

Report of an Explosion at the Fidelity Coal & Mining Company, Stone City, Kansas, December 20, 1906, causing the death of seven men.

## COAL FATAL

Lawrence, Kansas  
January 15, 1907

His Excellency Gov. F. W. Hoch, Topeka, Kansas:

My Dear Sir:-In compliance with your request I went to Stone City, Kansas, where an explosion of powder had occurred in the mine No. 1 of the Fidelity Coal Mining Company, and I have the honor to make the following report:

I arrived in Pittsburgh, Kan., on the evening of Wednesday, January 9, and met the state mine inspector, Mr. Frank Gilday, Mr. Gilday had taken the statements under oath of the men who could in any way know accurately the details of the explosion. Wednesday we went over this evidence very carefully, and in this report I give the conclusions which I have drawn from it, together with my own observations and experiments. The copies of these sworn statements are in Mr. Gilday's possession. On Thursday we went from Pittsburgh to Stone City and went into the mine. We were shown everything which could possibly have been connected with the accident. Everything was put as nearly as possible into the position it was at the time of the explosion.

The facts, as nearly as I have been able to ascertain, are as follows: On the morning of December 20, the men were just going to work, at about 7:30, or a few minutes later. A number of them were a little way in the tunnel waiting for the "trip" to be made up, some of them intending to ride in on it. The boss driver was at the front of the trip (train of pit cars), the motorman sitting on the rear of the motor, several men at the end of the trip, and the coupler busy coupling up the trip. In the first car was one man with no powder. In the second car there were four men, each with his powder jacket. These cars are supposed to be sound and to have metal caps, but the men sometimes use very defective ones and often lose the caps and stuff the tops with paper and the like. One such can was found later that morning unexplained, though of course no one knew what the condition of the cans in the second car, as the men who were in that car are all dead. Of twelve cans, some on the cars and some on the ground near by, eight were exploded. At the side of the second car a man was sitting on the ledge with a powder jack and a pipe. This man was among those killed. The men wore their lamps. The coupler signaled the motorman to go forward a few feet. As the motor started there came an explosion, followed immediately by another and severe one, and later by a third and lighter one. The motorman stopped the machine at once, it having gone not more than two feet. The greater number of the witnesses agree that the explosion started in the middle of the trip, undoubtedly in the second car, as that is where the worst damage was done. About all we have from any of the men in that car is that one man (now dead) said that he was sitting on his powder jack when it exploded.

One testified that the motor moved eight or nine feet and

that the explosion started from it. He was not on the trip himself and the evidence of the other men all goes to show that about two feet was the greatest distance moved by the motor. Moreover, the spot at which this man says the explosion started is almost exactly where the others said it started, except that the others said that the second car was at that point. As it was the testimony of this man that had much to do with Mr. Gilday's asking that an engineer be sent to look into the matter. I will give it some further space. He said that the motor seemed to explode with a report like that of a shotgun, and sent out a flame several feet towards him. Now, motors do not explode. Had a flame burned a slight noise would have been heard, but as the fuse was on the inside the motor, the light could hardly have been seen. Moreover, the motor had no fuse burned and was entirely unharmed, which would have seemed impossible had any such thing as he described occurred. The engineer stated to us under oath that no repairing had been done on the motor further than to clean the brushes and tighten a screw. I examined the machine and found nothing wrong with it. What this man describes fits very well what did occur in the second car, which was standing in the place from which he said the explosion first came, so that I think we must accept the bulk of the evidence and believe that the first can was ignited in the second car; that is, in the second car from the motor, not counting it as a car.

Now, as to the probable cause of the explosion there are several possibilities:

First. - Sparks are thrown from the wheels and trolley as the motor runs. They went two or three feet, however, and the nearest point at which there is known to have been powder was ten or twelve feet from wheels or trolley-pole, so I think it highly improbable that the powder was ignited in this way. Had the motor been running rapidly and so bringing the cars quickly to where the sparks were the, powder had been lighted in this way, but the motor had gone but two feet and that very slowly.

Second. - The jar of starting might have caused a spark to fall from the pipe or lamp of one of the men as he crouched in the car. The falling of such sparks is of common enough occurrence. Sparks, either from the motor or the pipes or lamps, should not get into tight and probably covered powder jacks, though if a spark was the cause of this explosion it seems to me that is much more likely that it came from the pipes or lamps than the motor.

Third. - The power for the motor is supplied by an overhead trolley, the current returning through the wheels and rails as in the ordinary street - railway car. At times, however, there is bad contact at the rails and the current runs back through the draw-bar and through the cars, so that men riding there often receive shocks from this bar. The voltage (205) is not dangerous but may be very unpleasant. When I was in the car last Thursday we felt nothing when we touched the draw-bar, but the motor was working smoothly with a good contact at the rails. It seems to be well established, however, that the bar has at times a sufficiently high potential to cause the shocks above referred to. If, then, a man could receive

such a shock from the draw-bar, might a can of powder be exploded by it. I was inclined to doubt this possibility, but as soon as I returned to my laboratory, on Saturday morning, I procured some blasting powder and proceeded to make some experiments with it to see whether it were possible to ignite it in this manner. I soldered two small strips of copper to the ends of two copper wires and connected these, through a switch, to a source of current, a battery or dynamo. Before closing the switch I sprinkled a little powder loosely over and between the copper strips. With 110 Volts the powder flashed at once when the circuit was closed. With 60 volts it did not ignite, but when jarred, showed scores of tiny sparks among the grains. With 20 volts these sparks were still to be seen. (I might explain that what we have here is similar to any case of striking an arc. If the carbons of an arc lamp are brought together no spark is seen till they are separated a little way after the current is started, when a spark at once springs across the gap and starts the arc.) I tried a number of times, with three assistants, and the above results were confirmed each time. While it would be a very exceptional case, still, with a series-wound motor, the potential of the draw-bar might be as light as 250 volts, just as the motor started, and this would be very likely indeed to ignite the powder in a can touching the bar, as I have shown less than this voltage is sufficient to do this. The only protection would be the shunting of the current through the can and around the powder. The cars are rusty in spots and the cars are damp enough to afford fair ground, and one spark would be enough to start an explosion.

In view of these facts, and the fact that the explosion occurred just as the motor started, I am inclined to think it very probable that the powder was ignited by a spark between the powder grains coming in this way from the draw-bar.

In any case, whichever of the above causes may have been responsible for this explosion, it is unsafe for the men to ride in the cars with powder. The insulation did not appear to be defective in any way, but a motor of this kind is bound to scatter sparks, as we all see in street-railways. There is often a shower of sparks from the lamps of the men riding in a rapidly moving car, and sparks too near to powder are always dangerous. Then there is the liability of discharge by a spark caused by current coming from the draw-bar. All of these things are possible at times with any such system through no fault of construction or operation.

Very restfully yours,

S/s Bruce V. Hill

DEPARTMENT OF LABOR