

seven inches in diameter and ten inches high and put in each jar a plate of copper. In the jar we put water with a ten per cent. solution of caustic potash. The parties we measured plunged their hands into the liquid so that the ends of their fingers touched the bottoms of the jars. After waiting thirty seconds, the measurement was taken. No one could go above eight volts."

"Then it is your opinion that the high figures obtained in some experiments upon the human body are largely due to imperfect contact?"

"Yes, but there is no difference between 2,000 and 20,000 ohms."

"Then the elements which enter into the test which indicate imperfect contact always produce high figures?"

"Yes; the tendency is always toward high figures."

"Is it your opinion that the condition of the skin, as to oil being upon it, affects the measurement?"

"Yes; or if the hand is hard, such as that of a workingman, it would offer much more resistance."

"What were those persons upon whom you experimented?"

"Assistants in the laboratory, clerks, neighbors and workingmen in the factories. In fact, men of all conditions."

"What effect does the size of the electrode have in obtaining resistances?"

"After the first contact the diminution of resistance is about equal to the surface covered by the electrode?"

"Where, in your opinion, is the major part of the resistance located?"

"I should say 15 per cent at the point of contact; the balance in the body."

"What is the law that governs the passage of an electric current when several paths of varying resistance are offered to it?"

"It divides in proportion to the resistance encountered."

"If there are two paths, one of very high and the other of very low resistance, which will it follow?"

"It will follow both if there is plenty of current behind it."

"May the voltage of an alternating dynamo, properly constructed, be increased by means of a current flowing from an exciting dynamo?"

"Yes, the voltage can be increased considerably; but in most cases they are worked up to the mark. I do not think much can be gained in this way from a Westinghouse dynamo."

"Does not the Edison Company own a patent for a system for the distribution of alternating currents?"

"Yes, the Zipernowski."

Here the commission took a recess while Mr. Edison spelled the Russian inventor's name for the stenographer.

"Is it used here?"

"No, it is used somewhat in Europe. We don't like to use it here. It is dangerous."

INSTANT AND PAINLESS DEATH.

"Can an electric current be applied by artificial means in such a

manner as to produce death in every case?"

"Yes."

"Instantly?"

"Yes."

"Painlessly?"

"Yes."

When the greatest electrician of the age answered these questions there was rejoicing among the friends of the new system of execution, and corresponding dejection among the friends of the alternating current. Mr. Post continued:

"What form of electrode would you advise in applying the current in criminal execution?"

"Put the criminals' hands in jars of water with potash."

"What amount of electrical energy do you think would be sufficient to produce painless death in all cases?"

"1,000 volts."

"Would that be true whatever current should be used?"

"No, an alternating current, or a continuous current very much interrupted, should be used. The latter can be produced by mechanical means."

"Will you state your reasons for advising the use of an alternative or an interrupted continuous current?"

"The continuous current does not seem to have much effect on the nerves. For instance, eight volts of a continuous current cannot be felt, while three volts of an alternative current would be as much as you could stand."

"Have you ever made experiments to ascertain the effect produced upon muscular tissue by the application of electric current?"

"Yes, with a galvanoscopic frog. At one time a surgeon prepared several frogs' legs, laying bare the nerves. I took one leg and connected it with a wire running from Washington to New York. By the twitching of the muscles I was able to receive a telegraphic communication from that city without the aid of a sounder."

"Was that produced by the intermittent current?"

"Yes."

"What amount of energy did you use upon the frogs?"

"I should say about one five-thousandth of an ampere. But I might say that the electricity was in the frog itself."

Regarding the mechanical effect of an electric current Mr. Edison said he did not know much about it. In experimenting upon animal tissue or membranes he found that when the current was applied there was a powerful rush of water through the pores. He had heard it through a telephone two hundred feet away. He thought that a current passing through a human body would cause his whole fluids to pass through the tissues. As to the heat developed, he said he had passed a current of 1,200 volts through a glass tube filled with water, the tube being as tall as a man, and of the same resistance, and found that the temperature only rose nine degrees centigrade in a minute.

Mr. Cockran then took Mr. Edison in hand. There were no new

facts elicited in the cross-examination.

The same paper of July 31 has the following:

The Kemmler electric execution hearing was resumed here today, and Referee Tracy Becker held two long and interesting sessions. The testimony was all on the part of the people, but W. Bourke Cochran was able to confuse some of the witnesses. The investigation related to the killing of two men in this city by electricity. In these cases it was sought to show that death was both painless and instantaneous. The first case was that of Lemuel J. Smith, who took hold of the brushes of a dynamo in the Ganson Street electric light station, this city, August 8, 1881, and was instantly killed.

Philip Fogarty, an undertaker, saw the occurrence. He said that Smith seemed to be lifeless as soon as he touched the dynamo. Policeman Wallace Harrington saw the accident. Smith put one hand on one brush and the other hand on another brush, and that very instant fell downward. His hands stuck to the brushes.

"Did you see any indications of life after he struck the brushes?" was asked.

"No, sir; he turned purple. His hands were cut and burned, and had a sort of greenish cast. He was a large man, about 5 feet 9 or 10, and would weigh 170."

"At the Coroner's inquest it was stated that Smith was heard to groan several times," said Mr. Cockran.

"Did you hear him groan?"

"No, sir; not a groan."

Charles Hayner, a witness at the Smith inquest, testified that he saw Smith seize the brushes and fall. The witness then caught Smith un- his arms, but he could not pull him off; he said, any more than he could pull a house. When the engines were stopped Smith was released, and after he was laid on the ground he groaned several times.

Dr. John A. Hoffmeyer made an autopsy on Smith's body, with Dr. Barker, who has since died. He found the lungs congested, the stomach congested, and an alcoholic odor emitted. The blood was in a fluid condition and the brain in a normal state. Black marks were on the hands, as if burnt.

"Did you discover the cause of death?" asked District Attorney Quinby.

"It was not apparent."

"You learned how he met his death, and formed an opinion?"

"Yes, sir."

"How did you know it?"

The doctor could not answer.

"Doctor," said Mr. Cockran, "if you had not known that this man was killed by electricity would you have been able to decide the cause of death?"

"No, sir."

Dr. Joseph Fowler, the coroner who held the inquest on Smith's body, made an investigation himself. He traced the electric current on the surface of the skin by a discoloration sufficient to be noticed, and on dissecting the skin found the