

## MAINTENANCE OF ROADS AND PAVEMENTS.\*

By James Owen.†

The writer of this article would have preferred that the title of this paper should have been the economies of roads and pavements, as he sees that at this stage of road development the financial question is paramount. But as finally the maintenance problem is the one with which to deal, the discussion of that feature will of necessity include the money end, so it is hoped that undue stress upon what is sometimes too apt to be ignored in engineering in the means of construction as well as the methods will be pardoned.

In discussing the pavement problem in such an extensive country as this, with its varying climate, topography, materials to be used and habits of the people, it would seem impossible for any one individual to cover the whole ground, as, of necessity, each man's environment and experience are limited. Yet, the aggregate of such experience will be of value to all. So, if in these remarks statements at variance with the ideas and experience of other members of this convention are made it is hoped that prompt repudiations of the statements will be evolved, as by such means will accurate data be accumulated.

To properly consider the subject in its entirety it may be wise to indulge in a classification of the people, the pavements and the pay. The traveling people may be divided into urban, suburban and rural and it may be confidently stated that the requirements of the pavements differ in character practically in accordance with this division, except that there may be a certain overlapping due to special conditions. This covers two heads. The ability to pay varies spasmodically with climate, topography and the energy of the community.

Now enters into consideration the character of vehicles which there are to-day two, self-propelled and horse-driven. Both of these may be divided into fast and slow moving, the heavy wagon, the light buggy, the motor truck and the automobile, these introducing still other items, the iron tire of the wagon, the solid rubber of the buggy, the corrugated tire of the motor truck and the pneumatic tire of the automobile. All these factors vary in weight and speed and their effect on the surface of the pavement is of vital importance.

Another point, which has not yet arisen, is the effect of different pavements on the tires of vehicles. So far, the owners of such vehicles have been so busy trying to get something smooth to ride upon that they have been content to pay their bills for new tires and new wheels ungrudgingly, yet in the future it will be an important economic factor.

There is still another factor which to-day is the most important in road construction, viz., the suppression of dust. Also, there enters in, to a lesser degree, the suppression of noise in cities.

Taking all the factors outlined heretofore, the problem is to furnish a pavement that is smooth, durable, dustless and cheap; and that problem is to-day facing the civilized world. It is not my intent to dilate very extensively on the paving of cities, as practice in that branch is being slowly crystallized and the principles governing it are giving good results. Classify city traffic into business trucking, arterial communication and purely local distribution, with the use of the following standard pavements, wood block, granite block, Medina sandstone, brick, asphalt and the tar compounds,

and with proper care in the selection and manufacture of material and a conscientious disposal of it in place, and in most cases a smooth dustless pavement will be secured. But here enters the question of maintenance and also the traveling factor. At the same time there arises a controversy between drivers of horse and motor vehicles on the question of smooth pavements, the horsemen claiming that the smooth pavements, like wood block or asphalt, are impassable and useless at certain periods for heavy hauling and should not be tolerated. That at seasons their slipperiness is detrimental is not doubted. However, this point is one for purely local consideration and cannot be generalized upon.

Cobbled and old-fashioned granite block are certainly permanent but not desirable. The close jointed grouted granite block and the Medina sandstone would seem to be ideal. They are smooth, and once down relieve the maintenance department from attention for a generation. Wood block as now laid is desirable, smooth, and, at times, slippery, but its permanency is unknown.

The brick pavements of to-day are desirable and appropriate, especially in districts where there are no stores. Here it is proper to make the statement that many paving brick manufacturers are setting an example to the community in concentrating their efforts on making and delivering the best possible brick, relying more on the character of the material than on their profits for future prosperity. The writer suggests this example to other industries. Brick pavements as now constructed also relieve the maintenance department, if proper care is used in discriminating on certain character of travel. Where there are extraordinarily heavy loads and dense vehicular travel, it is not wise to use brick.

We now come to the mastic propositions in which the maintenance department sooner or later takes an interest. The asphalt and tar preparations give a smooth, dustless and serviceable road, and are desirable for residential sections and in many cities are universal. Their maintenance is carried on in different municipalities in different ways, some owning their own repairing plant, others contracting the repairs, and still others neglecting them altogether. It is safe to say, however, that after five years' use of these pavements the item of repairs begins to be a factor, although the writer has one asphalt pavement which has been in use for nearly ten years without repairs or apparent necessity for them.

Interjected into many cities is the use of cheaper pavements for purely residential streets of both high and humble character. Sanitary precautions in some cases cause their existence before the demand is made by the residents who often are not able or willing to pay. In other instances they are laid at the desire of the property owners, and in these the maintenance problem soon appears, and the practice there can be considered the same as in suburban communities.

In street development in suburban communities or small towns there are new factors to be considered. Except in main thoroughfares the travel is light. The unwillingness to pay large assessments and also the suppressing of dust has opened the field to endless inventions with varying materials to provide cheap, smooth and dustless pavements. All kinds of panaceas have been promoted and enormous sums of money have been expended in experiments, and it is to be hoped that in the near future a practice may be adopted available to all within their means. This same idea extends, to a degree, to rural highways, and it would seem desirable to discuss the problem as common to both classes of communities.

\* Paper read before American Road Builders' Association, Nov. 14-17, 1911.

† County Engineer, Essex County, New Jersey.