

State inspector of coal mines reports

Section 22, Pages 631 - 660

These reports of the Kansas State Mine Inspector mostly concern coal mining, though by 1929 the scope of the reports broadens to include metal mines. The content of individual reports will vary. The reports address mining laws and mining districts; industry production and earnings; fatal and non-fatal accidents; accident investigations and transcripts of oral interviews; labor strikes; mine locations; mining companies and operators; and proceedings of mining conventions. The reports document the political, economic, social, and environmental impacts of more than seventy years of mining in southeastern Kansas.

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A recess of about 15 minutes was then taken, to allow the committees time to draft resolutions and prepare reports. After recess, the committee on permanent organization reported, as follows:

We, your committee on permanent organization, submit the following: That M. L. Walters act as president of this convention, and J. M. Lacy act as secretary.

Robert Abbott was appointed assistant secretary.

The committee on credentials then reported, as follows:

We, the committee on credentials, find the following delegates entitled to seats in the convention:

Kirkwood No. 2, George McGrath and E. M. Horchaes.

Cornell, Patrick Welsh.

Frontenac, H. Forsyth and C. H. Friskel.

Litchfield, Nos. 22 and 37, John Wykle and Branz Martin.

Minden mines, James McManus.

Chicopee, J. K. Stevenson and Peter Sherman.

Morgan Lee shaft, William James.

Arnott & Lanyon, Hector McGinnis and Henry Turner.

Midway No. 4, Sam Britton and George Bousfield.

Fleming No. 2, Robert Beveridge.

Fleming No. 3, Thomas Gorman.

Yale, Walter Waldie and Edward Edwards.

Pittsburg No. 20, Fred. Teller.

Minard & Co., B. Dueber.

Scammon, Durkee's, Wm. Grady.

Graham's, John Grant.

No. 4, J. G. McLaughlin.

No. 7, R. Gilmore.

Hamilton No. 1, Weir City, William Ridly and James White.

Wear Bros. No. 2, P. K. Stevens and Pearl Sweeney.

Excelsior, U. S. Paxton.

Bennett slope, W. Sinclair.

Keith & Perry No. 8, Robert Abbott and John Lavery.

Durkee Nos. 1 and 2, William Davis and William Gowns.

Keith & Perry No. 6, Thomas Horsley and David White.

Kansas & Texas No. 18, Albert Gladinour and William Bevans.

Kansas & Texas No. 47, Thomas Coulson.

Keith & Perry No. 5, G. R. Fulton and J. Price.

Stippville, Thomas Skeen.

Each delegate was requested to announce the number of men he represented, and state his instructions.

The proposition of C. J. Devlin was then taken up and freely discussed, each delegate giving his opinion.

The motion to either accept or reject the proposition was then brought before the convention.

After a vote, a majority was found in favor of accepting the proposition.

The vote stood 2,318 for, and 927 against; 45 for 57 and 70 cents per ton, and 400 for 60 cents yearly basis; 75 who were present with discretionary power were not counted in the vote.

After the vote was taken, a committee was appointed to draft resolutions, after which an adjournment was taken until 7:30 o'clock.

The committee then held a meeting and drafted the Devlin proposition out in full:



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That the minimum price per ton for rough and tumble coal shall not be less than 50 cents, and 5 cents per 100 pounds screened coal shall be paid for each additional 100 pounds over 50 per cent. Example: 1,100 pounds, 55 cents; 1,200 pounds, 60 cents; 1,600 pounds, 80 cents; 2,000 pounds, \$1.00; and that the men have a check weighman, his money to be stopped by the company, and the pit committee be allowed the privilege of examining the scales when deemed necessary.

The above proposition was accepted with the following proviso: That the weekly-pay law be complied with in averaging the premium coal, and that all men directly or indirectly in the strike be reinstated, and that the screens remain as they are, free from all impediments or devices.

The following analysis of the Santa Fé proposition, which has been so unanimously accepted by the miners, was prepared by one of the oldest mining experts in the district, and will be perused with interest. It is of value as being a statement of the conditions on which the greatest miners' strike known west of the Mississippi river was settled, to the satisfaction of the men and that great corporation.

It is proper to add that the proposition was submitted to the men by C. J. Devlin, general manager of the Santa Fé coal-mining business.

PERCENTAGE.	Part of ton, in pounds.	Amount of money paid for same quantity of coal under former prices.		Number of 85-pound bushels contained.	Amount of compensation under Devlin's proposition.	Increase in compensation to the miner over former prices.	
		Summer.	Winter.			Summer.	Winter.
50.....	1,000	\$0 41.174	\$0 47.056	11.764	\$0 50	\$0 08.83	\$0 02.95
60.....	1,200	49.409	56.468	14.117	60	10.60	03.54
70.....	1,400	57.652	65.888	16.472	70	12.35	04.12

These figures are all based on former lump-coal prices, at 3½ cents in summer and 4 cents in winter, for each 85 pounds.

Thus the termination of the strike, or suspension, of three months' duration seemed near at hand, as the "Santa Fé" miners were willing to resume work, but before doing so, a contract was presented for their approval, a copy of which reads as follows:

MINER'S ANNUAL CONTRACT.

THIS AGREEMENT, Made this — day of —, A. D. 189—, between —, of the first part, and — of the second part, witnesseth, the said party of the second part has agreed, and by these presents does agree, to enter into the employment of the said party of the first part as a miner of coal, to commence on the — day of —, A. D. 189—, and continue therein until the — day of —, A. D. 189—, and to abide by, adhere to and observe all rules and regulations hereto appended, which was made a part of this contract, and abide by and observe all rules and regulations promulgated from time to time by said coal company, with the consent of the party of the second part, for the purpose of regulating mining and other employment in and about the coal mines of the said coal company, and not to be absent without leave, except in case of sickness or other unavoidable contingency that would prevent him from work; also, to keep — room or entry in good working order.

The said party of the first part agrees to pay the party of the second part for each ton of coal mined by him and delivered on pit cars at the mouth of the room

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where the same is mined, as follows, viz.: For mining, ——— per ton, from above date to ———; all coal to be loaded free of dirt, sulphur, and slate.

Said first party hereby reserves the privilege, however, of closing the mines at any time, or of reducing the number of miners by discharging them, or such of them as the superintendent or person having charge of the mines for the time being may think proper, including said second party; all payments to be made between the 10th and 20th of the month for all coal mined and labor performed during the preceding month, in accordance with the rules and regulations aforesaid.

And it is hereby expressly agreed to and understood by the party of the second part, that should he become a tenant of the party of the first part, during the term of his engagement, that in case of its termination, either by discharge from the company's employ or in any other way, he will vacate the premises so occupied by him as early as practicable thereafter, upon a verbal notice from the company's agent or superintendent; and that he will not be entitled to receive any part of the wages due him for labor performed, should the party of the first part so elect, until the premises are vacated, and the keys of the same delivered at the company's office. And the party of the second part further agrees, that he will not stop work, join any "strike" or combination for the purpose of obtaining or causing the company to pay their miners an advance of wages or pay beyond what is specified in this contract, nor will he in any way aid, abet or countenance any such "strike," combination, or scheme, for any purpose whatever, during the time specified in the first clause of said contract.

IN WITNESS WHEREOF, The said parties have hereunto set their hands and seals, the day and year first above written.

By ——— Agent and Superintendent.

Witness: ——— (Signed in duplicate.)

RULES AND REGULATIONS ADOPTED FOR THE PURPOSE OF REGULATING MINING AND OTHER EMPLOYMENT IN AND ABOUT THE COAL MINES.

I.—Every employé of the company will be required to be ready for duty when the whistle blows for work every morning, and will be expected to perform a full day's work of 10 hours in his respective line of employment, unless the foreman of his department orders less time to be worked. Engineers are strictly forbidden to lower any miner or underground laborer into any pit after 7 o'clock A. M., without orders from the pit boss or person in charge of the pit head.

II.—No suspension of work shall take place during working hours, except in case of actual necessity.

III.—Any employé feeling aggrieved in any respect must present his claim to the pit boss in person. If he fails to adjust the matter in a manner satisfactory to the employé, it may be referred to the superintendent (if either party desires), whose decision, upon hearing of both sides of the question, shall be final.

IV.—Any employé who may have been discharged by the company, or who, with the consent of the company, may have left its service, shall receive all arrearages of pay due him at once. The company will consent to their employé's leaving their service without previous notice, except under circumstances that in their judgment would indicate bad faith.

V.—No person will be allowed to interfere in any manner with the employer's just right of employing, retaining or discharging from employment any person or persons whom the superintendent or pit boss having charge of the mines for the time being may consider proper; nor interfere in any way, by threats and menace, or otherwise, with the right of any employé to work, in any way, and upon any terms, and with whom he may think proper and best for his interest, or the benefit of his family.

VI.—No employé will be permitted to fill his place by another man without the consent of the superintendent.

VII.—Every employé will be paid once a month, at the regular pay day, all wages or money he may have earned during the last calendar month previous to such pay day, after deducting any indebtedness which such employé may owe to the company, or which the company, with the consent of such employé, may have assumed to pay to any other person.

VIII.—It shall be the duty of every miner working in the mines to keep his rooms in said mines in good order and repair, and any such miner who shall willfully, negligently or carelessly suffer his room to get out of order or repair, and who shall not, upon request, immediately put the same in re-



pair, the company may put such room in repair at the expense of the miner in default, and retain the amount of such expense from the next or any future payment to which said employé would be otherwise entitled, until fully reimbursed for such expense.

IX.—No miner who has left the employment of the company, whether voluntary or by discharge, will be entitled to receive any arrearages of pay due him for labor performed, whether on the regular pay day or during the interval preceeding pay, until he shall have put his room and roadway in perfect working order, as required by his contract with the company. All miners leaving said employment will be required to procure the certificate of the pit boss that they have complied with the requirements of this rule, as aforesaid, before making application at the company's office for final payment.

X.—Any tenant of the company, upon leaving its service, whether voluntarily or by discharge, will not be entitled to receive any part of the wages due him for labor performed until he shall have vacated the premises occupied by him (should the superintendent or other person in charge of the mine for the time being so elect) and presents the keys of the same at the office. And if no wages are due him he shall also vacate the premises within five days without process of law.

The signing of this contract was seriously objected to by many of the miners, who claimed it was nothing short of an ironclad, the approval of which would disfranchise them of the rights and privileges granted by the constitution. A period of three days' unpleasantness elapsed, when C. J. Devlin offered the following substitute, as a modification of the former contract:

To the Miners assembled at Frontenac, Kas., August 22, 1893:

To promote a better understanding, we put in writing our agreement as we made it with you last week, and which we propose to put in the form of a contract, and to have each man who has already signed a contract to sign one similar to this, and to return his old contract to him.

CONDITIONS OF THE CONTRACT.

First. That the price of mining shall be 50 cents per ton, run of mine, and a premium of 5 cents for each 100 pounds for all coal averaging over 50 per cent. of lump in a ton of run of mine, said average to be arrived at weekly or monthly, and this price to continue until May 1, 1895; all coal to be loaded free from dirt, sulphur, and slate.

Second. That all entry work and underground labor, and all deficiencies and opening of rooms and such like, shall be paid during the period of this contract the same as has been paid during the last 12 months.

Third. That settlements will be made monthly, not later than the 15th of each month, and weekly advances made to the employés, when required by them, equal to 90 per cent. of their earnings.

Fourth. That the miners will be permitted to have a check weighman, and he will run a check of his own to collect enough money to pay his wages only; and that should he at any time become obnoxious to the company, the miners will be notified, and another check weighman will be required in his place.

Fifth. We will have no dealings with executive committee or district board, and we will permit no pit committees.

Sixth. We will reserve the right to hire and discharge who we please.

Seventh. All check weighmen will have to be employés in the mines where they are selected from.

VERBAL AGREEMENT.

All the dealings between the men and the company will be by the officers of the L. U., or L. A., at the company's works, and by the company's agents.

This last contract was unanimously accepted by the miners of the Pittsburg & Cherokee Coal and Mining Company. This being the first break



in the miners' ranks, the best concessions possible were made with other companies, who resumed operations a few days later.

THE WEAR COAL COMPANY'S CONTRACT.

First. The price of mining shall be 50 cents per ton of 2,000 pounds mine run coal from date to September 1, 1893; from September 1 to March 1, 1894, 56 cents per ton; from the 1st of March to the 1st of May, 1894, 50 cents per ton, at which time this contract expires. All coal to be loaded free from dirt, sulphur, and slate.

Second. That all entry work and underground labor, and all deficiencies and opening of rooms and such like, shall be paid during the period of this contract the same as has been paid during the last 12 months.

Third. That settlements will be made monthly upon the nearest Saturday to the 15th of each month for the previous month's work.

Fourth. That the miners will be permitted to have a check weighman, and he will run a check of his own, and to collect enough money to pay his wages only, and that should he at any time become obnoxious to the company the miners will be notified, and another check weighman will be required in his place.

Fifth. We will have no dealings with executive committee or district board, and we will permit no pit committees.

Sixth. We reserve the right to hire and discharge who we please.

Seventh. All check weighmen will have to be employes in the mines where they are selected from.

Witness: _____

THE WEAR COAL COMPANY.

By _____, Superintendent.

Dated August 30, 1893.

CENTRAL COAL AND COKE COMPANY'S CONTRACT.

THIS AGREEMENT, Made this _____ day of _____, A. D. 189—, between CENTRAL COAL AND COKE COMPANY, of the first part, and _____, of the second part: Witnesseth, The said party of the second part has agreed and by these presents does agree to enter into the employment of the said party of the first part as a miner of coal, to commence on the _____ day of _____, A. D. 189—, and continue therein until the _____ day of _____, A. D. 189—, and to abide by, adhere to and observe the rules and regulations hereto appended, which are made a part of this contract, and abide by and observe all rules and regulations promulgated from time to time by said coal company, with the consent of the party of the second part, for the purpose of regulating mining and other employment in and about the coal mines of the said coal company, and not to be absent without leave, except in case of sickness or other unavoidable contingency that would prevent him from work. Also, to keep his or their room or entry in good working order.

The said party of the first part agrees to pay the party of the second part, for each ton of coal mined by him and delivered on pit cars at the mouth of the room where the same is mined, as follows, viz.: For mining, _____ per ton from date to _____.

All coal to be loaded free of dirt, sulphur, and slate. Said first party hereby reserves the privilege, however, of closing the mines at any time, or of reducing the number of miners by discharging them, or such of them as the superintendent or person having charge of the mines for the time being may think proper, including said second party. All payments to be made between the 10th and 20th of the month for all coal mined and labor performed during the preceding month, in accordance with the rules and regulations aforesaid.

And it is hereby expressly agreed to and understood by the party of the second part, that should he become a tenant of the party of the first part during the term of his engagement, that in case of its termination, either by discharge from the



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company's employ or in any other way, he will vacate the premises so occupied by him as early as practicable thereafter, upon a verbal notice from the company's agent or superintendent, and that he will not be entitled to receive any part of the wages due him for labor performed, should the party of the first part so elect, until the premises are vacated and the keys of the same delivered at the company's office. And the party of the second part further agrees, that he will not stop work, join any "strike" or combination for the purpose of obtaining or causing the company to pay their miners an advance of wages or pay beyond what is specified in this contract, nor will he in any way aid, abet or countenance any such "strike," combination or scheme for any purpose whatever during the time specified in the first clause of said contract.

IN WITNESS WHEREOF, The said parties have hereunto set their hands and seals the day and year first above written.

CENTRAL COAL AND COKE COMPANY.

By _____, Agent and Supt.

(Witness) _____

The signing of the contracts and the various prices established by the companies throughout the mining district were not approved, in general, by the miners. About the latter part of August, all the mines in Cherokee and Crawford counties were in operation, but a uniform price for mining was not established in the district. Some operators paid 50 cents and some paid 56 cents per ton for unscreened coal, while others paid 50 cents and 5 cents premium for every 100 pounds of screened coal in excess of 50 per cent.

The regulation of prices left the district in an unsettled condition. The same also, may be said of Leavenworth county, as the Kansas & Texas and Home mining companies paid 80 cents per ton for unscreened coal, while the Leavenworth Coal Company resumed operations about the last of August, under the following

AGREEMENT.

THIS AGREEMENT, Made and entered into by and between the Leavenworth Coal Company, a corporation created and existing under and by virtue of the laws of the state of Kansas, of the first part, and the undersigned as parties of the second part, witnesseth, that the said party of the first part, for and in consideration of the premises hereinafter stated, does hereby hire the undersigned individuals up to May 1, 1894, from the date of this contract, and no longer, to mine coal in the mine of said company, at Leavenworth, Kas.

The said individuals are to receive, for their services for the coal so mined by each of them, pay at the rate of 4 cents per bushel for screened coal during such time; the coal thus mined to be passed over a screen with 1 inch mesh, 6 feet wide and 12 feet long. And the said parties of the second part are to receive no pay for or because of the coal passing through such screen, and the said 4 cents per bushel for such coal so passing over said screen, as aforesaid, is to be their full pay and compensation. And said persons so mining coal, as aforesaid, shall be paid at such rate for their services every two weeks by the said company, at its office at said mine.

And the said parties of the second part hereby bind and obligate themselves to mine coal during said time from this date, and agree to conduct themselves, in all respects, in a proper and orderly manner, and to do no injury to the said mine or any of the property of the said party of the first part.

WITNESS our hands and seals, this _____ day of August, A. D. 1893.

THE LEAVENWORTH COAL COMPANY.

By _____, President.



By the 1st of September, all the miners of Cherokee, Crawford and Leavenworth counties had resumed work, except those who had taken a prominent part in the suspension. Those men were refused employment by the companies which formerly employed them. In applying for work at any of the principal mines in the district, a letter of recommendation from their last employer was necessary. Failing in this, they were refused, except at the Kansas & Texas mine No. 18, the lessee of which made no discrimination. The disagreeable experience and the vanishment of accumulated gains may prove in the future a valuable lesson to both operators and miners in Kansas.

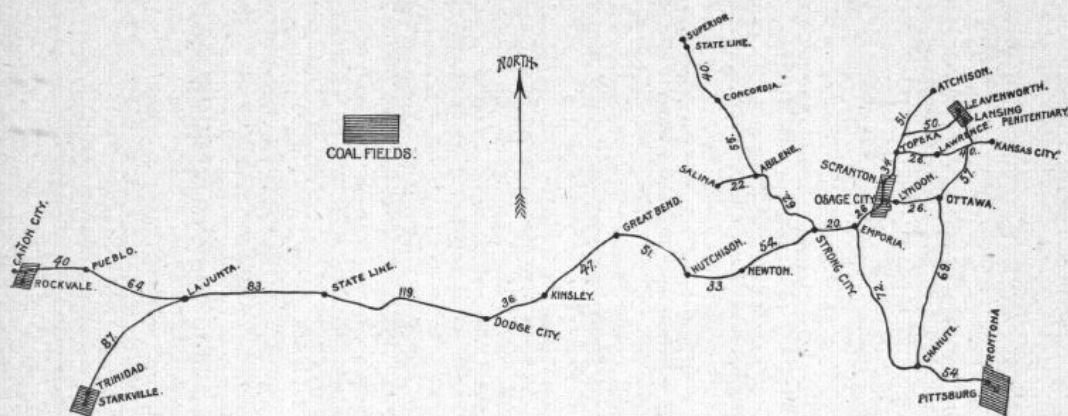
SUSPENSION IN OSAGE COUNTY COAL FIELDS.

As the principal reasons of the strike or suspension have been explained in the first part of this article, I would state that in Osage county there had not been and are not now any screens used, as the coal makes but very little slack or nut in mining. To better understand the interest taken in behalf of the miners of southern Kansas, it is necessary here to show the relations that exists between the conditions of the coal miners of southern Kansas and those of Osage county. The mines in both districts are situated along the main lines and branches of the Atchison, Topeka & Santa Fé railroad and the Missouri Pacific railway. Both roads own or are interested in mines in southern Kansas.

The Atchison, Topeka & Santa Fé railroad owns the largest amount of coal lands in Osage county, and turns out over half the amount of coal mined in the county. Nearly all the steam coal used by the Atchison, Topeka & Santa Fé railroad in the eastern part of Kansas, which contains two-thirds and more of its population, is taken from the mines in Cherokee, Crawford, and Osage counties. Some part of the supplies of the Missouri Pacific comes from the southern Kansas fields. The Santa Fé Railroad Company also owns the majority of the coal mines near Cañon City, Colo., and around Trinidad, Colo., and others in Missouri, New Mexico, and elsewhere. The Missouri Pacific Railway Company operates coal mines at Rich Hill, Minden, and other places in Missouri, also some in Arkansas and other states.

In the consumption of Osage county coal, in the past, nearly one-half has been used for railroad purposes. This portion is furnished by the coal companies organized as auxiliary to the railroad corporations only, the independent coal operators not being permitted any share of that trade, while the railroad coal companies do not confine themselves to mining coal for railroad use only, but enter largely into the competition for the commercial, manufacturing and smelting trade.

The railroad companies being thus in the position of both producer and consumer, their interests are different from those of the independent coal operator. A reduction of the price paid for mining is to them not only a



THE COAL FIELDS OF THE SANTA FE SYSTEM IN KANSAS AND EASTERN COLORADO.

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means of meeting competition of coals of other coal fields in the commercial market at an unchanged operator's margin, but it means at once a great direct saving in the fuel bill of the road. This saving is, owing to the large amount of coal used by the railroads, a greater object, by far, than the mere gain from increased local sales. In fact, to accomplish any such saving, the railroads can afford to sell much commercial coal at a loss, and thus, by depressing prices in the commercial market, force a reduction in miner's wages to correspond thereto; as an example, take the fuel bill of the Atchison, Topeka & Santa Fé Railroad Company, in the year 1892, which amounted to \$1,645,097.01 for locomotive use alone; adding thereto the cost of coal used in cars, depots, offices, shops, pumping stations, etc., the total fuel bill of the road will exceed \$2,000,000. At \$2 per ton, which is probably above the cost of the coal at the mines, taken altogether, the road used 1,000,000 tons of coal. A reduction of the mining price of 10 cents per ton only means a saving of \$100,000 per year to the one railroad system—the Santa Fé alone. A reduction in the selling price of commercial coal to a point forcing the independent operator to work at a loss will, therefore, compel him to turn upon the only party left on which to recoup himself. He must bring his pressure to bear upon the weakest point. He must force the miner to accept smaller and smaller wages, and, doing this, still strengthen his real antagonist.


There is still another point to be considered, viz., that of transportation charges. The freight rate is, in the coal business, in most cases, the factor next in importance to cost of coal at mines. In some cases, where the point of consumption is remote from the mines, it even becomes the most important factor. The power of naming the rate for transportation of coal is, under our present laws, lodged in the railroad companies. The railroads make such rates as will be of most advantage to their auxiliaries, the railroad coal companies. They have adjusted transportation charges so as to bring coal fields into close and unnecessary competition in many markets. Their own companies are practically unaffected by the loss to any particular coal field of any especial market. Their loss in one locality is balanced by a corresponding gain in the other, while the independent operator, losing for the time being his entire market by a small change in the rates, or prices, is driven to the wall.


The diagram on page 130 presents a view of the location of the four principal coal fields on the Atchison, Topeka & Santa Fé system, together with the distance to the principal towns where these coals compete, the Santa Fé system being taken as an illustration, since it carries to market about 90 per cent. of all the coal mined in Osage county. The following schedule of actual coal freight rates and distances will illustrate this point.



To 	LYNDON.			TOPEKA.			ATCHISON.		
	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....
Osage City.....	9	\$0 50	5.55	34	\$0 60	1.76	85	\$0 65	.76
Scranton.....	22	50	2.27	21	60	2.86	72	65	.90
Frontenac.....	145	1 30	.90	177	1 40	.79	234	1 00	.45
Trinidad and Starkville, Colo.....	559	3 90	.70	584	3 90	.67	634	4 40	.69
Cañon City, Colo.....	583	4 00	.69	608	4 00	.66	659	4 50	.68

To 	KANSAS CITY.			OTTAWA.			EMPORIA.		
	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....
Osage City.....	92	\$0 65	.71	35	\$0 65	1.86	26	\$0 60	2.31
Scranton.....	88	65	.74	48	65	1.35	39	60	1.54
Frontenac.....	181	80	.44	119	80	.67	126	1 50	1.19
Trinidad and Starkville, Colo.....	650	4 40	.68	585	3 90	.67	524	3 90	.74
Cañon City, Colo.....	675	4 50	.67	615	4 00	.65	549	4 00	.73

To 	NEWTON.			HUTCHINSON.			ABILENE.		
	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....
Osage City.....	100	\$1 20	1.20	133	\$1 40	1.05	109	\$1 30	1.19
Scranton.....	113	1 20	1.06	146	1 40	.96	122	1 30	1.07
Frontenac.....	200	1 90	.95	233	2 00	.86	208	2 00	.96
Trinidad and Starkville, Colo.....	450	3 90	.87	417	3 80	.92	566	3 90	.69
Cañon City, Colo.....	475	3 60	.76	442	3 60	.82	591	3 60	.61

To 	SALINA.			CONCORDIA.			SUPERIOR, NEB.		
	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....	Miles.....	Rate per ton.....	Rate per ton per mile, in cents.....
Osage City.....	131	\$1 30	1.00	164	\$1 60	.98	204	\$2 00	.98
Scranton.....	144	1 30	.90	177	1 60	.90	217	2 00	.92
Frontenac.....	230	2 00	.87	263	2 20	.84	303	2 40	.79
Trinidad and Starkville, Colo.....	588	3 90	.66	621	3 90	.63	661	4 00	.61
Cañon City, Colo.....	613	3 60	.59	646	4 00	.62	686	4 00	.58

As will be seen, the coal freight rate per ton per mile from Osage county points to all the principal markets of Kansas is far in excess of the coal freight rate from southern Kansas or Colorado. This goes to such an extent that southern Kansas coal is shipped in actual competition with Osage county coal into Lyndon, the county seat of Osage county, situated but nine



miles east of Osage City, just outside of the limits of the Osage county coal fields. Nature has granted an advantage to the southern Kansas coal field, which should make it the paramount and controlling influence in its proper market; but the power which makes freight rates establishes them in such manner that its coal encroaches upon the natural market of other fields.

The system of decreasing rapidly the rate per ton per mile charged in transportation is largely responsible for this condition of affairs. The rate to Lyndon, in Osage county, is one of the clearest points in view. It is, from Osage City, 5.55 cents per ton per mile; from Scranton, 2.27 cents; from Frontenac, .90 cent; from Trinidad, Colo., .71 cent; from Cañon City, Colo., .69 cent. Scranton, located within only 21 miles of Topeka, pays 2.86 cents per ton per mile, while the rate to that point from Frontenac is but .79 cent, and from Colorado points, .67 cent and .66 cent; and so in central Kansas.

Kansas coal fields, which ought to, from their nearness, supply the market of that territory, are charged a rate of freight that does not correspond with those charged Colorado coals. As an instance, Cañon City coal is hauled for \$3.60 a ton to Raymond, on the main line of the Santa Fé, then east to Strong City, 117 miles, and then north to Salina, 84 miles, being a total haul of 201 miles, without any charge whatever. The total raise of freight rate for hauling one ton of Cañon City coal from Dodge City across two-thirds of the state to Topeka, 302 miles in distance, is but 50 cents per ton, while Osage City is charged that exact sum—50 cents—to get a ton of it hauled to Lyndon, nine miles distant. Trinidad, Colo., coal is hauled to Burrton, on the main line of the Santa Fé, for \$3.20 per ton, thence east to Strong City, thence north across the state to Superior, Neb., a distance of 219 miles, without any additional charge whatever, while Osage City to Superior, only 204 miles, is charged \$2 per ton, and Frontenac, 303 miles distant, pays \$2.40 per ton. This haul from Frontenac to Superior, Neb., at \$2.40 per ton, is exactly like in distance to the haul of Cañon City coal from Dodge City to Topeka, quoted above, at a charge of only 50 cents per ton. Like comparisons might also be easily made with rates charged on coal from Wyoming, Iowa, Illinois, Missouri, Arkansas and Indian Territory coal points. It can be easily seen by these comparisons that the system of permitting corporations to make coal rates not based upon distance is the cause of much discrimination and its attendant evils.

Our railroads can raise or lower the price of coal in any given town. This often does give one mining point an improper encouragement to go out of its legitimate market and compete for the trade of points really within the natural reach of some other mining points, which latter, not having the benefit of such rebate, are often shut out of their proper markets. As a remedy, I would suggest a law making a specific rate per ton per mile on coal, regardless of distance hauled, just as our passenger-rate law makes no difference whether a passenger travels 5 or 500 miles. This rate, under the



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law, should be inflexible, allowing no deviations either above or below the lawful standard. This, then, was the condition of the coal market in the spring of 1893. A reduction in the mining price in southern Kansas clearly threatened not only a corresponding reduction of the mining price in Osage county, but, till the inevitable adjustment, it threatened also the loss of a large part of the legitimate trade of Osage county, and a corresponding period of slack work and small pay; and the very threat of the impending reduction in the mining price wore a dark and dismal aspect to the miners of Osage county. Were these reductions never to end? From the opening of the mines, these reductions had come periodically. The scale of prices, with but one, and that but temporary, exception, showed lower and lower range. The mining price early in 1873 was 11 cents per bushel, equaling a rate of \$2.75 per ton, which gradually sank to the present average, \$1.35 per ton—a reduction of \$1.40 per ton in 20 years. When and where were these reductions to stop? It was in this strain that the miners discussed the situation and the news and reports from southern Kansas.

The coal miners of Osage county heretofore have conducted their common business in the following way: Each shaft or mine selects one delegate. Whenever any question of common concern comes up for consideration, the mine delegates are instructed by the mine meeting as to the action required. The delegates agree upon a course to be pursued. This course is then referred back to the mine meeting, and, if then approved, will be carried into execution by an executive board of three, selected by the delegates.

It was in this manner that the proposition to aid the miners of Crawford and Cherokee counties by a suspension of work was formally discussed, and the formal decision finally rendered upon the result of a vote. In this vote each miner was given a slip of paper whereon the words "For a suspension" and "Against a suspension" were printed, on separate halves, the miner tearing off one-half, and voting according to his view. The vote showed an overwhelming sentiment in favor of a suspension.

The general feeling was so strong that, in Osage City, out of some 600 miners, only 22 ballots were cast opposing a suspension of work. One of the remarkable features of this strike was that the sentiment of the merchants and business men of the community was with the miners. Never before in the history of Osage City had a strike or suspension been popular.

Many expressed their sympathy by large donations to tide through some of the poorest of the men.

On June 7, the men cleaned up their places, and after that day all work ceased in all the mines of Osage county. There were no disturbances whatever in Osage county at any time during the continuance of the strike or suspension.

The coal is but 12 to 20 inches thick, and barely anything but coal is taken from the rooms; so that new men, owing to the very limited space in which the Osage county miners work, even if experienced coal miners, can-

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not make much progress for a considerable length of time. That is probably the reason why no effort was made by any of the companies to replace the men with men from elsewhere. The strikers spent their time working their gardens, discussing the situation, and watching the train loads of coal coming from Missouri and Illinois and from the Kansas Penitentiary, passing through to supply the railroads and other consumers. The fact that the Penitentiary shaft, owned by the people of the state, of whom the miners are a part, assisted materially in supplying the market and neutralizing the efforts of the striking, free miners, seemed to excite a great deal of comment.

The subject of the contracts under which the Penitentiary coal is sold was largely discussed in the meetings of the miners' organizations. This subject had been a great source of grievance to the miner in the past. He does not object that the convicts should work; he does not even particularly object that the convict should dig coal; nor does he object to the convict-mined coal being supplied to the state institutions; but he does object to the system of selling the product under contract, or otherwise, without the quantity being based on legitimate needs and the price based upon the cost and selling price of like coal produced by free miners. He objects to coal being produced by convicts, who do not provide for wife and family, do not educate their children, nor pay any tax, being sold in disregard of the cost and selling price of other coal, because competition of that kind must reduce his wages to the standard of the convict, eventually making a convict of himself. It is impossible for miners, or any other craft, to receive a just remuneration for their labor when forced to compete with convict labor in the market.

In my opinion, the convict should receive pay for every bushel mined at the same rate as that paid the free miner of Leavenworth, charging him for board and clothing; and the necessary cost of operating the mine be charged to the management. If other coal companies can operate their mines profitably, why not the great state of Kansas? If the convicts were paid as the free miners are, they could contribute to the support of their fathers, mothers, wives, or families, who may have been left destitute in some other part of the country, where, in many cases, the district or county has to levy an additional tax for their support. If the convict had no one depending upon his support, at the expiration of his term he could engage in some legitimate business, probably, with his little savings. Instead, he is turned loose, with no visible means of support, and branded as a convict, whose reputation and character are scarcely worth considering; and, thus disheartened, he becomes reckless, and soon finds himself on the way to some other institution or place of punishment similar to the one from which he had been dismissed.

The Penitentiary or state mine should be governed by some similar plans to those laid before the mining committee of the Kansas house of represent-



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atives of 1891 by four mine experts, viz.: Messrs. John Gray, of Osage City; Hugh Bone, of Chicopee; Robert Gilmore, of Scammon; and A. S. Glasgow, of Leavenworth, appointed by that body in response to the following memorial:

The Osage City Citizens' Alliance to the Kansas Legislature, regarding the Leavenworth Convict Coal Shaft.

The Citizens' Alliance of Osage City, composed largely of miners and persons connected with coal mines, respectfully directs the attention of your honorable body to the statement of the workings of the State Penitentiary, as shown in the governor's message, and to the effect the present system of working the convict coal shaft has upon the mining industry and upon the welfare of the miners of the state.

There were in the two years reported upon, on an average, 876 convicts worked in the Penitentiary. During that period there was received in cash \$209,125.59. Besides this, there were made certain improvements within the Penitentiary, and coal furnished to state institutions, amounting to (all told) \$95,966.16. Total earnings of 876 prisoners in two years, \$305,092.75; or an average of \$348.28 per prisoner for two years' work; or \$174.14 per year; or \$14.51 per month. The message shows also that during that period there was an output of 3,405,231 bushels of coal, and sales of same to the amount of \$134,598.43.

From the facts so stated in the governor's message, we deduct the following: The state receives from the work done by the convicts only \$14.51 per month, or less than one-half what the work of ordinary free laborers—mechanics, clerks, or coal miners—is worth. The plant of the Penitentiary has been furnished by taxes raised from the citizens of the state. There is no interest account accruing to take away part of the revenue of the business done. The supplies furnished for the maintenance of the prisoners are bought at wholesale, and should be therefore gotten at a less rate than those used by private people. Any private business man operating a business of a magnitude equal to the Penitentiary, should it be in like circumstances—that is, free from taxes and interest—be enabled to make large profits, while the business done by the present management shows a loss, that has to be made up by taxation. Anyone acquainted with the management of mines must be convinced that there must be gross extravagance, mismanagement, incompetency, or worse, in the operation of that concern; and those can be found who would operate 800 men (in no position to strike, or refuse to work in unpleasant places) and realize out of the product sufficient to turn over \$100,000 annually to the state, after paying all expense and keeping up necessary improvements. There is a worse feature attached to the operation of the convict coal shaft: the coal produced by men for whose work the state, under the present system, receives only \$14.51 per month, is sold to contractors at a price away below its actual value, and is sold in competition with coal mined by free, honest labor of men who are compelled out of the proceeds of their labor to provide for their families, educate their children, and pay taxes to the state. Especially is this competition felt in the summer, or when, as in the three years past, there is a mild winter. During these times the ordinary consumption of coal is small, and the earnings of the miners are then very light. The free miners eke out their scant earnings resulting from two or three days' of mine work a week by gardening, or doing odd work around the mining community; but the work of the convict miner, done under compulsion, goes on every day, until the coal forced on an unwilling market demoralizes and breaks down the market and mining price even of such scant demand as may remain. A plain illustration of these facts is now to be seen in the strike of the free miners of one of the coal companies



of Leavenworth. These miners are now, in midwinter, on a strike against a reduction of the mining price, and it is alleged that the company these men are working for is, if not composed of the same men who hold the contract for the Penitentiary coal, at least so intimately connected with them that they can use the Penitentiary coal to supply their trade. This of course means that so many free coal miners shall be gradually, or at once, brought down in earnings to the level of the convicts, *i. e.*, \$14.51 per month; or, in other words, to be brought into a condition where it would be far better for them to become thieves and convicts, rather than be free, honest, self-sustaining workmen.

In view of these facts, we think it little short of criminal to ask to put the convict shaft into a still better position to produce yet more coal; to call for an appropriation for better underground haulage, electric lights, etc. If it be the object of the state to use the work of the convicts for the purpose of getting revenue only, then its present management has made a woeful failure of it; if it be the object of the plant to provide work for the convicts, and prevent them from spending their days in idleness, then there is a plain inconsistency in the demand for more and better labor-saving machinery. It looks like an attempt to ease the toil of the convict and at the same time place an additional burden upon the free miner. Even now, where the free miner has to do from \$30 to \$40 worth of work per month to maintain his family, the convict is allowed to get off with \$14.51 worth. Upon these reasons we base the following request:

First. That the legislature appoint a committee of four experienced and practical miners, one each from Osage, Leavenworth, Cherokee and Crawford counties, to investigate the workings of the Leavenworth convict shaft, and report their findings to the legislature.

Second. That the legislature withhold from said convict shaft its appropriation until after a consideration of the report of said committee.

The following is the report of the committee appointed to investigate the Penitentiary coal shaft:

To P. H. Dolan, Chairman of House Committee on Mines and Mining of the Legislature of the State of Kansas, year 1891:

Your subcommittee of experts appointed to accompany your honorable committee to Leavenworth, to make certain investigations concerning the workings, management and condition of the state mines at that place, beg leave to make the following report and recommendations:

As to the mechanical arrangement of the shaft, we have been able, in the short time permitted, to visit and inspect only a portion of the Penitentiary mines. That portion we find in a first-class condition. We find ample opening in the coal now owned and leased by the state to employ from 250 to 500 men for years to come. We find that there are three veins of coal beneath the one now in operation, of greater thickness, which would give over 100 years' work at the present output of the mine.

We therefore recommend that no appropriation be granted; neither for the purchase of more coal territory, nor for the purchase of cables or electric motors, or any improved system of machinery of underground haulings, or light, to assist in the increase of the production of coal. There is ample surplus of labor employed to do all the necessary work of hauling, and labor at 53 cents per day is cheaper than the wear and interest upon the cost of additional machinery. We find the machinery for screening and cleaning of coal in excess of anything we know in that district. The coal is prepared with so much more expenditure of machinery and



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labor that it becomes superior, and more valuable in the markets—fully 25 cents per ton.

There is at present practically no system of accounting for all the coal mined. We recommend that a scale be put on the mine. Every box of coal hoisted should be weighed according to such scale, and what is called the weigh sheet should be kept, giving each convict miner a number, and showing the accurate amount of coal mined by him. This quantity should tally daily, weekly, monthly and yearly with the amount of coal sold and used in the Penitentiary. These weigh sheets should be in the possession of the superintendent, to form a check against any waste or loss of coal.

As to the cost and distribution of the coal, we find, from the evidence of practical men adduced at the investigation, that the product of the convict laborer, under the present contract system, is forced upon the market in disastrous competition to free labor and free business, and should be abolished. We are satisfied that the mine owners in Leavenworth are damaged, and also the coal miners, on account of the coal being sold, by contract, at a less price than at which it can be produced by free labor, and that the state is losing money by the transaction. If a check weighman was appointed at each coal shaft, and the coal miners were paid for all the coal they mine, and the present mine owners had to compete with the Penitentiary mine at the present price, it would close every mine in the city of Leavenworth.

The parties who suffer most by the present manner in which the state coal is sold are the coal miners. They are paid 4 cents per bushel for mining, but they only receive this amount for what passes over the screens, and as 25 per cent. passes through the screens, their price is reduced to 3 cents per bushel, so that a coal miner has to dig 50 bushels of coal in a day to make \$1.50. Seeing that they have only three days a week, according to present arrangement, if a coal miner wants to be well cared for, and have a comfortable home, he must commit some act against the law, for which he will be sent to the Penitentiary.

It is true that the state of Kansas has a very good property in the state coal mine—too valuable, in fact, to be set aside—and we believe men who commit crime and are sent to the Penitentiary ought to be compelled to work. We make the following suggestions, which would provide the convicts with work, keep them from competing with the coal miners of the state, and would distribute the benefits of the state mines throughout the state: Let all the institutions be supplied with coal; let every courthouse in the state be supplied, and also every country schoolhouse; then let the balance be divided in equal proportions by taxation or population in every county in the state, and supplied at cost price by the county commissioners to the poor people in such county.

If the above, in your judgment, is not advisable, we recommend that at the expiration of the present contract the state by law empower and authorize the superintendent to sell the surplus coal, after supplying the state institutions, at not less than the cost of same, computed on the following basis:

First. The management shall be charged for each and every bushel of coal mined by each convict at the same price as is paid per bushel to the free miner in the Leavenworth district.

Second. The management shall be charged with all the dead work, yardage, and day work, to be estimated by the superintendent, at prices to equal prices paid free miners for like work in that district.

Third. To the above shall be added the cost of all material used in the operation of the shaft, interest on the investment, cost on the shaft, and 6 per cent. on \$1,500; 2 per cent. of the cost of the shaft as a sinking fund to replace the same; a royalty of not less than 2 mills per bushel for all coal mined, computing the cost of the coal



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as above recommended; the superintendent shall sell the coal at not less than cost. We think that with the superior equipments of the convict shaft, and the further advantages of being at all times able to command the services of a large number of men, it will be no difficult matter for the superintendent to dispose of the coal without loss, and even to an advantage to the state. Respectfully submitted.

JOHN GRAY, Osage City.
HUGH BONE, Chicopee.
ROBERT GILMORE, Seammon.
A. S. GLASGOW, Leavenworth.

The total number of men idle, because of the strike, was something near 1,300. They were idle from June 7 to August 21—about ten weeks. This may seem a heavy loss to the men, and to the community of Osage county; but that loss was more apparent than real, as the average work during these (the summer) months for years past, I am informed, had rarely exceeded \$2 per week to the average miner. In fact, some of Osage City's merchants claim, that at the expiration of the strike the men, as a rule, were no worse off—rather better, if anything—than usually, at that period of the year. They claim that the miners, not being able to foresee the duration of the strike, and being determined to carry it through, as long as southern Kansas stood, used extraordinary economy in their domestic arrangements. They say that families who usually buy from \$12 to \$15 worth of groceries per month got along with from \$3 to \$4 worth, and so made up for the loss of work.

That the strike was not a success is well known. Various causes have been assigned therefor. But it must be said, that under the conditions which developed during the summer, and principally after its inauguration, a successful issue seems to have been impossible. It was during the early part of the strike that the English government, in demonetizing silver in India, brought about the rapid fall in the price of silver, which closed hundreds of mines in Colorado, and throwing thousands of silver miners out of employment.

The general commercial panic and depression immediately following added thousands of idle men, to fill, from other mines, the demands of the legitimate market of the Kansas mines; and at the same time, by closing numberless factories and ore mines, East and West, largely curtailed the consumptive needs for coal. When it became known that the miners of southern Kansas had made arrangements to go back to work, the executive board of the Osage county miners called meetings over the county, and, upon a favorable ballot, the men agreed to resume work. All the companies who are independent of the Atchison, Topeka & Santa Fé Railroad Company opened their mines at once, and set as many of the men at work as they could conveniently find room for. The Osage Carbon Company did not open its mines at Osage City until October 25; at Scranton, the same company resumed operation January 1, 1894, enforcing a reduction of the mining price paid of 25 cents per ton at the same time, which the Scranton men were forced to accept. This reduction, being a direct effect of the



reductions offered in southern Kansas, and of the conditions cited before, has since become general in Osage county, as the miners of the other companies in Scranton and Burlingame had to follow; and the miners of Osage City and Peterton have since been forced to accept a reduction of about 25 cents per ton.



DUST EXPLOSIONS.

Numerous dust explosions have been reported recently from Colorado, Missouri, and the Indian Territory, and the same may be said of Kansas. Almost universally they have been caused by "windy shots"—that is, shots which have failed to break coal, because the charge was too light, or the direction was badly chosen, expending their energies on the atmosphere. Great skill in boring and loading will prevent such accidents.

Occasionally explosions have been traced to the second shot, which dislodged the coal, and which was claimed to have been the instigation of such explosions. This is accounted for by the fact that the windy shot had agitated the air and dust, and heated the surroundings. These conditions render the ensuing explosions possible.

The removal of the dust from the entire mine is evidently impossible. Sprinkling settles the dust and reduces the danger of explosion. But it must be remembered that it is not the dust of the traveling ways which is dangerous, but the dust produced at the working faces. The sprinkling should, therefore, be practiced at the face and not in the roadways. Discussions on this subject will be found in the *Journal of the Illinois Institute*, vol. II, and in the *Colliery Manager*, vol. IX.

In addition to a clearly written article by Wm. Giles, the above-mentioned journal contains a particularly instructive one, by George S. Rice, upon the Pekay mine explosion, which evidently is believed to have been caused by the dust and merely incidentally by powder. The following will explain the danger of coal dust in mines:

COAL DUST IN MINES.—IMPORTANT EXPERIMENTS ON ITS EXPLOSIVE PROPERTIES.—AN ABSTRACT OF THE METHOD ADOPTED TO CARRY OUT THE WORK, AND THE RESULTS OF THE EXPERIMENTS.

[From the *Colliery Guardian*.]

Mr. Henry Hall, inspector of mines for the west Lancashire district, England, at the suggestion of the royal commission on explosions from coal dust in mines, undertook a series of experiments on dusts collected from the principal seams in the respective mining districts. Each separate dust was to be tested as to its liability to explosion in the same way as had already been done with certain Lancashire dusts.

In order to keep the experiments within practicable bounds, and, at the same time, to insure their being sufficiently extensive and inclusive to be decisive of the characteristics of the dusts which accumulate in and about the roadways of mines in the various coal fields of Great Britain, it was necessary to fix a limit to the number of samples to be tested, and with that object, the following code of instructions was drawn up for the guidance of those who were kind enough, at the request of the respective inspectors, to undertake the collection of the samples:

(1) "The dust selected should be that found lodged on the timbering, or on ledges underground, or on ledges above the screens on the surface. The dust should

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be gathered by the hands, and not by the shovel, and should be put in bags holding each about an hundred weight. Each separate bag should be placed in a deal box, tongued and grooved, and placed in a dry place, at least as warm as the spot whence the dust was taken.

(2) "There must be at least 5 cwt. of any particular variety of dust collected and forwarded, to insure a fair test of its liability to explosion.

(3) "It is impracticable to test more than four samples from any inspection district, consisting of about 5 cwt. of each variety.

(4) It is imperative that the dust be fine and dry, and it is suggested that one of the samples should be from the seam of the district bearing the character of being most liable to colliery explosions, and one should be from the seam considered most safe. Each box should bear a small label, in addition to the address label, giving the following particulars: Weight of dust in hundred weights and pounds, name of coal seam, name of colliery, quality of coal, where and by what means collected, whether from underground or from screens.

(5) "The boxes containing the bags of dust should be forwarded by rail or a covered wagon, and each box should be labeled on the outside as follows: 'Experimental coal dust; to be kept dry, and immediate delivery,' etc."

The samples of dust were all received in excellent order, some having been gathered from the ledges and timbers underground, others from the underground roads, and others again from the timbers over the screens on the surface. In a few cases the dust had been passed through a fine riddle, but there were enough samples in what may be called the raw state, from underground roads, to insure that the results of the experiments did not depend on any unusual or artificial conditions. Whatever care and labor may be bestowed on the collection of samples underground, it is, Mr. Hall thinks, impossible that the sample should be as fine and dry as that floated in the ventilation of a mine and lodged on the timbers about the roof, and on all uneven or projecting surfaces underground, from which dust is always ready to be lifted and thrown into the air current by any violent rush of air, such as might occur through a blasting shot blowing out, or in consequence of the ignition of a small body of fire damp.

The samples received for experimental purposes numbered in all 52, coming from 45 different collieries and from 36 separate seams; and, with the exception of four or five samples, all were tested. Mr. Hall details in tabular form the results of all the experiments. It is impossible to reproduce the whole of them, but we give the particulars relating to the fine experimental dusts, of which analyses are given at the end of this report.

The mine shaft placed at Mr. Hall's disposal by the proprietors of White Mass Colliery, Skelmersdale, is the same shaft in which he has made many similar experiments. It is 50 yards deep, 7 feet diameter; struts of timber 6 feet long and 7 inches broad are fixed from top to bottom of the shaft at intervals of 6 feet, to represent the timbering of an underground roadway. The ventilation of the shaft is secured by means of a small fan on the surface, driven by hand, and forcing fresh air to the bottom through 10-inch iron tubes. The tubes reach to within 5 feet of the bottom, and the quantity of air passed is about 750 cubic feet per minute. A wrought-iron cannon was used for the gunpowder shots. It measures 2 feet 11 inches in length, with a bore hole 2 inches in diameter and 2 feet deep, and it was charged in every case with 1½ pounds of ordinary blasting powder, tamped lightly with coal dust. The tamping occupied a space of about 12 inches. The cannon was always charged on the surface, and lowered by means of a rope to the bottom, and fired in an upright position near the center of the shaft by means of a detonator in connection with an electrical machine.



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<i>Colliery from which dust was collected.</i>	<i>Name of seam.</i>	<i>Condition of dust.</i>	<i>How collected, and whether from underground or screens.</i>	<i>Weight of dust used in experiment.</i>	<i>Weight of explosive used.</i>	<i>Dust in suspension, or at rest.</i>	<i>Interval between putting in dust and firing shot.</i> Min. Sec.	<i>Result.</i>
Lightmoor (Gloucestershire).	Rocky.	Fine, but brown.	Collected from main haulage roads underground.	2 cwt.	1½ lb. G. P.	In suspension.	2 0	No explosion, charring 11 yards.
"	"	"	"	1½ cwt.	1½ lb. G. P.	"	3 0	No explosion, charring 11 yards.
"	"	"	"	None added.	1½ lb. G. P.	At rest.	30 0	No explosion or charring.
"	"	"	"	1½ cwt.	1½ lb. G. P.	In suspension.	1 30	No explosion, charring 6 yards.
"	"	"	"	2 cwt.	1½ lb. G. P.	"	3 0	No explosion, charring 20 yards.
"	"	"	"	2 cwt.	1½ lb. G. P.	"	3 0	No explosion, charring 26 yards.
Clifton Hall (Lancashire).	Trencherbone.	Fine and black.	Collected from screens.	1½ cwt.	8 oz. Roburite.	In suspension.	2 0	No explosion or charring. NOTE.—Roburite.
"	"	"	"	1½ cwt.	1½ lb. G. P.	"	2 0	Most violent explosion, and flame 50 or 60 ft. above pit top.
"	"	Very gray and heavy, mostly metal dust.	Collected a mile underground.	1½ cwt.	1½ lb. G. P.	"	4 30	No explosion, slight charring.
"	"	Fine and black.	Collected from screens.	1½ cwt.	1½ lb. G. P.	"	3 0	Very violent explosion, and flame 50 feet above pit top. Shot fired from iron tube.
Albion (Glamorganshire).	Merthyr or Aberdare 4 ft.	Fine and black.	Collected by hand underground.	2 cwt.	1½ lb. G. P.	In suspension.	1 30	Most violent explosion, and flame 50 ft. above pit top.
"	"	"	"	1½ cwt.	8 oz. Roburite.	"	1 30	No explosion or charring. NOTE.—Roburite.
"	"	"	"	None added.	1½ lb. G. P.	At rest.	15 0	Most violent explosion, and flame 50 ft. above pit top.
"	"	"	"	1½ cwt.	1½ lb. G. P.	"	18 0	Most violent explosion yet recorded, and flame 50 ft. above pit top.

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Coalery from which dust was collected.	Name of seam.	Condition of dust.	How collected, and whether from underground or screens.	Weight of dust used in experiment.	Weight of explosive used.	Dust in suspension, or at rest.	Interval between putting in dust and firing shot. Min. Sec.	Result.
Albion (Glamorganshire).	Merthyr or Aberdare 4 ft.	Fine and black.	Collected from screens.	2 cwt.	1½ lb. G. P.	In suspension.	3 0	Very violent explosion, and flame 60 ft. above pit top (tamped with clay).
"	"	"	Collected underground.	2 cwt.	1½ lb. G. P.	At rest.	30 0	Very violent explosion, and flame 60 ft. above pit top.
"	"	"	"	None added.	1½ lb. G. P.	"	45 0	Explosion, and flame 15 ft. above pit top. NOTE.—No dust put in after last explosion.
Barrwood & Hough (West Scotland).	Kilsyth.	Fine, but brown.	Collected from ledges in return air roads underground.	2 cwt.	1½ lb. G. P.	At rest.	15 0	Most violent explosion, and flame 60 ft. above pit top.
"	"	Fine and black.	Collected at a coal crusher on surface.	1½ cwt.	1½ lb. G. P.	"	16 1	Most violent explosion, and flame 60 ft. above pit top.
"	"	"	"	1½ cwt.	2 lb. G. P.	In suspension.	3 0	Most violent explosion, and flame 50 ft. above pit top.
Beamish (Durham).	Busty.	Fine and black.	From screens.	2 cwt.	1½ lb. G. P.	In suspension.	3 0	Very violent explosion, and flame 60 ft. above pit top; also spreading horizontally about 12 yards.
"	"	"	"	2 cwt.	1½ lb. G. P.	"	3 0	Very violent explosion, and flame 60 ft. above pit top; also spreading about 10 yards horizontally. NOTE.—Gun not tamped with clay instead of coal dust.
"	"	"	"	None added.	1½ lb. G. P.	At rest.	20 0	Violent explosion, and flame 30 ft. above pit top. NOTE.—No dust put in after last explosion.



The amount of charge of gunpowder used in the experiment ($1\frac{1}{2}$ pounds) was fixed upon as being likely to develop a similar flame to that produced by the accidental ignition of a small quantity of fire damp in a mine. The charge is somewhat heavier than an average mine shot, but in consequence of the tamping being placed loosely upon the explosive and not being rammed home, the shock and violence of the explosion is very inconsiderable, as compared with an average mine shot, where the tamping is always rammed home and beaten solid.

Mine shots in the West Lancashire inspection district, and used in strong coal, amount to as much as 20 ounces, or even more, and by reference to the earliest series of these experiments it will be seen that coal-dust explosions resulted from the firing of charges of one pound of gunpowder.

The experiments were commenced on each day by firing two-pound charges of gunpowder without dust, so that the onlookers might be better able to judge of the part played by dust in the subsequent tests.

When a high explosive was used, it was fired from an iron tube tamped with coal dust, as it was feared the cannon would not bear the shock. In a few cases, in order to make the tests of gunpowder and the high explosives precisely the same, the gunpowder charge was fired from an iron tube exactly similar to that used for the high explosives, and in two or three cases it will be noticed the charge was tamped with clay in place of coal dust.

The conditions under which each sample was tested were kept as nearly as possible the same in every case. Usually the sample was first tested in suspension—that is, the shot was fired with some of the dust floating in the air in the shaft. This state of things was considered most favorable to an explosion of the dust. If this experiment resulted in an explosion, then the same sample was again tested at rest—that is, an interval of 15 or 20 minutes was allowed to elapse after putting the dust down, and before firing shot; the dust having by that time settled, part on the timbers and the remainder at the bottom of the shaft, and if an explosion resulted under these conditions, the tests of that particular sample were considered complete.

Mr. Hall found by a careful collection and weighing of the dust resting on the timbers, after putting down 200 weight, that these timbers afforded a lodgment for about 80 pounds of dust, and he is of opinion that this portion only of the 200 weight put down was exploded, and gave rise to the whole of the phenomena exhibited by the explosions.

When the testing of a sample was complete, one or two what may be called "blank shots" were fired in the shaft to blow out any remnants of dust before the testing of a new sample was commenced.

The phenomena presented by these experiments as they progressed, and a careful examination of the detailed results, warrant Mr. Hall in arriving at the following conclusions:

(1.) That the flame from a blowing-out gunpowder shot in the presence of dry coal dust always ignites more or less of such dust, and so increases the burning and charring effects of the shot. This is proved by the fact that in almost every experiment which did not result in an actual explosion of dust there was nevertheless severe charring of the electric-firing cable for several yards up the shaft, whilst without dust and with a similar charge of explosive no such charring occurred.

(2.) That when a large flame, such as that of a blowing-out gunpowder shot, or the flame from the ignition of a small quantity of fire damp, traverses an atmosphere containing a very moderate quantity of dry coal dust, the dusty atmosphere will explode with great violence, and the explosion will continue on and pass through-



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out any length of such atmosphere, its violence and force increasing as it progresses. This is proved by the fact that in nearly every case where the cannon was fired whilst there was dust suspended in the atmosphere of the shaft a violent explosion followed, the force of which was evidently only beginning to be developed as it reached the top of the shaft and escaped, spending itself in the outside air, the flame in some cases attaining a height of 70 feet over the top of the shaft. It is true there were exceptions to this rule, as in the cases of the samples received from the Forest of Dean, Somerset, South Stafford (Great Fenton and West Cannock), Lancashire (Moston), and South Wales anthracite. The difference in the results from these dusts was, Mr. Hall thinks, due to some difference in the character of the coal seams in those districts. There were also partial failures with the samples from Auckland Park and Trimdon Grange (Durham), and from Talk-o'-th'-Hill, Astley, and Tyldesley, and Llanerch, but in these latter cases Mr. Hall is satisfied that a little more perseverance with the tests and a more careful collection of the samples would have resulted in explosions. (*Note.*—In the Haydock experiments, reported in 1890, the dust explosions traveled 200 yards and were evidently increasing in force and violence as they reached the top of the shaft.)

(3.) That coal dust from several seams in different districts, notably those from Glamorgan, Monmouth, Durham, Lancashire, Yorkshire, and Scotland, are almost as sensitive to explosion as gunpowder itself.

(4.) That coal dust is, as a rule, more sensitive to explosion in proportion to its high quality and freedom from impurities.

(5.) That a ready supply of oxygen, such as is supplied by a brisk ventilation, has the effect of making coal dust explosions more probable and more severe.

(6.) That certain high explosives are incapable of igniting or exploding coal dust. It will be noticed in the details of experiments that charges of Roburite, and in two or three cases ammonite, were fired without effect, but as soon as gunpowder was introduced its explosion was followed by violent dust explosions. The difference in the behavior of gunpowder as compared with the high explosives was most impressive and convincing. Of the whole of the dusts tested, that from the Albion colliery, Glamorgan (Aberdare or Merthyr four-foot seam or upper four feet), excelled all others in violence and sensitiveness to explosion, and this seam has the worst history of any in the kingdom, upwards of 1,600 lives having been lost in it by explosions since the year 1845. Indeed, throughout the experiments one could not fail to be struck by the great violence and sensitiveness to explosion exhibited by the samples received from collieries with an unfortunate history as regards explosions.

It was, Mr. Hall thinks, also evident from the experiments that the higher the quality of the coal seam the more liability there is to explosions of dust, and it is singular that the collected history of explosions in mines in past years shows that nearly all sweeping disastrous explosions have happened in seams producing the highest class of coals, such as the Durham Hutton seam, Yorkshire-Barnsley and Silkstone seams, the Lancashire Arley seam, and the South Wales Aberdare four feet and black vein.

With regard to precautionary measures to be taken in the face of these facts, Mr. Hall again urges the total abolition of gunpowder from coal mines, and the substitution of certain high explosives. Many of the largest firms in the country have already of their own motion taken this step.

Mines which are naturally of a dry and dusty character cannot be artificially damped so as to render gunpowder safe, but it is nevertheless imperative, in the absence of gunpowder, that every possible effort should be made, either by watering or removing, to avoid accumulations of dry dust, so that any accidental ignition of



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fire damp may be limited in its effects and prevented from developing into a sweeping explosion through the agency of dust.

During the last 20 years an average of 20 persons per annum, or a total of 400 lives, have been lost in the handling alone of gunpowder cartridges, that is, through accidental ignitions by stemming, drilling out, or setting it alight by candle sparks, quite apart from the part it has played in nearly all great colliery explosions. The loss of life from explosions during the past 20 years amounts to 4,098, and it will be much below the mark to say that gunpowder is accountable for 50 per cent. of these explosions, or a total death roll of 2,449 persons.

It is deserving of consideration and experiment to test whether a coal-dust explosion would be stopped in its course by a certain length of roadway being constantly kept in a wet condition. Mr. Hall thinks such a plan would not prove effective, in consequence of what may be termed the pioneering cloud of dust which precedes the flame, and also in consequence of the great explosive force developed by a coal-dust explosion. In three or four experiments, the remnants of dust left in the shaft after an explosion proved sufficient cause for a second explosion.

Below are given the tabulated results of the experiments on five samples of dust, together with analyses of these dusts, and also of the ventilation of the shaft during the progress of the experiments. The following are analyses of five samples of the experimental dusts:

	<i>Volatile.</i>	<i>Coke.</i>	<i>Ash.</i>
Lightmoor colliery. Rocky seam from underground.....	22.8	30.4	46.8
Clifton Hall colliery. Trencherbone from screens.....	20.8	68.4	10.8
Albion colliery. Four-foot seam from underground.....	14.1	80.4	5.5
Barrwood colliery. Kilayth seam from underground.....	24.7	45.7	29.6
Beamish colliery. Busty seam from screens.....	28.3	67.3	4.4

NOTE.—The dusts from underground roads contain a good deal of shale dust; hence the large quantity of ash.

The following are analyses of the ventilation of the shaft, taken during the progress of the experiments:

Oxygen.....	20.56	Nitrogen.....	79.3
Nitrogen.....	79.20	Oxygen.....	20.5
Carbon dioxide.....	0.15	Carbon dioxide.....	0.2
Sulphur dioxide.....	0.09		
	100.00		100.0

No trace of carbon dioxide or marsh gas found.



THE PHILOSOPHY OF VENTILATION.

Atmospheric air is composed of two gases, oxygen and nitrogen, with the addition of a small portion of carbonic-acid gas. Oxygen is the vital part of the atmosphere, and the supporter of ordinary combustion. It is an elastic fluid, invisible, odorless, and heavier than atmospheric air. Nitrogen is the basis of nitric acid, and the principal ingredient of atmospheric air. In the pure state, it is a colorless gas, wholly devoid of smell and taste. It was first noticed by Doctor Rutherford, in the year 1772. The air contains 23 per cent. of oxygen, and 77 per cent. of nitrogen, by weight, or 21 per cent. of the former, and 79 per cent. of the latter, by volume. Oxygen is the most abundant substance in nature, forming, besides its proportion of atmosphere, 89 per cent. of water, and fully 33 per cent. of the solid matter composing the earth. This gas is the constituent of the air upon which every form of life and light, and all organic substances, are dependent for their existence. Nitrogen will not support life nor light, and cannot even be breathed into the lungs until it has been diluted with oxygen. Neither of these gases has taste, color, or smell.

The atmosphere is a vast aerial ocean, of which the earth is the bottom. This ocean extends upward to a height of about 45 miles, growing gradually thinner in the ascending column. The bottom of the column is pressed by the air from the top downward, which squeezes and contracts it into smaller bulk, and consequently into greater density. At the height of 3½ miles, air is twice as light and elastic as at the level of the sea; and at the height of seven miles, it is four times as light; and so on until it thins out to nothing. A column of air the whole height of the atmosphere, weighs nearly a ton to the square foot; a column an inch square weighing 14.7 pounds. An ordinary-sized man sustains a weight of air of about 14 tons. The pressure of the atmosphere is equal in all directions—upward, downward, lateral, diagonal, etc. Air, in common with all gaseous bodies, is possessed of the property of inertia, which means that it cannot move when in a state of rest, until force is applied to start it and keep it in motion. Whenever the pressure becomes lessened, from whatever cause, on any side of the atmosphere, the pressure on the opposite side pushes it forward in the direction of the place where the pressure has been reduced, and the air commences moving, at a greater or less speed, in proportion to the amount of pressure that has been removed.

Air, on being heated, expands $\frac{1}{273}$ part of its volume for every degree of heat applied to it. The heated, expanded air, becoming lighter, bulk for bulk, flies upwards, while the cool, heavy air presses down to supply the



ascending column. When heat is constantly applied, there is a constant motion of the air. This is the principle of furnace ventilation in mines, still preferred by many, where the mines do not contain gas. However, it should not be preferred, as the furnace fire is often neglected by those having charge of same, and there is much danger of setting fire to the wooden structure in and near the top of the shaft, and very often the furnace or grate fires are built within a few feet and, in many places in Kansas, in the bottom of the upcast shaft.

When two shafts or other openings of the same depth are made into a mine, and the tops and bottoms of both are on the same level, there cannot be any movement of air in the mine, even if the mine air and that of the surface be of different densities, because the pressure of the atmosphere in both shafts is equal; but if one of the shafts is sunk in higher ground, and is, consequently, deeper than the other, there is always a natural motion of the air, provided the temperature of the mine and that of the surface is of different densities.

In winter, when the air of the mine is rarer and lighter than that of the surface, the current tends down the lower opening and up the higher one; and in summer these conditions are reversed, because the cooler column of air is then transferred to the higher opening. At certain seasons of the year, when the atmosphere above ground and that of the mine approach each other in density, there is again no motion, except what may be produced by the action of the cages in the shafts, the movement of the cars along the galleries of the mine, or the direction and force of the wind on the surface. In the language of the miner, "the pits fight"—the ventilating current sometimes going down one shaft or opening and in a few minutes reversing itself and going down the other. But, in such cases, it is weak, and often assumes a state of rest, which causes the miners to suspend work. The powers applied for the purpose of creating and maintaining a constant and necessary current of air in mines, when natural forces failed, used to be many and various.

In Belgium the law forbids the use of a furnace. Exhaust fans have been the favorite ventilating power in the United States since the passage of the mine-inspection law of Pennsylvania, which was enacted shortly after the disaster at the Avondale shaft, located on the bank of the Susquehanna river, four miles from Plymouth, in Luzerne county. In this catastrophe, which occurred on the morning of September 6, 1869, 110 men and boys lost their lives. It was caused by the ventilating furnace setting fire to the woodwork in the shaft.

At present, the ventilation of coal mines is almost entirely effected, in Cherokee, Crawford, Leavenworth and Linn counties, in Kansas, by ventilating fans, which is shown by tables of the various counties in this report. The other coal mines of the state, excepting those small country banks, which only work a few months in winter, are ventilated by means of a fur-



nace, applied in many places at the foot of an upcast shaft, in which an ascending current is produced by rarefaction, as in an ordinary chimney.

In many mines in the state of Kansas the mining law is very defective. The law provides for a second opening, or an escapement shaft. The superintendents and operators of mines which are ventilated by furnaces claim they are complying with the requirements of the mining law as to a second opening. Should the main shaft catch fire, or something unusual happen, which would necessitate the miners to make the upcast, or furnace shaft, the only available means of egress, what would be the result? Every intelligent miner knows it would be impossible, notwithstanding that neither stairway, ladder, windlass, or any other means by which a man could get to the surface in a case of an emergency, is accessible. In discussing the matter with a superintendent of a certain mine, he claimed his shaft was equipped according to the requirements of the law; but when I examined the escapement, the so-called ladder, rudely constructed of a few poles cut along some creek, was temporarily suspended from a crosspiece in the shaft, and hanging over a blazing furnace. On another page in my report, second openings and escapements are described more fully.

Under the mining law of Kansas, the furnace shafts constitute an escapement; which I will treat more fully under the head of recommendations. The mining laws of Kansas provide 100 cubic feet of air per minute per person in all mines where the coal strata are three feet thick or over, which shall be circulated wherever any person or persons shall be working in said mine. This is impossible where coal is mined by room-and-pillar system, unless some provisions are made by law to fill or partition break-throughs between rooms and entries.



TREATISE ON COAL MINES AND THEIR SUPERVISION.

There is no industry in which practical and theoretical knowledge is of more importance than the mining of coal, because of the great danger connected with it. Especially is this true in the shaft mines of southern and eastern Kansas, and particularly so in Leavenworth county, where the only means of egress from the dark and dismal chambers in earth's bosom depends upon hoisting engines and other necessary machinery, which should be handled by capable, practical, careful and sober engineers; and the matter of good judgment should be carefully exercised by men of knowledge and experience as to the strict attention and safety of the most important part which bears the cargo of human freight mornings and evenings, which is absolutely necessary for lowering and hoisting employes into and out of coal mines, and upon which depends, to a certain extent, the lives of those who have to descend 780 feet into the bowels of the earth, viz., the wire or steel rope.

Those who never had occasion to earn their livelihood as miners can form no conception or realization of the dangerous and hazardous occupation of the miners, as their lives depend upon chance from the time they stand upon the cage in the morning until they arrive on top again in the evening.

The difficulties to be encountered in mining are increasing. The requirements of the market are increasing also, with competition, so that management of mines requires more than ordinary ability in a boss or superintendent, who has the lives of those in charge or in his company's employment depending upon him, to a certain extent.

In the interest of safety, the mining laws of Kansas should demand that those having the care and direction of the mines should hold certificates of competency, after passing a satisfactory examination before a board of competent examiners. This board should be composed of operators and practical miners in a like number, and of one civil engineer, all of whom should be familiar with underground workings, both as to how it should be conducted and ventilated. Said board should be vested in theoretical knowledge in regard to ventilation, and have at least seven years' practical experience as to the manner and mode of working the different seams of coal, under an improved system, which would result in a gain for the company and secure the health and safety of those employed in the mines.

By doing as I have quoted, it would be the means of raising the standard of intelligence among those on whom the safety of others to any extent depends. Those whose ambition it is to become bosses, or mine foremen, are generally those who have spent their youth in mines, and whose educa-



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tion has been neglected, and, in many cases, their fathers were compelled to take them into the mines through mere necessity and hard times; therefore, the preparation necessary to face a board of examiners is to them a work of great magnitude. Your humble servant, who belongs to the mining element, has had 20 years' experience, and has acquired some knowledge as to the acquirements of the average foreman, or so-called superintendent, who should be qualified in every respect to fill the position he so presumptuously, but most ignorantly, occupies.

There are a few of these superintendents who have acquired knowledge as to how a mine should be conducted in regard to safety, and the manner in which it should be operated to result in a practical gain to the company and to the health and longevity of the miner.

We have superintendents of coal mines in Kansas who never, perhaps, in the course of their lives have seen the working face of a mine. They hire a foreman, or mine boss, to look after the mines, and the first instructions the foreman receives is to cut down expenses and get coal out as cheap as possible. If he fails to comply with these instructions, another man is soon found, who will eagerly take his predecessor's place, and who, in many instances, assumes a lofty air, because that title "pit boss" is conferred upon him.

With a determined resolution he enters the arena of a coal corporation, and, to prove his ability and qualifications beyond a doubt, his first endeavor is to show the company the practical gain which he can render them by his economy and interest in their property, and, particularly, to prove beyond a doubt that his predecessor was a worthless foreman, who did not look after the company's interest. He is everlastingly finding fault with the condition in which his predecessor left the mine, having no knowledge of the instructions by which his predecessor was governed. So he is given an opportunity to try his hand, and if it can be proven, by book accounts, that he has curtailed expenses \$200 or \$300 the first few months, he is, in all cases, preferable to his predecessor, and, to encourage him in his undertakings, his wages may be raised \$5 per month.

At whose expense does this new foreman receive a reputation and an advance of wages? At the overlaid, oppressed and persecuted miner's. In many mines, particularly in Cherokee and Crawford counties, a scheme of saving to the company is often resorted to, where so much dead work is done; the new foreman, taking advantage of the miners, by reducing in price the cutting of horsebacks, slips, and rolls, brushing of entries, and room turning, dispensing with timber men and water bailers, and reducing in number pushers and drivers, and often setting aside the most important employé in the mine, namely, the man who attends to the supervision of ventilation.

The new foreman makes a great change or show off, assuming also that he can increase the output, but in the course of time he realizes that he has