

26. *Mr. Moore.*] If you had a single-trolley system would that mean taking charge of the whole street on account of the electricity being so powerful?—The effect would be on telephones; they are very delicate instruments, and their action depends on the vibration of a ferrotype diaphragm which is actuated by extremely small currents. Tramway or other electrical systems would take care of themselves.

27. But the telephones could make use of the earth?—Yes, under certain conditions. Electric lighting companies are debarred from using the earth-return when working above a certain electrical pressure. It would be absolutely dangerous for them to use the earth as a return when using a high electro-motive force, owing to the chance of a leakage on the one insulated wire, when contact with same might mean serious damage to persons. In the case of a tramway company, Mr. Edison recommends that not more than 500 volts should be used when earth is the return. Although there are these effects upon telephones, the single-trolley system is being used in hundreds of cases, and the rails used as return; each rail is joined to its neighbour by a copper strip about a foot long, with an eye at either end, and a copper rivet put through the eye and rail and well rivetted up. This is supposed to make a complete metallic circuit.

28. Is it possible to use the line as a return?—It is being used in America, and the public there is not up in arms against the single-trolley system.

29. *Mr. Earnshaw.*] Has there been any difficulty between the tram services and the telephone subscribers?—There have been difficulties, and they are to be got over by the telephone companies using a metallic return.

30. *The Chairman.*] Are the Committee to understand that if the single-trolley system were adopted, and the Telephone Department adopted the metallic return, neither would injure the other?—Certainly, that is the case. The induction caused by the use of the single-trolley system, when the telephone exchange is using the earth-return, can be fairly well got over by using the copper strip as described. But that copper strip must be rigidly inspected from time to time to see that contact with the rail is good.

31. *Mr. Earnshaw.*] I presume the Tramway Company in Dunedin would be quite prepared to put the copper strips on the line?—Yes. Tramway companies have not consented to its use on account of any pressure brought to bear on them, but simply for the protection of the telephones. In America, they have in several cases a bare wire running down the centre of the track, and every rail is joined on to that wire. With that arrangement you of course get an even better return circuit.

32. *The Chairman.*] Could you give the Committee any information with regard to the extra cost involved in making the alteration to the telephone system?—Not unless I went over the ground. Circumstances alter cases so much. Mr. Edison was asked: "In your opinion, as an expert on telephoning, is the grounded telephone the best?" He said, "No, the telephone suffers more from its own self than anything else I know of. What is said on one wire, under certain conditions, is heard on half a dozen other wires. The metallic circuit obviates this, and prevents what they call 'cross-talk.'" He was asked whether the successful use of a grounded circuit on the telephone depended upon its having exclusive use of the ground; and he said, "Certainly not; if you make a good contact with the rails in the electric motor, it would not interfere particularly." I think that is the best evidence you can possibly get. The Judge said, "So long as anybody uses the earth, can a grounded telephone be successful?" and the reply was, "Certainly, if the rails were united as I say." He said, "If the telephone is to be made free from all sounds and all interference, then my impression is that the power and light stations would either have to stop, or else the telephone would have to employ metallic circuits." That is, you must stop all motors for domestic services, and so on. There was a very important decision given some little time ago. The National Telephone Company of England was the plaintiff, and Mr. Graff Baker representing the Leeds Tramway Company the defendant. The National Telephone Company wanted a permanent clause inserted by the Board of Trade in all Tramway Bills, in order to save the expense of opposing each Bill. At the present moment there is a Select Committee of the House of Commons and the House of Lords taking evidence, with a view to decide once and for all, whether the telephone companies are to have the exclusive use of the earth as a return.

33. *Mr. Moore.*] That would apply to the Government?—No, to any one. There was a case in the town of Halle, in Germany, a year ago. There the telephones are owned by the Government, which is semi-despotic, and it was thought very bold on the part of the Tramway Company to attempt a case with the Government. They did so, however; the case spread over several days, and was given by the Judge against the Government. The trams are running now on the single-trolley system.

34. *Mr. Earnshaw.*] If the Tramway Company took every precaution with regard to making their rails a good return current, would there be ordinarily as much conflict with the telephone system then as there is now?—There would be no more cross-talk heard in the telephones than there is now.

35. The percentage would not be great?—There should be a clause inserted in any Tramway Bill that the lines are to be properly inspected, and the return kept in proper order. In the case of *The National Telephone Company v. Leeds Trams*, in which case Sir Richard Webster, Q.C., Mr. Moulton, Q.C., and Mr. Bousfield were employed, Mr. Bousfield, in addressing his Lordship, Mr. Justice Kekewich, said he would only trouble him with one case—an important one—in which the British authorities were cited, and which plainly went on the same law as was administered in his Lordship's Court. It was *The Cumberland Telephone and Telegraph Company v. The United Electric Railway* (42 "Federal Reporter," p. 273). The concluding passage of judgment in this action ran as follows: "The substance of all cases we have met with in our examination of this question—and we have cited but a small fraction of them—is that, where a person is making lawful use of his own property, or of a public franchise, in such a manner as to occasion injury to another, the question of liability will depend upon the fact whether he has made use of the means which, in