THIRD INSPECTION DISTRICT—1904.

TWENTY-FIRST ANNUAL REPORT.

Counties—Cass, Fulton, Hancock, McDonough, Menard, Peoria, Schuyler, Tazewell.

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SIR—I have the honor to submit the twenty-first annual report of coal mines located in the third inspection district. The coal producing counties of which are Cass, Fulton, Hancock, McDonough, Menard, Peoria, Schuyler and Tazewell.

The tabular part of the report gives the number of tons of coal mined; the number of kegs of powder consumed; the number of boys over 14 years of age working in the mines, also the number of miners and other employés; the number of shipping and local mines; the aggregate value of the total product at the mines; the thickness of the coal seams, with the geological number and the depth of the seams below the surface; the number of casualties, fatal and non-fatal; the number of mines, old, new and abandoned; the total tons of the different grades of coal produced and the number of days of active operation of each mine during the year.

The total number of mines reported this year is 238, of which 55 are shipping mines and 183 are local mines. The shipping mines are increased by five, being four in Fulton county and one in McDonough.

The following summary shows the prominent features to be found in the report:

Number of counties	8
Total number of mines	238
Number of shipping mines	55
Number of local mines	183
Total number employés	4,808
Number of miners	3,472
Number of other employés, underground, including boys	849
Number employed above ground	487
Number of kegs of powder used	137,937
Number of fans in the district	62
Total tons of coal produced	3,058,414
Tons of mine run	760,251
Tons of lump	1,572,778
Tons of egg	108,702
Tons of nut	179,127
Tons of pea or screenings	302,090
Tons of slack or waste	135,466
Tons of coal shipped	2,518,158
Tons sold to local trade	422,978
Tons supplied to locomotives	29,920
Tons consumed at the mines	87,358
Aggregate value of the total product	$3,832,202
Average value per ton of all grades	$1.253
Average number of days of active operation, shipping mines	220

Average price paid per ton for hand mining, mine run	$0.6067
Number of fatal accidents	16
Number of non-fatal accidents	9
Number of employés to each fatal accident	301
Number of employés to each non-fatal accident	534
Number of tons of coal to each fatal accident	191,151
Number of tons of coal to each non-fatal accident	338,824

A comparative table is presented of the product of each county in the district with the loss or gain for the years 1903 and 1904:

COUNTY.	TOTAL PRODUCT OF ALL GRADES OF COAL—TONS.		Increase.	Decrease.
	1903.	1904.		
Cass	2,807	2,780	.....	27
Fulton	1,036,496	1,284,279	247,783	.....
Hancock	11,340	12,270	930	.....
McDonough	43,394	60,574	17,180	.....
Menard	492,328	543,763	51,435	.....
Peoria	920,716	939,737	19,021	.....
Schuyler	15,734	18,400	2,666	.....
Tazewell	185,535	196,611	11,076	.....
Totals	2,708,350	3,058,414	350,091	27

Net increase ..... 350,064 tons.

All the counties in the district show an increase in tonnage over last year except Cass, which shows a very small decrease. The net increase for the district being 350,064 tons. The shipping mines have increased from 50 last year to 55 this year, and 387,376 more tons were shipped this year than last.

INSTALLATION OF ELECTRIC HAULAGE PLANTS.

The following coal companies have installed electric plants during the past year: Athens Mining Co., Athens; Howarth & Taylor, Edwards; Big Creek Coal Co., St. David; Newsam Bros., Farmington; Clark Coal & Coke Co., Peoria.

The plant of the Clark Coal & Coke Co. was installed by the Goodman Mfg. Co., and consists of a 16x16 automatic McEwen engine 175 H. P., 250 revolutions per minute, directly connected to a 100 K. W. Goodman multipolar generator, voltage 250; a single marble switch board with 300 volt voltmeter, 600 ampers ammeter, 400 I. T. E. circuit breaker, 400 ampere switch; and suitable station equipment makes this plant complete.

The haulage equipment consists of two six ton single motor locomotives, of 250 volts, and 36 inches gauge. These locomotives are equipped for double end control. This type of locomotive is provided with a single motor, the armature lies lengthwise of the frame, and is geared to both axles, thus making every wheel a driver and utilizing the entire weight of the machine for traction purposes. The use of one motor insures that both axles shall revolve at the same speed, which is indispensable for the best tractive results and is quite impossible where two motors are used.

The plant of the Athens Coal Mining Co. consists of a 17x16 automatic McEwen engine, 190 H. P. at 250 revolutions, directly connected to a 125 K. W. Goodman multipolar generator, 250 volts, with a single marble switchboard correspondingly equipped to that furnished for the Clark Coal & Coke Co. with the exception of the units being of 25 per cent greater capacity in the case of this plant. The plants of the two mines are of the same type.

The haulage equipment consists of a ten-ton single motor locomotive, the same type as those installed at the Clark Co.'s mine. The gauge of track in the mine is 34 inches and the amount of haulage circuit is 4,000 feet. The company furnishes its own boiler plant.

The plant of the Big Creek Co. consist of a 17x16 automatic McEwen engine, capacity 150 H. P., belt connected to 125 K. W. Goodman multipolar generator 250 volts, with a single marble switchboard. The haulage equipment of this mine consists of one five-ton Goodman gathering motor.

The plant of Newsam Bros. Coal Co. consists of a 16x28 single engine, capacity 160 H. P., belt connection to 100 K. W. Goodman multipolar generator, 200 volts. The haulage equipment consists of one six-ton Goodman motor. The belt wheel on the engine shaft is 14.5 feet in diameter, and the belt wheel on the generator is two feet.

The electric plant of the Howarth & Taylor Coal Co., at Edwards, consists of a 60 H. P. automatic McEwen engine, a 42 K. W. Goodman multipolar, a 250 volt generator, a skeleton switchboard, a 300 volt voltmeter, a 200 ampere ammeter, an automatic circuit breaker, a 200 ampere, D. P. S. T. switch and four lightning arrestors. The haulage locomotive is a Jeffrey electric motor of the D. M. 26 type, gauge 34 inches, five tons and of 250 volts. The trolley wire is 4,726 feet long.

Specifications.

For the guidance of those contemplating the installing of electric generators and motors at coal mines, the following specifications are suggested:

The generator to be of normal rated capacity .....K. W. with a no load voltage of.....volts and compound wound for ten per cent rise in voltage. The rated speed to be..... R. P. M.

Conditions of Rating—The dynamo to be capable of carrying its full load of .....amperes and.....volts for a continuous period of ten hours, without sparking or heating any part of it more than.....degrees centigrade above the surrounding air.

To be capable of carrying a 50 per cent overload for one hour, without injury when already heated by its normal load, and without heating its windings more than 55 degrees centigrade, also to be capable of taking 100 per cent overload momentarily without injury.

The design and proportions of the field, and armature coils and windings, to be such as to secure a fixed line of commutation for the brushes, so that the load may be varied at any desired rate, from no load to 25 per cent overload, without calling for any change in lead of the brushes, and without causing objectionable sparking. The machine is also run without injurious sparking up to 50 per cent overload.

Efficiency—The efficiency of the dynamo to be 90 per cent at full load and 82 per cent at half load. Loss due to belt is included for belted generators.

Frame—The field magnet to consist of a circular yoke in two symmetrical halves joined horizontally on a plane, passing through the center of the shaft. The frame shall be of cast iron, and there shall be.....poles of laminated wrought iron or soft steel joined by being bedded into its castings.

Magnet Winding—The series and shunt to be wound in distinct coils, each adequately insulated and protected so as to make them practically moisture proof. The series to be wound of flat copper bar bent to the proper form. The shunt coils to be wound of double cotton covered wire, and the two coils to be so supported as to allow ample ventilation between and around them.

Armature—The armature to be slotted or iron clad type. It is to be built up of discs of sheet steel of the highest magnetic quality, each disc to be insulated from the next by a thin layer of insulating material. The armature conductors to be of flat copper so bent to form the coils that there shall be no soldered or other joint except at their junction to the commutator. These conductors shall be insulated by an armor of micamite, tape, and other insulating material, and held in place by wooden strips driven into grooves provided in core teeth for the purpose.

Commutator—The commutator to be mounted on a hub, keyed to the armature shaft. The length of the commutator bars to be such as to allow ample space for the brush surface. The insulation between these bars to be of the best mica, suitable for the purpose, and of such hardness as to wear down equally with the copper. Excepting between the bars, all other insulation between copper segments and grounded part of commutator to be mica 3-32 inches in thickness.

Brushes—The brushes to be of carbon. The current density per square inch of brush, in contact with the commutator face, not to exceed 30 ampere at full load. The brush holders to be arranged to allow maximum freedom of access to the commutator, also to allow sufficient contact of the brush with the holder, and to leave the brush perfect freedom to follow up any unevenness in the commutator.

Electrical Features—The winding of fields and armature to be free from all electrical defects. The machine to be capable of withstanding a breakdown test of 2,000 volts alternating current. All current carrying parts to be arranged so as to have ample ventilation.

Mechanical Features—The design of construction to be strictly first-class in every respect. The mechanical construction of the commutator to be such that the segments shall be firmly held in position against all disturbing effects due to normal operation.

The workmanship to be in general of the highest class. All parts to be accurately made to standard gauge. All joints to be dressed and finished so as to present a neat appearance. The nuts and heads of bolts to be hexagonal and to be suitably finished where exposed.

Powder Blasting.

Many of our accidents are clearly due to ignorance on the part of some miners, who seem only to know that powder placed in a hole and tamped will produce an explosion that will break the coal. They are entirely ignorant of the expansive force of powder, of the resistance of a solid body of coal, and in fact of the simplest principles of mining. Instead of being miners they are nothing more than unskilled laborers, and many of our disasters are a convincing proof of the claim so frequently made, that the successful and intelligent miner is a skilled mechanic. It is unfortunate that such unskilled labor is gaining a footing in the coal mines of our State, but the fact that this is so is before us, and a remedy is needed. What this remedy shall be is hard to say, but it seems remarkable that the principle applied in other industries ought to be at least tried in the mines, and this principle is, to make every man that desires a place as a miner show that he has served an apprenticeship and has learned his trade.

Experience is fully demonstrating that neither life nor property is safe when in the keeping of densely ignorant and inexperienced men. The cause of explosions of all kinds should receive greater attention and consideration, for the reason that no matter how intelligent, careful or circumspect a man, or number of men, may be who work in a mine, they are always liable to be the victims of some foolish or overt act that would cost them their lives, and, as the strength of the weakest link in a chain measures the strength of the whole chain, so their safety is measured by the probable misconduct of some ignorant or vicious person who cannot realize the awful consequences of his misbehavior.

A blown out shot is one in which the powder blows out the tamping in the drill hole, and does not throw the coal. In such cases the rush of gases into the air will be greatest and more concentrated. The energy of the powder expends itself in moving the tamping in the drill hole and the air outside of it. These shots are capable of causing an explosion on a large scale, and of carrying a flame to distant points in the mine, frequently burning men who have retired to places where they considered themselves entirely safe from any possible effects of a shot.

There is the force due to the expansion of the gases and again there is the force due to the contraction. Lack of room for the rapid expansion and dissipation of heat produced, by the firing of a tight or windy shot, causes an explosion.

How many of our miners can verify the statement by saying they have quite a number of times, when returning to the working face, after firing a shot,