1914-0006

COAL FATAL

Report of a Haulage Accident December 9, 1914; Tripp Shaft. Scranton, Pennsylvania; 13 Killed (From the Bureau of Mines report by Daniel Harrington)

At about 6:20 A.M., December 9, 1914, when lowering the third cage load of men into the Tripp shaft of the Diamond Colliery, 13 men were precipitate from the cage at a point about 285 feet below the surface to the sump, a distance of about 300 feet, and fearfully mangled; one man was found clinging to the side of the cage when it reached the Clark vein, 300 feet below the surface, He was taken off very slightly bruised, but badly frightened. The bodies of the victims were taken up in the cage on the opposite side of the shaft, and it was found that 13 men had been killed, which together with the man saved, brought the total occupants of the cage to 14, though the State Law of Pennsylvania restricts the number on a cage at any one time to 10.

The coal company (sic) officials state that the accident was caused by an explosion of powder, which shattered the cage supports and broke the bottom loose. It was established that at least one of the men on the cage purchased that morning 25 pounds of dynamite, and had it with him on the cage, and some of the shaft attendants claim to have heard a sound resembling the explosions of powder at or about the time of the accident in the shaft.

Against the powder explosion theory is that advanced by most of the miners, that the cage bottom became detached from its supports on one side, allowing the floor of the cage to take a position of about an angle of 45 degrees along its length, supported on one side sufficiently to prevent the cage floor from going to the bottom of the shaft, but with the opening sufficiently large to precipitate the men except one, who clung to the side of the cage, downward and against the side of the shaft. An inspection of the cage shows no evidence of a powder explosion; there are no sings of blood on the sides or floor, and if even one stick of dynamite had exploded, blood would certainly be deposited on either the side of the cage, or the floor or both; the cage floor has four planks running lengthwise along the rails, and outside the rails, and these planks are in place, and give absolutely no evidence of a shattering which accompanies a powder explosion. The planks between the rails are missing, leaving only the nails which fastened to the transverse joints or beams below, and these beams (5 in number) are The rails on the cage floor are exposed and show no shattering. absolutely straight and not in the slightest degree displaced from the accustomed position. The upright wooden posts which constitute supports for guides, and which brace the center of the cage show no sign of powder violence at the floor line or at any point above

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that line, nor do the hood nor any part of the wood or iron work on the cage show signs of powder violence.

The fact that the shaft lining is unscarred in any manner, and that cages were running thru it within a few hours of the accident also tends to discount the idea of a powder explosion. It is stated that the feet and legs of the victims show no evidence of burning or of the terrific violence which would attend an explosion of powder in such large quantities and in such close quarters. Moreover, a powder explosion on the cage undoubtedly have so badly stunned the one surviving that he could hot have maintained his hold on the side of the cage, and there would have been no question in his mind as to whether such an explosion actually occurred.

An inspection of the cage shows clearly the immediate cause of the accident; the cage has a powerfully constructed timber box frame floor attached by four diagonals 1 1/8 inch diameter rods, to the cross piece above to which the hoisting rope is attached. These four 1 1/8 inch diameter rods are welded both at the top near the rope support beam, and at the bottom near the cage floor, to flat iron straps. The only bond other than these four 1 1/8 inch rods between the bottom or floor of the cage and the beams above to which the hoisting rope was attached, are two vertical timbers mortised and bolted above to the beam which holds the rope attachment and mortised and bolted below to the lengthwise timber of the box frame floor. At this point where the vertical timber supports are mortised to the floor beam, there are 5 bolt holes which very materially weaken 4 X 10 vertical posts. Hence the floor of the cage depends totally for a bond to the hoisting rope on four rods 1 1/8 inch diameter, which have been welded in a places to two pieces of 4 x 10 oak weakened by a mortice of 1/2inch, and by 5 bolt holes in an area of 8 x 10 inches.

One of the welds in the 1 1/8 inch rod became loosened by continued vibration and this threw a double load on the companion rod on the same side of the cage. The other rod also had a flaw, as the broken section showed but about one half of the total area cohering, the flaw being not in the weld but in the solid part of the rod; when the second rod failed on the same side, the only remaining support of the cage bottom on that side was the 4 x 10 oak vertical post. The oak post was greatly weakened by the bolt holes at the point where it was bolted to the floor, and gave way at that point leaving the cage bottom supported on one side only, and throwing the occupants into the shaft sump, some 300 feet below.

It is admitted quite generally that frequent inspections are made of the rope, the cage and the shaft, but a very minute inspection would be required to detect either the disconnected weld, or the flaw in the solid rod.

A serious lack of discipline is apparent. It is admitted by the

company officials that 14 men were on the cage, whereas the state law prohibits the handling of more than ten. The company officials state that their rules call for not over 10 men at one time on a cage and throw the burden of the top cage tender, who at first insisted that not more than 10 men were on the cage. It is reported by the Scranton, PA., newspapers that on December 10, 1914, the morning following the accident the various companies around Scranton, consumed practically double the time lowering the men that they had previously done, implying that not only this mine but many others were openly violating this provision of the state law.

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF MINES

MINE HAULAGE OR HOISTING ACCIDENT File No. D - 306

Mine Tripp Shoft La	ocation Scranton. Pa.
Company Diamond Collicty Ma Delewer, Lockewonnham western Rairer Date Dec. 9.1914 Time of day 6 ²⁰ a	mp.m. Mine working or idle <i>luicking</i>
Total employment /200 UndergroundS	nifts worked Daily production (tons) 775,000 unn
Number men killed /3 Injured	1In mine
Type: Man-trip Man dropped court 310' - 285' below sorry Cause of accident <u>Flott of Wooden Cag</u>	Man-hoist V Her & sump e goic ciry altopping men f. bottom of shift
Type hoist	Type man-trip cars
Location of accident (shaft, slope, hau	Lageway, etc.) In Tripp 59 aft
Mine openings_ 5444s	Principal Tripp shift - 4 comportment
Surface and coalbed elevations (shafts a	and slopes)
Coalbed "enetites out of Anthereite body	Thickness 50' to be worker in min
Mining system_ Com 2 P. llar	Pillars extracted
Roof support: Main entries]	IntermediateSection
Transportation: Main Locos	Intermediate 40000 Section Animate
Electricity (voltage ac or dc)	FacePortable lights
Principal mining machinery (continuous m	niners, conventional, etc.) <u>Blast result</u>
Blasting and explosives: Coal <u>Black Power</u>	1 a. t. Dy namile plus 5 me plumosities in gestines and s.
Was Bureau report made <u>y</u> e, Author(s)	Charles Enzian
II no Bureau report, what and by whom	
Remarks 2" water lines along Jonger	cys for five protection

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UNITED STATES BUREAU OF MINES

CAGE ACCIDENT

TRIPP SHAFT, DIAMOND COLLIERY

(Scranton, Pa., Dec. 9, 1914)

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY, COAL MINING DEPARTMENT.

Report by

CHARLES ENZIAN.

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	Page
INTRODUCTION	3
Brief Statement	3
GENERAL INFORMATION	4
Location Operators Personnel of Organization	4 5 6
GEOLOGY AND CHARACTER OF COAL	6
Geology Coal Gas	6 7 7
DESCRIPTION OF MINE AND METHOD OF OPERATION	7
Development. Mining. Explosives. Haulage. Lighting. Ventilation. Humidity. Drainage. Fire Protection.	7 8 9 9 10 10 10
THE ACCIDENT	11
Local Conditions. Alleged Cause. Rescue and Recovery. Coroner's Verdict.	11 12 13 14
EVIDENCE OF ACCIDENT OBTAINED FROM INVESTIGATION	15
	18
ACKNOWLEDGEMENT	20

TABLE OF CONTENTS

INTRODUCTION

Brief Statement:

On December 9, 1914 about 6:20 A. M. the north cage failed in the north hoistway of the Tripp Shaft, Diamond Colliery of the D. L. & W. H. R. Co. Coal Mining Department. During the act of lowering the third cage load of men from the surface to the Dunmore seams 13 men were precipitated to the bottom of the shaft, a distance of about 200 feet; while one man was rescued from the wrecked cage at the Clark seam 15 feet below the point of failure, or 330 feet from the surface. Aside from the severe shock the rescued man was uninjured; but on account of the nervous shock, he has not returned to work in the mines.

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The list of fatalities is as follows:=

	•		Single	¥ A
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Name	pation	Age	married	Children
Anthony Brathinas	Miner	32	married	4
John Terasavage	Miner	40	married	5
Peter Tankus	Laborer	25	single	
Charles Tankus	Miner	30	married	3
John Bognitus	Miner	27	single	• *
Jomes Grebas	Miner	37	married	4
Koston Petson	Winer	51	married	7
James Zunerities	HILL'	38	married	1
Jamos Zundri Gios			married	
	Winon	10	single	
Wm. Zalukonis	WIHOT.	T.3	BINGIO	
Anthony Shonis	Laborer	22	singre	
John Pazley	Laborer	29	single	
Thos, Thomas	Doortender	60	married	4

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GENERAL INFORMATION

Location:

The Diamond Colliery is located in the City of Scranton, Lackawanna County, Pennsylvania, and is connected by a branch off the D. L. & W. Railroad. The mine is indicated No. 61 on the Alder map of the Anthracite Coal Fields of Pennsylvania.

Operators:

The colliery is one of the oldest operations in the Lackawanna Valley, having been in operation for over fifty years, and is controlled under lease and fee by the D. L. & W. R. R. Co., Coal Mining Department. It produces about 475,000 tons annually and employes about 1200 men and boys.

The colliery is bounded on the north by the Libbin and Cayaga collieries of the D. L. & W. Co; on the east hur the Pine Brook Colliery of the Scranton Coal Company; on the south by the Mount Pleasant Colliery of the Scranton Coal Company and the Oxford Colliery of the Peoples Coal Company; and on the west by the Central and Hyde Park collieries of the D. L. & W. Co.

	Productio	n Number	
Year	(tons)	er Employees	worked.
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1903	405,429	740	2 28
1904	449,804	803	271
1905	430.335	678	244
1906	390.833	858	221
1907	408.574	842	258
1908	272.843	774	189
1909	325.745	860	190
1910	406,635	1000	255
1911	413,365	1005	619
1912	419,648	1194	226
1913	484,641	1199	234
1	ter and the second s		

(State Mine Inspectors' Report Part I, 1913).

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Personnel of Organization:

Delaware, Lackawanna & Western Railroad Company, \ Coal Mining Department: -

E. E. Loomis, President, New York City. R. A. Phillips, General Manager, Scranton, Pa. C. E. Tobey, Superintendent, Scranton, Pa.

Diamond Colliery:

Walter Reese, District Superintendent. Harry E. Harris, Assist. District Superintendent. Sidney Baker, Inside Foreman. P. J. Shovlin, Outside Foreman.

GECLOGY AND CHARACTER OF COAL

Geology

The Diamond shaft is located centrally in the Lackawanna Branch of the Northern or Wyoming Basin of the Pennsylvania Anthracite Field. The coal measures in this colliery contain in part the Diamond, Rock, Big, New County, Clark, Dunmore No. 1, Dunmore No. 2 and Dunmore No. 3 seams, aggregating approximately a total workable thickness of 50 feet. The inclination of the seams is variable, but generally flat.

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Coal:

With the exception of the Dunmore seams the coal at this colliery is perhaps slightly above the average anthracite quality.

Gas:

The entire colliery is designated gaseous by the Pennsylvania State Department of Mines. Methane is the only gas encountered and this only in small quantities under normal conditions. In the development of new sections gas is sometimes generated in considerable quantities.

DESCRIPTION OF MINE AND METHOD OF OPERATION

Development:

The Tripp shaft consists of 4 compartments, and extends from the surface to the No. 3 Danmore seam, which is the lowest workable bed in the Lackawanna Valley basin. Each compartment is about 7 feet wide and 13 feet long. The 2 center compartments are used as hoistways. The northern compartment is used as a upcast return aircourse and the south compartment as a pumpway. Each seam is developed in the regulation gangway and airway and room and pillar method.

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Mining:

The coal measures at this colliery are practically horizontal. The coal is shot off the solid by the miners and loaded into mine cars by the miners' laborers.

Explosi ves:

Black powder, and dynamite are in general use at this colliery. Black powder is used on the coal where no gas is encountered. Dynamite is used in blasting bottom or top rock and to some extent in the harder Dunmore seams in sections where no gas is encountered. Permissible explosives are now being used to some extent on coal and rock in sections where gas may be anticipated.

Year	Days Worked	Black Powder	Dynamite	Permissible Explosives
1905	228	1 501		
1904	271	1.507	22	
1905	244	1777	31	
1906	221	1934	43	
1907	258	1788	28	
1908	189	1785	47	
1909	190	2373	107	
1910	255	2184	90	
1911	216	2484	143	
1912	226	2437	170	
1913	234	2820	247	

Pounds of explosives used per working day.

(State Mine Inspectors' Report Part I, 1913).

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The explosives are distributed to the miners in accordance with the anthracite mine law and company regulations which provide that only "sufficient quantity for the day's work, but not to exceed 25 pounds" is to be taken into the mines by any miner. The powder is stored in the tool box which by law every miner is required to provide for himself. The charges are exploded by squibs, fuses or electric detonators at the discretion of the miner and colliery officials as is the general custom in the anthracite field.

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Haulage:

The haulage system in this colliery consists of mules and electric motors. Mules distribute and gather the mine cars from the main haulage turnouts to the working places and return the loaded cars thereto. Electric motors are used on principal haulage roads from the main turnouts to the foot of the shaft.

Lighting:

Mixed lights are used in this mine. In sections where no gas is encountered or anticipated locked safety lamps are used.

-9-

Ventilation:

The entire mine workings of the Diamond Colliery are ventilated by 5 fans, different diameters; 3 being Guibal and 2 Jeffrey types, all steam driven. The average total capacity of all fans is 397,000 cubic feet per minute. The colliery ventilating plant is given in the following table:-

Diameter of fan in feet	Width of blades (feet)	Depth of blades (feet)	Revolutions per minute	Water guage (9nches)	Name of fan
16.0 18.0	4.0 3.0	4.0 4.0	92 90	1.2 1.2	Guibal "
15.5	7.0	1.6 3.0 4.0	80	1.0	Jeffrey
15.5	7.0	3.6 4.0	80	1.0	
14.0	4.0	4.0	96	•9	Guibal

Humidity:

No method of humidifying the air is employed in this mine. The coal and rock strata are generally moist and no dangers from dust accumulations are anticipated.

Drainage:

The water from the mine workings is collected in main sumps near the foot of the shaft and delivered to the surface by steam pumps.

Fire Protection:

The system of fire protection of this colliery consists of the following: -

Two inch water lines connected with the surface mains and pump columns at the foot of the shaft are maintained along the working gangways with frequent connections for fire hose. A supply of hose is always kept in readiness on the surface and in suitable underground stations.

THE ACCIDENT.

Local Conditions:

According to the colliery records the cage had been inspected by the night hoisting engineer, William Young, who has been hoisting engineer at this colliery for about 25 years.

The following statement is taken from the records :-

December 8 "Evenined balts, ropes, cages and all other appliances and found same in safe condition".

> (Signed) Wm. Young, Engineer, P. J. Shovlin, Outside Foreman.

The records further show that the wrecked cage had been put in the shaft on September 21, 1913. On the morning of the

accident during the hour of 5 to 6 the customary examination of the shaft had been made by shaft footman Peter Gallagher, who is 29 years old and has worked in the mines for 14 or 15 years, and during the past 7 or 8 years held the position of footman at this shaft. The descending examination consists of the examiner riding on the cross-head of the cage to which the hoisting rope and bridle chains are attached; an 8 pound hammer is used to test the buntons and guides and guide joints and counter sunk bolts fastening the guides to the buntons. The ascending trip is made on the platform of the cage to note whether or not Such an examination the cage has the required smooth clearance. was made on both cages on the morning of December 9, and reported by Gallagher that he had found the fans, guides, cage and shaft in good working order.

Alleged Cause:

One of the miners, Albert Burnett, 42 years old claiming to have worked in the mines for 35 or 36 years stated that on his descending trip, which was the second one to be lowered from the surface, he noticed a heavy jar in the vicinity of the Clark seam that made him grab the hand bar. In all 32 men had been lowered on the morning of the accident; this

-12-

included the footman, the barnboss and assistant foreman who went down the shaft before the regular lowering of the miners, which started at 6 A. M. Burnett was the only man who claims to have noticed that the cage was not riding as smoothly as customary.

The mine officials are of divided opinion as to the cause of the accident; some advance the theory that a box of dynamite, which was carried by one of the miners on the fatal trip, exploded and wrecked the cage, while others are of the opinion that for some unaccountable reason a sudden jar was brought on the cage which caused the failure of one of the main upright posts where it is framed and bolted to the platform stringers, and the stay rods on that side.

Rescue and Recovery:

The hoisting engineer was not aware that an accident had occurred until he had received a stop signal from the man at the shaft mouth in charge of lowering the men, and who was substituting for the regular headman on that morning. After stopping the engineer noticed that the rope on the uninjured cage was binding and the other rope was loose from the drum.

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The wrecked cage was lowered about 15 or 20 feet to the Clark seam where the footman had arrived from the No. 1 Dunmore to investigate the cause of the stopping of the cage. At this point the only survivor of the 14 men that were riding on that cage was removed and later sent to the surface. The 13 victims were recovered from the sump at the bottom of the shaft within an hour of the accident and brought to the surface.

Coroner's Verdict:

"We, the Jury appointed by the coroner of Lackawanna County to investigate into the cause of the deaths of thirteen men killed while being lowered into the Tripp shaft, owned and operated by the Delaware, Lackawanna & Western company, on the morning of December 9, 1914, at or about 6:20 o'clock do find:

That Article 12, rule 16, page 33, of the Pennsylvania Anthracite mine laws, which reads that not more than ten men shall at any one time be allowed to enter or leave the mine on any one trip of the carriage, has been violated. We suggest that some arrangement be erected or devised to prevent men from entering or approaching the cage, only from the side where the headman is located or stationed; also that some device should be arranged which would aid the headman in ascertaining that only ten men are on the carriage.

We also find that the thirteen men came to their deaths by falling down the shaft, said accident being due to forcing out of a portion of the bottom of the cage, and after consideration of all the testimony and also an inspection of the shaft, cage, etc., that the cause is unknown to this jury.

> (Signed) H. C. Birbeck, foreman W. C. Jenkins David T. Pierce Fred H. Thomas W. C. Jones Thomas Soulsby."

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EVIDENCE OF ACCIDENT OBTAINED FROM INVESTIGATION.

Mining Engineer Daniel Harrington, and Foreman Miner Jesse Henson, visited the Tripp Shaft and examined the wrecked cage on December 10, 1914. Mr. Harrington submitted his report of the investigation under date of December 14.

The writer, being absent from the anthracite region at the time of the accident did not visit the Tripp Shaft until December 22, at which time he also had a conference with General Manager Phillips, Superintendent Tobey and State Mine Inspector S. J. Phillips.

The results of Mr. Harrington's investigation are so clearly and ably presented in his report that further comments in my opinion are required only in several particulars.

Under "The Theory of the Accident": It was established from personal inquiries and by the evidence of witnesses that none of the company officials countenance the practice of allowing more than 10 men to ride on a cage at one time; in fact some men have been discharged for allowing this practice wherever it was brought to the attention of the colliery officials.

-15-

Occasionally the eagerness of the men to rapidly complete the work has been responsible for violations in this respect. On the other hand the construction of the shaft surface landing, and on account of darkness makes it impossible for the headman to note that men surreptiously enter the cage from the opposite side. This latter condition was perhaps the principal reason for the presence of more than the 10 men he had tallied from the regular entering side of the cage.

There was no necessity for the men to croud on the cage at this shaft. It requires on an average only 1 minute and 4 seconds to lower a cage of men, and 36 cage loads of ten men each will accomodate all of the employees in the shaft. It is impossible for me to agree with Mr. Harrington that "there is an apparent serious lack of discipline". This is con This is contrary to my observations at the D. L. & W. Company mines. ---- - man an antipicate and Company officials have always prided themselves and do expend a great deal of time and money in methods of discipline and If it does not exist it is not safety among their employees. because of lack of rules and frequent rigid enforcement of these rules, even to the point of encountering opposition from the miners:

-16-

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a notable example of which is the concerted and strenuous objection by the miners against the installation of the system of safety inspectors about one year ago, when the company put on a large force of additional inspectors, but unfortunately at that time misnamed them"patrolmen".

This accident however has brought out the fact that glaring violations of the law have been occurring quite generally and most of the mine officials and state mine inspectors are co-operating in breaking up the practice and are devising arrangements whereby it will be impossible for men to enter a cage other than by passing the headman or footman.

I agree with Mr. Harrington that the dynamite explosion theory is practically disproved by the condition of the cage platform and main upright posts of the cage.

Under the heading, "Construction and Condition of the Cage": The writer disagrees with Mr. Harrington's quotation "an inspection of the cage shows clearly the immediate cause of the accident". The condition of the cage, which had not been changed since Mr. Harrington's examination, indicated the results of the accident rather than the cause of the accident. The broken main upright post was of the best quality white oak, and the fracture did not indicate decay or cracks which might be

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responsible for the failure.

The Coroner's Jury engaged a chemist who testified that none of the stay rods contained a flaw and that the weld had not been broken.

CONCLUSIONS.

The writer can not agree with Mr. Harrington's statement that "an engineer would immediately condemn the construction of the cage". The Tripp shaft cage conforms with the general design of frame cages used in the anthracite region, which have been giving excellent service for many years. The fact that this same cago hoisted 262 cars of coal, each weighing about 6000 pounds, on the day before the accident would disprove the suspicion that it was in a dangerous or neglected condition. The fact however remains that the cage did fail, but in my opinion the cause of this failure was due to a sudden jar, caused either by the closing of the safety catches, or the momentary jamming of the cross-haad between the guides; or perhaps by the cage guide shoe striking either a projecting guide joint or catching on top of a bunton, and on account of

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the tremendous momentum the bottom of the cage on the impeded side broke away.

In wooden cage construction the stay rods are not designed to carry the entire weight, but serve as lateral braces, and the reinforcement of the body of the cage.

The question of taking explosives into the anthracite mines is a rather complex problem. I agree with Mr. Harrington that an employee experienced such as a shot firer, would take greater care, but it is manifestly impracticable to provide an employee of that kind to take explosives into the mine for On the other hand the question of lowering each miner. explosives into the mines in separate cars prior to the lowering of the men causes a violation of the mine laws, which prohibits carrying more than 25 pounds at one time. There is no good reason why an experienced employee, such as an anthracite miner is supposed to be, should not be capable to carry the explosives he intends to use for his day's work with comparative safety to himself and other employees. The manner of carrying the same has been a subject of considerable discussion among employees and mine officials and no doubt a satisfactory solution will yet be reached, but it is pertinent that a

-19-

miner consents not to take into the mines, and is honest enough not to request more explosives than the amount absolutely necessary for his day's work.

I do not wish to appear in the position of holding a brief for the mining company, but in fairness to all concerned, and within reasonable bounds of the practical operation of our mines, I am of the opinion that an accident like the Tripp shaft might recur in the best designed mines in the country. I very seriously doubt whether the broad statement that "steel cages should be installed" would prove a panacea for mine cage accidents.

ACKNOWLEDGHENT.

The writer desires to acknowledge the personal assistance extended by General Manager Phillips and Superintendent Tobey of the D. L. & W. Company and State Mine Inspector S. J. Phillips.