

the tires, forming a constituent part of the tire, as would be taken up off the road from a road oil. As for sulphuric acid, the refining processes tend to neutralize any such acid in the oils. But even a little sulphuric acid would not injure tires appreciably. The little bit of acid that would remain on the road after rainstorms, etc., would not 'touch' the tires."

C. A. Mullen, director of paving department, Milton Hersey Co., Limited, chemists and inspectors: "In reply to your enquiry for our opinion as to the effect that the small percentage of sulphur in asphaltic road oils might have upon the rubber in automobile tires passing over roads treated with such oils, we do not believe there would be any effect, and consider the suggestion that there might be as very far-fetched."

A. W. Dow, of Dow & Smith, chemical and paving engineers: "From long practical experience with oils containing sulphur, on roads, and also from laboratory examination, and from a theoretical consideration of the subject, we can positively state that the sulphur contained in road oils has no action whatsoever on rubber tires or rubber compounds.

"If the sulphur in the original oil was in a condition to act on rubber, this property would be entirely destroyed in the course of refining the oil. Any sulphur or sulphur compounds that will attack rubber will also attack the hydrocarbon oils when heated with them at a high temperature. In the process of manufacturing the asphalt road oils they have been heated to such a temperature that all active sulphur or sulphur compounds have been destroyed and rendered inert so that any sulphur that remains in the road oil has absolutely no action whatsoever on rubber or its compounds.

"The writer, while connected with the United States Government in Washington in 1914, made quite extensive tests on the action of road oils on rubber tires and pure gum rubber. Among the oils tested was a crude oil from Beaumont, Texas, oil field, containing considerable sulphur, some of which was evidently in a free state. After a test extending over six months he could not note that this oil had any more deleterious effect upon rubber tires and gum rubber than had oils from California and Pennsylvania, which were quite free from sulphur and sulphur compounds. In fact, he was surprised at the slight action of the heavy road oils on rubber and rubber compounds. He did find that the crude Russian oil had more action on rubber tires than any of the oils from the United States.

"Any statement to the effect that the sulphur is contained in these oils as sulphuric acid is absolutely false, as sulphuric acid can not exist at temperatures much lower than those to which the oils have been subjected in the course of their manufacture. The fact that these oils are shipped in iron receptacles and are refined in iron stills should be sufficient evidence to show that such a statement is ridiculous.

"I have just inquired of the chief chemist of the United States Rubber Company, who are large manufacturers, if he has ever noted any deleterious effects of road oil on rubber tires, and if so whether he has noted that any one oil is more deleterious than another. He has just told me that he has never noticed any difference in the action of different oils on rubber tires, and part of his work consists in the making of special mixtures for tires and studying their wear under different road conditions."

A. E. Heyes, of Thos. Heyes & Son, consulting chemists: "The sulphur or sulphonates in road oil would

not affect rubber tires. There would be no active sulphuric acid in such oils after refining. The only damage road oils would cause would be a tendency gradually to rot the tire and its canvas backing through softening. This would be very gradual and hardly need be considered for any practical purposes. If a tire were to be immersed in an oil bath and stood in the sun, then the oil would no doubt have an effect upon the tire. But it would require eight per cent. of sulphur to harden or crack tires, and even if this quantity were to be in the road oil, the nature of the contact of the tire and the oil is such that we do not believe there could be any injurious results from anything of this nature."

T. Linsey Crossley, of J. T. Donald & Co., consulting chemists and paving engineers: "Unless the road oil is badly placed, the oil will not get on the tire at all except on the tread, which would not be affected by the oil. The tread is either being continually rubbed off by the stone dust and sandy matter, or else, if the road is muddy, the mixture of water with the oiled earth will dilute it so much that there is still less chance of any damage. As a matter of fact, the tire troubles so often attributed to road oils are almost always due to other causes.

"Some oils are solvent and might affect a tire somewhat, but not a high grade asphaltic or tar oil. The cheaper, carelessly-prepared road oils would affect tires, but even there the damage is not due to sulphur but to the fraudulent use of acid sludge, i.e., the mixture of sulphonated hydrocarbons resulting from the treatment of bitumens with sulphuric acid. If any of this material should be sold by mixing to form a road oil, or should find its way into a carelessly prepared road oil, it might have a bad effect. The chief effect would be upon metal surfaces rather than on rubber, however.

"Sulphuric acids in straight steam-refined road oils would no doubt be eliminated by the refining processes. The sulphur that occurs in the crude oils is present as complex sulphur compounds of these oils, and not as H_2SO_4 , or as H_2SO_3 , and probably not even as H_2S .

"Chemically, road oils are very inert substances. Any action they would have would be physical, i.e., as solvents. And I do not think that the solvent effect upon tires would be noticeable. Even if one soaked a tire in road oil, it is doubtful whether that would have much actual effect."

The opinions of these well-known paving chemists, and of the tire manufacturers (who guarantee big mileages for their tires and would be bitterly opposed to any influences tending to damage them) are authoritative. Due consideration will no doubt be given to them by the committee reporting on this specification.

C.P.R. EXHIBIT OF HYDRO-ELECTRICS.

To emphasize the economic importance of electric products, and to show their relation to other industries is the object of the C.P.R. Hydro-Electric exhibit opened on March 12th in the Shaughnessy Building, McGill St., Montreal. The exhibit has been arranged to interest the layman as well as the specialists, and, although it is essentially technical in character, processes are explained so clearly in the accompanying placards that he who runs may read. An instance of this is the series showing the evolution of the modern incandescent electric lamp. An interesting item shown was a shell piercer punch with an actual record of having pierced 24,000 4-5 inch shells.