BALTIMORE

Locust Point, *via* Baltimore and Ohio Railroad.

Curtis Bay, *via* Baltimore and Ohio Railroad.

PHILADELPHIA

Jackson Street, *via* Baltimore and Ohio Railroad.

Port Richmond, *via* Philadelphia and Reading Railway.

NEW YORK

St. George, *via* Baltimore and Ohio Railroad.

Port Reading, *via* Philadelphia and Reading Railway.

SOMERSET COAL COMPANY

☞ Markets

From the extent of the territory covered by our operations, it would naturally be assumed that the coal is of varying chemical and physical properties. While this is true, it gives the Company an advantage in that it has a choice of many different kinds of coal to apply under special conditions and uses. The selection of a proper coal is in the hands of a



SUMMIT MINE

competent metallurgist and chemist, who has a thorough knowledge of the different classes of our coal, and is in every way able to make judicious selection to apply on any special business, so that under existing conditions the best results can be obtained. It is not considered that one coal is better than another, but we have classified the coals according to their chemical and physical properties and ability to stand heavy draft, whether giving long or short flame, and their smoke-producing qualities. We have fuels that are admirably suited for use in plants having insufficient draft,

SOMERSET COAL COMPANY



SALISBURY YARD



ALLEGHENY MINE

SOMERSET COAL COMPANY

small fire-boxes under boilers. For ordinary steam business, where smoke is objectionable or heavy firing is required, and for heavy, locomotive, and marine firing, we have a coal that will not clinker, gives a long flame, and works well also under heavy puddling and heating furnace work. This fuel is one of the best domestic soft coals in Pennsylvania for use in both ranges and furnaces, and careful preparation is given to the coal shipped for this purpose. For plants where the boiler capacity is limited, we have a coal that is specially fitted, for the reason that it can be carried for long periods in the furnaces without cleaning, and is capable of producing an evaporative power which commonly gives from eighty to ninety per cent. over builders' rated horse-power on boilers. It is largely used in lime-burning, where its free-burning and non-clinkering qualities are appreciated. For general puddling and heating furnaces we supply a coal unusually low in sulphur contents. Its coke-making properties render its use economical where fires are carried to their fullest extent at all times, the coal banking down very well, and it will not clinker or run on the grate. The same coal is successfully used in pottery and brick work, where very high temperatures must be maintained, as in enamelled-brick furnaces.

This coal is also particularly adapted for blacksmithing purposes, especially in light forging, and the business of the Company in this particular trade is constantly growing.

Consumers who have tried the cokes of this Company have pronounced them equal to the best on the market. Unsolicited, we received from one of the largest Eastern furnaces, which has consumed as high as 5000 tons per month of our coke, an average analysis of 481 cars showing the sulphur to be only .846 per cent. The coke is quite dense in its physical structure, and is capable of bearing the ordinary furnace burden.

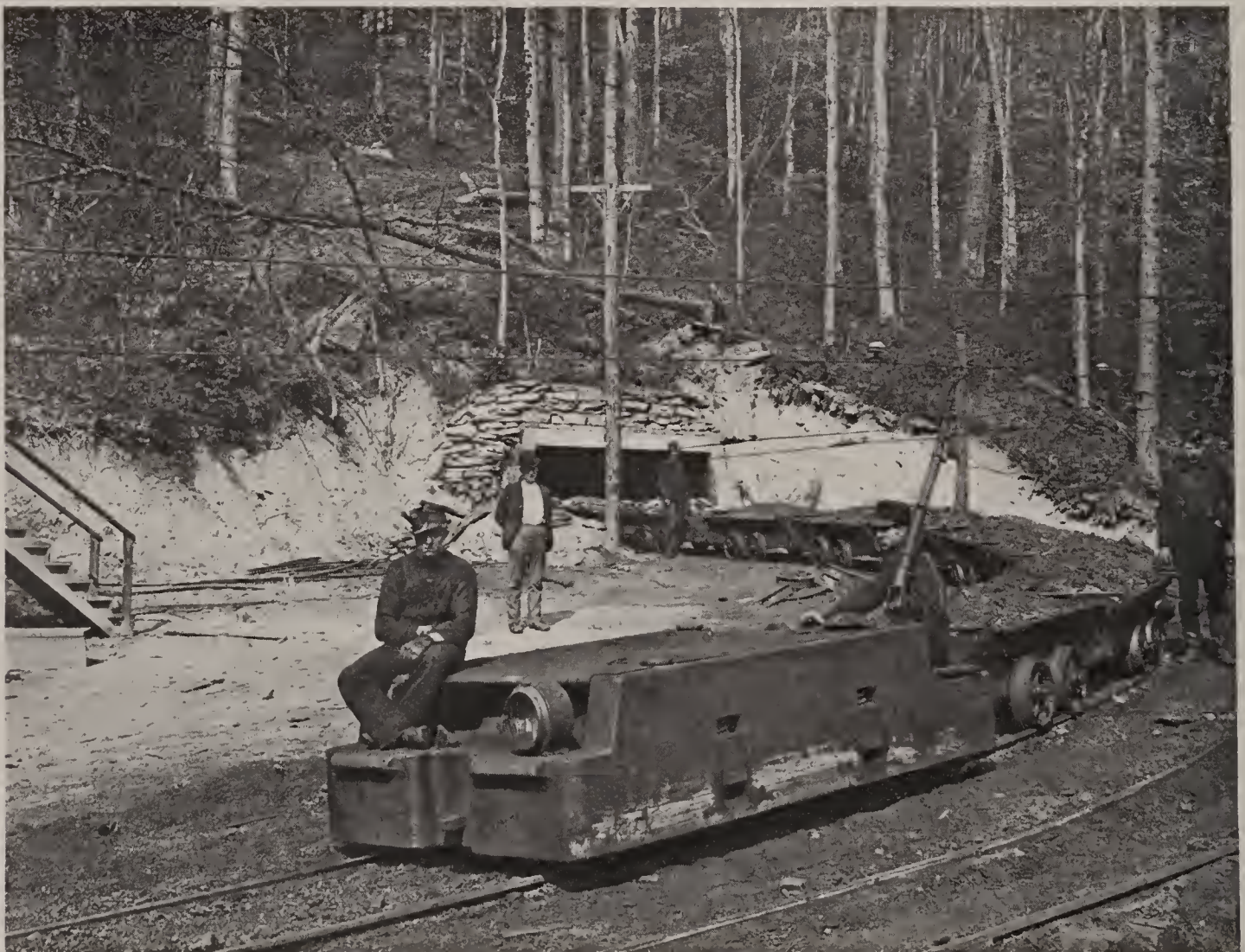
There is a demand for this coke wherever it can be obtained, and a ready market is always open for it.



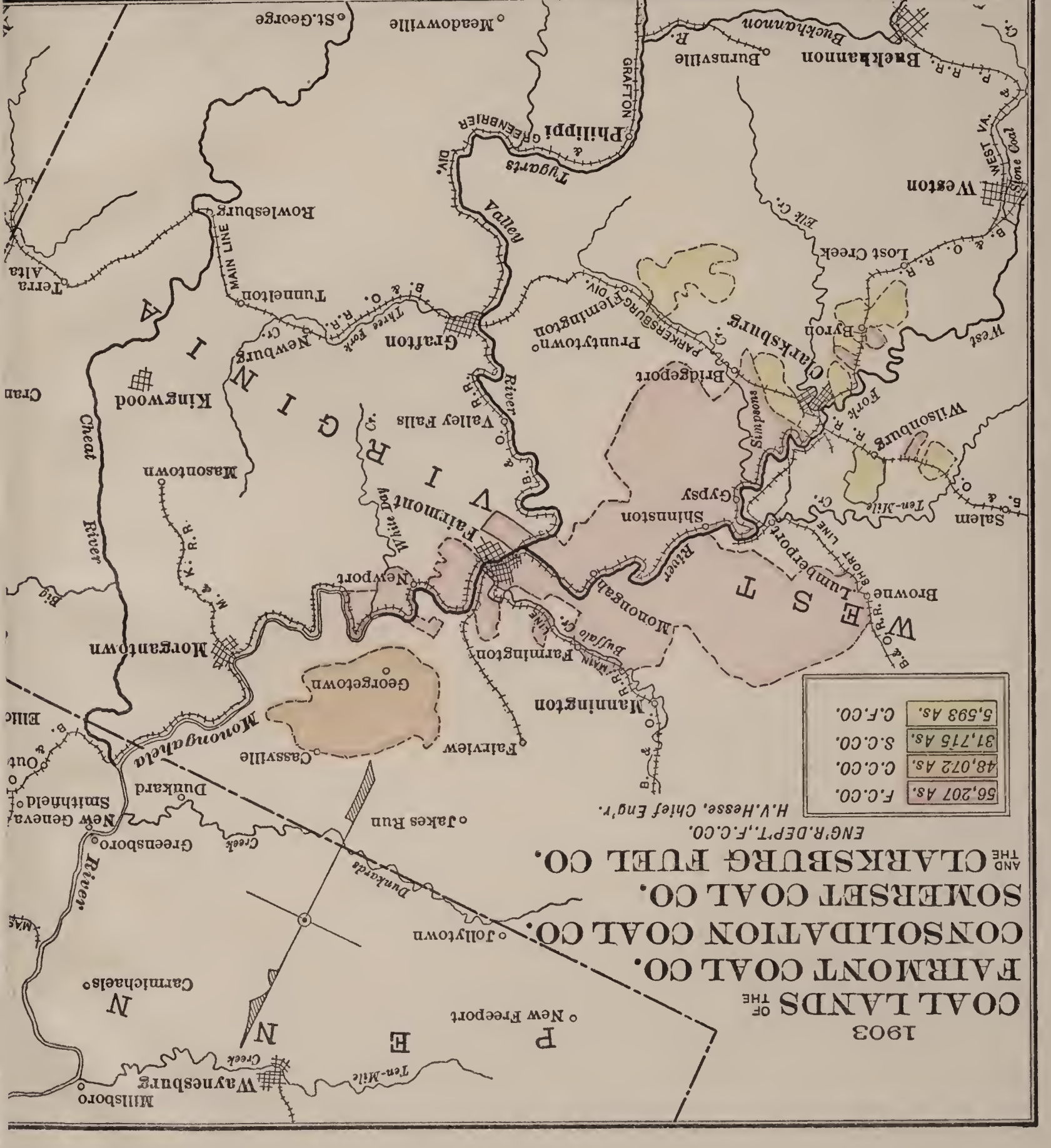
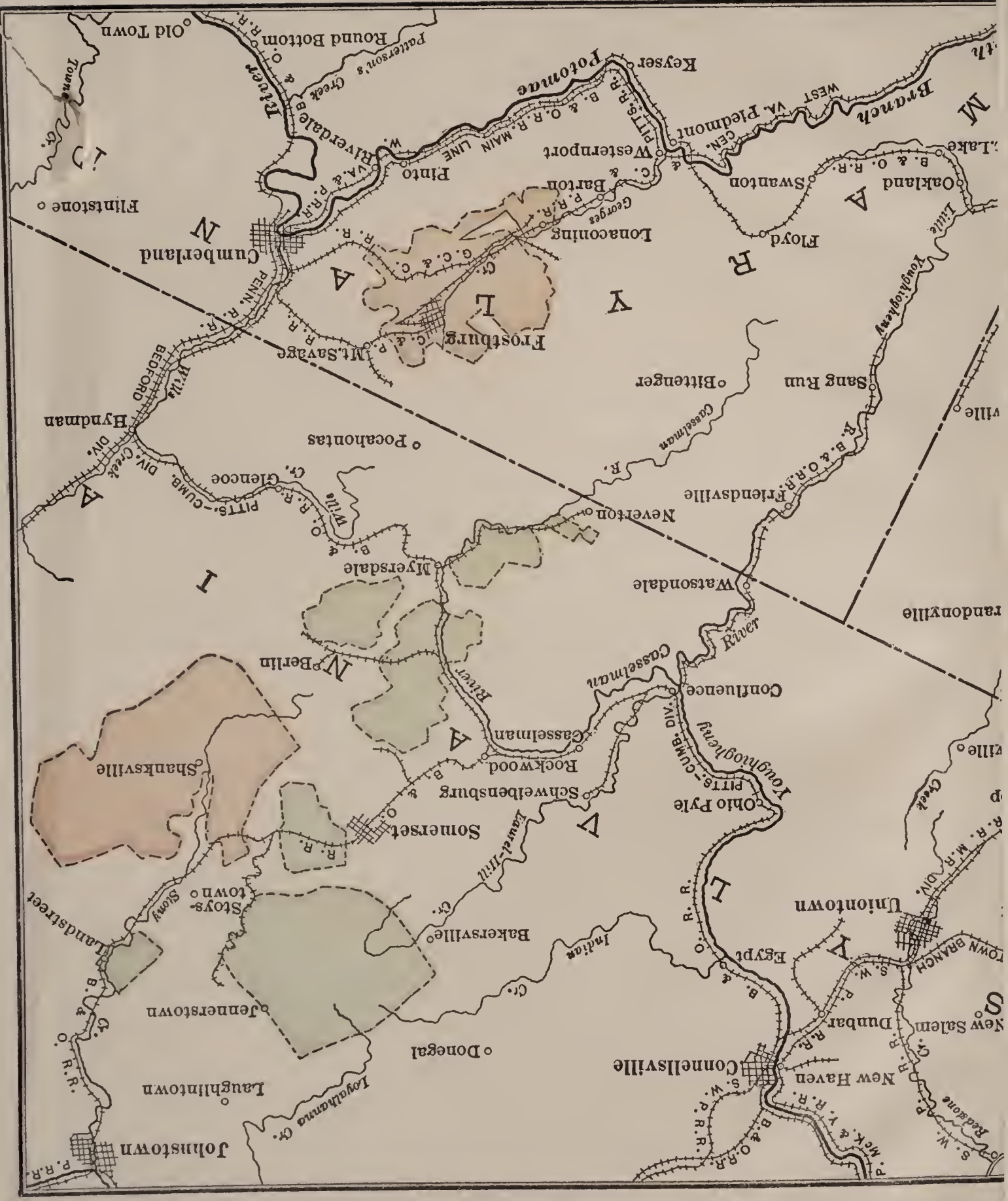
SOMERSET COAL COMPANY



ELK LICK OVENS



STUART MINE OPENING



1903
 OF THE
COAL LANDS
FAIRMONT COAL CO.
CONSOLIDATION COAL CO.
SOMERSET COAL CO.
AND THE CLARKSBURG FUEL CO.
 ENGR. DEPT., F.C.CO.
 H.V. Hesse, Chief Eng'r.

56,207 As.	F.C.CO.
48,072 As.	C.C.CO.
31,715 As.	S.C.CO.
5,598 As.	C.F.CO.



CANTILEVER TOWERS ON CONGRESS STREET WHARF, BOSTON

Special Facilities for Delivery



THE marketing of the products of these three Companies is handled in conjunction and greatly expedited by the special facilities at their disposal, a brief description of which we give below :

EASTERN

☪ Boston

The Metropolitan Coal Company of Boston, controlled by the Consolidation Coal Company, affords our Companies unequalled opportunities for the discharge and delivery of their product in Boston and vicinity. The Metropolitan Coal Company has control of several wharves in Boston harbor, all fully equipped with modern machinery, where the largest steam-

SPECIAL FACILITIES FOR DELIVERY



ELEVATOR "COOK" TRANSFERRING COAL



LIVERPOOL WHARF, BOSTON



CHELSEA WHARF, BOSTON. LOADING LIGHTER FROM VESSEL

SPECIAL FACILITIES FOR DELIVERY

ships and vessels are quickly discharged. The schooner "Thomas W. Lawson," 8000 tons, is constantly employed, in company with other large vessels of from four to six thousand tons. The steamship "Hector," 4000 tons, is owned and used exclusively by the Metropolitan Company. Five of their wharves are situated on deep water, having a storage capacity of 250,000 tons, and are capable of discharging from 2000 to 2500 tons each per day. Recently the steamship "Orion," with 2250 tons, was discharged in seven hours.

In addition to the unequalled harbor facilities, this Company has depots and offices in the suburbs of Boston, covering the residential and manufacturing districts, including what is known as "Greater Boston."

The lighterage plant of the Metropolitan Company is a special feature, comprising tow-boats and lighters of from 100 to 1000 tons capacity, for transferring coal to their depots and other places in and around Boston. Also two floating bunkering machines, by which from 800 to 1000 tons can be put on board steamships in a day. This floating machinery is also used for discharging coal and other freight from vessels at anchor. From the vessels at the wharves the coal is hoisted into pockets and into storage bins, from which bins it is delivered by machinery for loading into wagons or barges.

The elevating machinery consists of towers, one of which is a revolving tower having a capacity of three tons per minute from a radius of one hundred and twenty feet.

The teaming department consists of five hundred horses, with the necessary harnesses and wagons, all of which have careful attention, the stables being of modern construction, with a repair-shop containing perfect equipment for wagon work, blacksmithing, and general repairs.

The wharves and offices are in every way modern and complete, fully prepared to do a large and widely distributed business.



SPECIAL FACILITIES FOR DELIVERY

☪ New York

The Consolidation Coal Company also operates, for exclusive use of tugs, private yachts, and other smaller craft, extensive coal pockets in the harbor of New York, where this coal, which is recognized as being unexcelled as a steam producer, can be procured day or night, Sundays or legal holidays.



Located at the foot of Ninth Street, Hoboken, N. J., directly under what is locally known as "Castle Point," opposite Twelfth Street, New York City, this Company maintains extensive coal pockets, with a capacity of 7500 tons, and always keeps on hand an ample supply of fuel, George's Creek and Somerset coal, for immediate delivery, and has facilities for the simultaneous coaling of from six to eight tugs, depending upon the size and length of the boats. Fresh water is furnished free to all vessels bunkering at these pockets, and at each coaling berth there are hose connections, so that vessels may obtain water while receiving coal, and thus save much valuable time. These pockets were formerly operated by Messrs. Rogers and Curran, and since having passed into the hands of this Company, the business of its predecessors has not only been retained, but has steadily increased.

The high calorific value of this coal and its smokeless qualities make it the most desirable fuel that can be procured in New York harbor for the use of yachts and other pleasure-crafts, two of the principal requirements of which are speed and comfort.

SPECIAL FACILITIES FOR DELIVERY

☪ Baltimore

In connection with the New England business of these Companies the Consolidation Coal Company operates, *via* the port of Baltimore, two steamers having a carrying capacity of 1500 tons and 800 tons respectively,

SEA-GOING
TUG
"SAVAGE"



CABIN OF
"SAVAGE"
EQUIPPED
WITH
WIRELESS-
TELEGRAPH
APPARATUS

three sea-going tugs and sixteen sea-going barges with a capacity of 1650 tons each, these facilities enabling our customers in the New England States to rely upon regular transportation for the coal taken from this Company.

SPECIAL FACILITIES FOR DELIVERY



THE LARGEST SCHOONER IN THE WORLD AT CURTIS BAY WHARF, B. & O. R. R.

☪ Curtis Bay, Baltimore

The greater portion of the tide-water business of these Companies is moved, *via* the Baltimore and Ohio Railroad, over the Curtis Bay coal pier of the port of Baltimore. The facilities of this pier for giving prompt dispatch are not surpassed on the Atlantic Coast. It is 800 feet long from shore line to deep-water terminus, 60 feet wide, and 45 feet high, its operation being practically automatic. The loaded-car approach is 1000 feet in length and rises gradually on a one and one-half per cent. grade to the top of the pier. At the summit the cars run over a one-hundred-ton Fairbanks scale and are weighed automatically; as cars can be unloaded on both sides simultaneously, each track has its set of scales. After the weigh-

SPECIAL FACILITIES FOR DELIVERY

ing, the cars are run to the unloading pockets. These are made of steel, each ending in a long steel spout which is dropped to the vessel's hatchway. There are twenty-five of these pockets and spouts on each side of the pier. When the drop-bottoms in the cars are opened and the coal has been dropped, the cars run by their own momentum to the switchback at the end of the pier; here they reach the return track and run down an incline 1800 feet long into the yard, being weighed on a third pair of automatic scales while moving. With the use of the fifty-ton steel cars and with requisite amount of vessel tonnage, the maximum capacity of the pier is 1000 tons per hour.

In order to handle the vast number of cars unloaded over this pier and quickly move the empties, an immense yard has been constructed at Curtis Bay, its capacity being about 1800 cars, and all necessary structures connected with a yard of this character are also available.

A channel three hundred feet wide and thirty feet deep from the bay to the shore line of the pier is maintained, so that any vessel which would enter Chesapeake Bay can load at the Curtis Bay pier. It was *via* this pier that the "Thomas W. Lawson" was loaded by the Consolidation Coal Company with 8189 tons of its George's Creek coal in nine hours and thirty minutes actual loading time. The "Thomas W. Lawson" is the largest schooner in the world, having seven masts, so that at best she is very unwieldy to handle.



ONE OF THE 100-FOOT AUTOMATIC SCALES, CURTIS BAY COAL PIER, B. & O. R. R., BALTIMORE

SPECIAL FACILITIES FOR DELIVERY

WESTERN

☪ Cincinnati, Ohio

The Fairmont Coal Company here maintains six large and extensive retail yards, conveniently located in various parts of the city, where they have constantly employed upwards of one hundred and thirty horses, which are required to make daily deliveries from these yards to their wholesale and



ONE OF SIX YARDS AT CINCINNATI

retail customers. These yards are modern and up-to-date in every way, and since their acquisition, the increase in their business has been phenomenal, comprising the largest wholesale and retail dealers in the city of Cincinnati.

THE NORTHWESTERN FUEL COMPANY

☪ St. Paul, Minn.

The Northwestern Fuel Company, whose principal office is in St. Paul, Minn., is controlled by the Fairmont Coal Company, and acts as distributing agent of these three Companies in the Northwestern territory, having large docks at various points, a brief description of which is given below.

SPECIAL FACILITIES FOR DELIVERY

☪ Washburn, Wis.

The dock at Washburn, Wis., on the Chicago, St. Paul, Minneapolis and Omaha Railroad, has a storage capacity of 150,000 tons. The movement of coal over this dock enables us to utilize its capacity two or three times over during the season of navigation, so that each year more than 200,000 tons of coal are carried over this property. From this dock all territory on the line of the above railroad, including St. Paul and Minneapolis, and all points on the Chicago and Northwestern in South Dakota and Minnesota, are reached.

☪ Duluth, Minn.

The Northwestern Fuel Company dock at this point has a storage capacity of 125,000 tons, and, owing to the manner in which coal is here moved, it is possible to handle during the season over 200,000 tons. From this dock all points are reached on the lines leading from Duluth,—namely, Northern Pacific; Great Northern; Chicago, St. Paul, Minneapolis and Omaha; Chicago, Milwaukee and St. Paul; Duluth, South Shore and Atlantic; Duluth and Iron Range; and Duluth, Mississippi and Northern.



DOCK AT SUPERIOR. THE ONLY ELECTRICALLY EQUIPPED DOCK IN THE WORLD

☪ Superior, Wis.

Here the Northwestern Fuel Company has three docks, one of which has just been equipped with electrical handling machinery. The combined

SPECIAL FACILITIES FOR DELIVERY



FRONT VIEW OF DOCK AT SUPERIOR

capacity of these docks is about 1,250,000 tons, and we can transport over them during the season of navigation 2,000,000 tons. From these docks we reach the same territory as *via* Duluth.

Adjacent to one of these docks we have 230 coke-ovens, where we manufacture daily about 400 tons of coke for shipment to the smelters in Montana and Washington.

☪ Milwaukee, Wis.

From the two docks of the Northwestern Fuel Company at this port are reached all points on the Chicago and Northwestern, and the Chicago, Milwaukee and St. Paul, and their connections. Storage capacity is 125,000 tons each, with a capacity for handling 175,000 tons each during navigation. At Chicago the Company handles coal in car-load lots, direct shipments being made from the mines.

The Northwestern Fuel Company also represents the D., L. & W. Railroad in the sale of its Scranton coal, handling during the year 1903 about 750,000 tons of this well-known product, and during that period almost 2,000,000 tons of bituminous coal.

Shipments of coal in connection with the Northwestern Fuel Company from our mines move *via* the Baltimore and Ohio Railroad to Lorain and

SPECIAL FACILITIES FOR DELIVERY

Sandusky, Ohio, where the cars are set on what are known as “car-dumping machines,” the entire car being turned over and emptied into a funnel-shaped chute, which discharges the coal into the holds of vessels for transportation to the discharging dock. The dumping machines are capable of unloading from five to six thousand tons every twelve hours. Upon arrival at the dock the coal is unloaded by clam-shell buckets, and is carried over the dock in small cars, except at Superior, where we have electrical appliances for bringing the coal out of the vessel in ton buckets, whence it is emptied into a bucket having a capacity of nine tons, and this is carried over the dock by electricity and discharged wherever needed. At this dock we can discharge from five to six thousand tons a day, and on our other docks from three to four thousand tons per day.

To load this coal from storage docks into cars, it is picked up by clam-shell buckets, carried to the car-loading side of the dock, emptied into buckets, and discharged into the cars.

Consolidation, Fairmont, and Somerset Coals as Steam Coals



THE value of a coal for steam production depends primarily on the number of heat units which it is capable of developing. There are instruments that will measure the heat given off by a coal to a degree of accuracy within one-half of one per cent., and various coals or different samples of the same coal can thus be compared on this as a standard basis.

The impression that there are wide differences in the heating value of coals, which arose from the inability to measure it accurately, is rapidly disappearing. An expression that one coal is twice as good as another, while

OUR COALS AS STEAM COALS

still occasionally heard, is exceptional. Again we hear reference to the "efficiency" of a coal, another wrong idea. If a coal is said to contain 14,000 B. T. U. (British Thermal Units), it will deliver this number of B. T. U. if completely burned, no matter how rapidly, how slowly, or how complex the conditions, and the word "efficiency" signifies that proportion of the total heat in the coal which any given plant can convert into available steam. It is true that it may be more difficult to maintain this efficiency with one coal than with another, due to difference in composition, but the variation is chargeable entirely to the manipulation and not to the coal.

Some few plants with modern appliances for automatic firing, and boilers of special design, have been able to extract eighty per cent. of the heat in the coal and deliver it in available steam. In other words, they have attained eighty per cent. efficiency. Such performances are very rare, and seventy-five per cent. might be called the best practice. While seventy-five per cent. would be very good, sixty-five per cent. is the average, and sixty per cent. the common practice in smaller plants.

Where and how these losses occur may be best illustrated by taking two tests made in the same plant, one of which is fairly good practice, and the other very poor. The results are given as heat balance in per cent.

	Test No. 1 Per cent.	Test No. 2 Per cent.	
HEAT USED IN EVAPORATION .	70.98	54.32	EFFICIENCY
LOSSES			CAUSES OF LOSS
Products of combustion .	8.46	7.12	In large part unavoidable
Latent heat	3.54	3.19	Due to composition of coal
Air excess	4.67	16.00	Good or bad firing
Unburned coal	1.35	10.71	" " " "
Unburned gases	2.68	0.00	" " " "
Radiation	8.32	8.66	Construction of plant
Total heat supplied . . .	100.00	100.00	

This shows that the efficiency of the plant is almost entirely in the hands of the fireman.

Firing



“INTERNAL vigilance is the price of economy in all things.” The commercial firing of fuel is no exception, and the economy obtained well pays for the attention paid to the handling of fuel and air in the production of steam. The ideal requirements would be an “automatic” stoker with human intelligence, to meet all variations of load with equal care and economy, and to perform its duty faithfully, whether much or little is required. The nearest this can be approached is in a plant having a uniform load where mechanical stokers are run at their best economy under the care of intelligent firemen. Where the load is too variable for mechanical stoking, hand-firing must be taken as the alternative, and it requires judgment and attention to produce the best results.

Fairmont coal has about thirty-six per cent. volatile matter which is driven off when it reaches the temperature of the fire-box. It is capable of meeting sudden demands for steam, as about thirty per cent. of its heat is given off in three minutes after it is fired. If a large amount is fired at one time, there is insufficient air pressure to burn all the gases. This causes much loss, and is followed by a period when there is more air than is necessary to burn the fixed carbon. When the two sides of a furnace are fired alternately every four or five minutes, there is a variation of only a few per cent. in the air required to burn completely all volatile matter from the coal, and the maximum required is well under the air usually supplied, so it is useless to admit air above the grates. The alternate method of firing is recommended because it keeps the temperature and air excess more uniform than when coal is spread over the entire grate.

After the air passes through the bed of coals it must have enough free oxygen to burn the volatile gases. For this reason it is important to determine the correct thickness of fire. With Fairmont coal eight to ten inches gives the best results, with ordinary draft of one-fourth to one-half inch. For further variations in the draft the fire should have a corresponding thickness.

The ash should be frequently worked through the grates with a slice-bar,

FIRING

or by shaking, if shaking-grates are installed. The ash must not be stirred up into the fire, as it retards the draft, and if hot enough will form clinkers. The fire need not be cleaned oftener than once in twelve hours. The cleaning should be thorough, leaving no ash on the grates or mixed with the coal.

Varying demands for steam require corresponding rates of combustion. When the fire is kept level and at the proper thickness, as should be done regardless of the load, the rate of combustion can be regulated by the draft only. Automatic damper regulators control the air very closely.

The relation of heating surface to grate area and draft affect the economy of a plant, and, although they are questions of construction, a fireman should know what each is for every boiler. A large amount of fuel may sometimes be saved by building the bridge wall a foot or two over the grates, or putting dampers in smoke connections, where they are too often wanting. Such minor changes to suit the load of that particular plant give better efficiency.

With two-tenths inch draft about sixteen pounds of Fairmont coal can be burned per square foot of grate per hour, and about twenty-nine pounds of coal with five-tenths inch draft.

The highest boiler efficiencies have been obtained when burning from thirty to thirty-five hundredths pounds of coal per hour per square foot of heating surface. This means a ratio of heating surface to grate area of fifty or seventy to one, depending upon the draft.

George's Creek and Somerset coals are similar chemically and physically, and require like conditions and methods of firing.

They are classed as smokeless coals, having from sixteen to twenty-two per cent. of volatile matter. The variations in the air required are not quite so variable as with Fairmont coal; still it is well to fire small amounts at intervals of five or six minutes. Smoke is prevented to a considerable extent by alternate firing. The fire should be from eight to ten inches thick for moderate draft of about one-fourth inch. They burn somewhat faster than Fairmont coal, as twenty-one and twenty-seven pounds can be burned per hour per square foot of grate with two-tenths inch and three-tenths inch draft respectively. Approximately the same amounts of coal should be burned per square foot of heating surface per hour as given before.

This display is here to instruct and entertain visitors but we are also prepared to do business. Mr. W. H. Williams representing the selling department, will gladly discuss the merits of our products at office in the pavilion at rear of exhibit.

Consolidation Coal Co.,

Fairmont Coal Co.,

Somerset Coal Co.

J. B. LIPPINCOTT COMPANY
PHILADELPHIA



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