

The basis of the action is that the street car Company is putting its overhead cable wire, to transmit electricity to the cars, on the streets that are partly occupied by the telephone company, and the latter wants the railway shut out on the ground that damage will result from the wires running parallel.

The telephone company asks an injunction forbidding the railroad from establishing the electric system on South Temple, First South and Second West streets, and alleges that, if the electric wire along the railroad be placed in a position necessary to operate the cars the telephone company's business will be interfered with, by induction, so that the telephone instruments cannot be used to good advantage because of the noise made by the induced current and the rattle of the cars; that it is probable that some of the employes of the telephone company will be injured; and that the articles of Incorporation of and grant by the city to the railway company do not authorize the use of electricity as a motive power.

The railway company replies that it is authorized by its articles of association and grant to use electricity; that their wires are properly insulated so that no injury is possible to users of the telephone; that there will be no interference whatever by induction from the street car wire, even though it were placed at a much less distance than it is at present; and in fact that there is no ground whatever for the complaint of the telephone company.

The first witness called by Mr. Williams, attorney for the telephone company, was

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who is constructing the electrical works for the street railway. He testified that the line on First South Street was constructed. The wires are suspended on insulators, on poles 25 feet high. The trolley wire was on the ends of the cross-arms, two and a half feet below the feed wire. Connections were made with the trolley wire at intervals of about 780 feet. The electric current passes through the motor on the car to the rails, which are bonded by No. 4 copper wire, and convey the current back to the station, to the negative dynamo. Both rails are bonded together, and constitute the conductor for the return current of electricity. The feed wire or overhead cable is connected with the positive dynamo, while the rail, bringing the return current, is connected with the negative dynamo. There is no insulation from the rail into the ground. The feed wire is insulated with rubber insulators, and is less than $\frac{3}{4}$ of an inch, without the insulation. The trolley wire is $\frac{1}{4}$ of an inch. The feed wire is entirely covered to guard against contact with other wires or materials. The feed wire is not left bare in any place; its covering is part of its manufacture, and increases the diameter to $\frac{3}{4}$ of an inch. There is a grounding of the electric current by metallic plates at the ends of the rails, reaching down to a point of moisture in the earth. The current

is also grounded at the electric house, near the dynamos.

To Mr. Rawlins—The feed wire carries from 400 to 450 volts; the volt is the standard of electric power; the electric current, arc system, here, ranges from 1500 to 2000 volts; the incandescent system is still higher.

To Judge Zane—The electricity is communicated from the dynamo to the feed wire, then to the trolley wire, then to the motor in the car, and through the rails back to the other side of the dynamo. If a child steps on the rail there is no effect, as there is but one current of electricity. There must be a connection of the two currents to have any effect whatever.

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testified that he was manager of the Rocky Mountain Bell Telephone Company in Salt Lake; most of the wires are on First South Street; we have 487 subscribers; the wires on the street railroad poles are directly under the telephone wires; the feed wire is 6 feet 3 inches under our lower wires, outside of the fire limits; inside of those limits the distance is greater. In two wires running parallel, the current of one is carried to the other by sympathy or induction; the current on a telephone wire is very small, from $\frac{1}{2}$ to 2 volts; from the proximity of the railroad cable or feed line, the telephone would be interfered with, by a humming noise, and when the car was close to where the instrument was being used there would be a rattling noise. The return current would also be likely to go over the telephone wire in sufficient force to ring the bell or burn out an annunciator drop.

To Mr. Rawlins—Induction would be no greater under our wires than alongside. In the outer part of town we do not conform to the city ordinance requiring telephone wires to be not less than 30 feet from the ground. If we had conformed to the ordinance our wires would be ten feet from the railroad feed wire. Insulation does not change the effect of induction.

I think the proximity of the feed wire would render our instruments valueless. Near your office are three electric light wires carrying from 1500 to 2000 volts each, within two feet of the telephone wire; they are at right angles, therefore there is no appreciable induction, but if they were parallel the electric light current would be worse than that from the railroad feed wire. I cannot say how much. Some of the electric light wires run parallel and within six feet of our wires for a short distance, and do not interfere with us. Induction is felt less as the distance increases. The witness was further examined as to his technical knowledge of the science of electricity, taking up the time till the afternoon. Except in a very few cases he replied that he was unable to answer the question propounded upon the relative effects of electric currents.

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was called as a witness for the plain-

tiff. He testified that he was connected with the United Electric Company of this city and was well versed in the science of electricity, having been engaged in the business for the past eight years, three years of which were spent in the experimental station of Thomson, Houston & Company, of Boston, where a system of street motors is manufactured, and from his knowledge of telephones he said the Sprague motor system would very materially interfere with the workings of the telephone. There is a system of electric cars which uses storage batteries placed in every car, each car carrying its own electricity and from which there will be no leakage. The wires of the electric railroad and telephone will parallel each other for a distance of three miles or more, and the chief difficulty will arise from leakage. There will also be considerable difficulty experienced from induction. He stated an instance where telephone lines had been placed parallel for three miles, one wire being on poles and the other under ground, when conversation carried on over one wire could be distinctly heard over the other. It is very often the case that telegraph lines parallel telephone lines, in which case an operator can distinctly read a message going over the telegraph wires while listening at the telephone. As the rails and earth are used to form a return circuit in the Sprague system, the electricity would readily be carried away by the earth if the resistance of the earth was low. To make the current more perfect, ground plates could be used on a return wire placed near the track. Under this system the ground wires of the telephone and street car line would interfere. This difficulty has been remedied somewhat by removing the telephone ground a quarter of a mile away from the car line. The injury to the telephones will be much greater from the car line than from the electric light, although the latter carries nearly five times as many volts of electricity, because the car line will parallel the telephone about sixteen times the distance. The effect of the electric light on the telephone is to cause a continual hum and buzz. The only way I know of overcoming the difficulty is for the car line to put in a return wire and make a complete metallic current. By using the return wire the two would neutralize each other and there would be no leakage. This has been done with other systems of electric railways, and I see no reason why it could not be done with the Sprague. The buzzing sound to be heard in the telephone is caused by the variations of the current, as no dynamo has ever yet been made that generates a perfectly steady current.

In cross examination, the witness was asked whether the telephone company could not easier run a return wire and overcome this difficulty, to which he replied that it could be done, but it would necessitate the running of another wire to