cluding that on farms and real estate. Should not a road, the primary purpose of which is to make the farm accessible to market, receive part of its construction and maintenance costs from the farm, and part from the motoring public for occasional use of that road?

At first, general property tax and abutting property assessments paid for all rural highways and city streets. Now the pendulum has swung to the other extreme, and through gasoline tax and motor-vehicle tax we are attempting to maintain all the roads and streets in Indiana at the expense of the motor-vehicle owner.

Could we not, at this time, create some well-founded plan or formula whereby all roads and streets in Indiana could be built on a co-operative basis by a motor-vehicle tax, a gasoline tax, and some real estate tax, either general or on abutting property? I am not trying to say what proportions these various agencies should pay. That would necessitate more careful study than I have given to it. I merely offer it at a meeting such as this for your consideration.

We in the state highway commission have enjoyed our associations with the other agencies in the highway field. These other agencies have been fair with us, and we have attempted to be fair with them. The problem before us is difficult and the solution must come from co-operation of all these various agencies rather than from dictation by one.

**OBSERVATIONS ON EUROPEAN ROADS**

John S. Crandell,
Professor of Highway Engineering,
University of Illinois

(Editor's note: No paper presented. This is a very brief resumé of Professor Crandell's excellent extemporaneous address.)

For a long period after the War the European countries neglected their highway systems. The roads of Germany and Austria suffered particularly because there was little or no maintenance. France maintained her roads but did not add to them or improve them. Italy seemingly was asleep for centuries, and did not awaken until Il Duce, in 1928, said, "Make war on the dust."

Now, however, all Europe is awake to the need for excellent highways, and in many of the countries road building is being pushed to the utmost. Italy has thousands of miles of splendid roads, all completed in the last six years. Germany is building nearly four thousand miles of new roads on new locations, which will make many of our own through routes look rather amateurish by comparison. France has been
widening and improving her network of roads to a very appreciable extent, and they compare favorably with our own. Austria started a very ambitious program of modern road building, but she ran out of money and only a series of scattered fragments is to be found.

Switzerland had a good-roads program in mind for years, and had put it to use long before many of the other countries were aware of what she was doing. As a result there are hundreds of kilometers of good roads in that mountainous country, where road building is most difficult. Spain embarked on a modern road building program as early as 1924, and many miles of heavy-type through roads have been constructed there.

The automobile is popular in England, and so the Britains have started to rebuild their ancient highway system. Their old narrow, crooked roads are wholly unsuited to 1936 traffic, and so straightening and widening of the existent roads is under way on a wholesale plan. A modern road-testing laboratory has been built, and England will soon have a system of highways of which she may be proud.

CEMENT-BOUND MACADAM PAVEMENTS

C. R. Wightman,
Director, Department of Public Works,
Benton Harbor, Michigan

The first known use of cement-bound macadam was in Edinburgh, Scotland, in 1872. Incidentally, that same pavement is still in use and in good condition after sixty-three years. It was first introduced in the United States in 1906 at Lynn, Massachusetts; in Portland, Oregon, in 1908; on the Boston Post Road in 1914; and at Hannibal, Missouri, in 1915 or 1916; and from 1906 until 1922, at various places in the New England states and along the Pacific Coast, some eight hundred miles were built. Portland, Oregon, has nearly 93 miles of this type of paving.

In 1933 a test road was constructed at Elmhurst, Illinois, by the Portland Cement Association, under the able direction of that well-known concrete-paving authority, Frank T. Sheets, consulting engineer. After much scientific research and investigation, there are now available to the engineer data which enable him to design a pavement of major importance and to control its qualities as closely as those of pavement of mixed concrete.

An impasse in street improvement in Benton Harbor having been reached in 1926, any suggestion of resuming operations which entailed special assessments would have meant official suicide to the proposer. Our city manager had requested me to make an investigation of some of the so-called