

satisfactory results may be obtained by importing the broken stone for the surface of the pavement and using local rock for the lower part of the crust.

In order that road metal should interlock during compaction and thus provide a stable wearing course, a proper angularity is an important prerequisite. The road metal should not contain over 5% of particles having small acute angles, nor should the product contain slivers. Road metal which has a rough or coarse grain or pitted surface is preferable to material with smooth or glassy surfaces, as the tar cement adheres more satisfactorily to the former than to the latter. Cleanliness is an essential quality of road metal for the wearing course of tar macadam pavements. It is difficult and usually impossible to secure a good adhesion of the tar cement to road metal which is not clean.

**Construction**—In the construction of tar macadam pavements it is desired to secure (1) a stable wearing course consisting of broken stone or similar material thoroughly rolled so that it will be well compacted and keyed together, and with the several sizes of material uniformly distributed; and (2) a uniform distribution and penetration of the tar within the upper  $1\frac{1}{2}$  to 3 inches of the crust.



**Construction of Pitchmac Pavement, Liverpool**

Several methods of construction have been devised with a view to meeting the above prerequisites. Careful supervision, based on experience, is necessary to prevent non-uniformity in the density of the wearing course of broken stone and in the amount of tar applied per square yard. It is evident that uniform application of the tar will depend upon the method of distribution employed. In using vehicular distributors, one cause of uneven distribution of the tar is overlapping of applications. The use of strips of tar paper or wrapping paper, from 3 to 5 feet in width, placed at the edge of an application, has prevented sections of the wearing course receiving double the amount of tar cement specified.

A typical American method of construction is as follows: The metalling of the wearing course is a uniform product of about 1 or  $1\frac{1}{2}$  inches in size or a product similar to or larger than one passing over a  $1\frac{1}{2}$ -inch and through a  $2\frac{1}{2}$ -inch screen, and the voids in the upper part of the wearing course are filled after the tar cement is applied. Practice varies with reference to the amount of rolling of the wearing course prior to the application of the tar cement. For traffic medium or heavy in weight and amount, the best results have been secured by thoroughly rolling the road metal and thus securing maximum interlocking of the particles and thereby securing the highest degree of stability practicable by this method. The tar cement is applied in an amount varying from  $1\frac{1}{2}$

to 2 gallons per square yard, after which  $\frac{3}{8}$ -inch stone chips, or a product similar to one passing a  $\frac{1}{2}$  inch and through a 1-inch screen, is spread and thoroughly rolled. Usually the surface is then broomed with stiff brooms, removing the excess loose broken stone, and another coat of tar cement, from  $\frac{1}{3}$  to 1 gallon per square yard, is ap-



**Wrong Way to Use Pouring Cans**

plied, covered with a layer of stone chips or pea gravel, and rolled.

A tar macadam pavement called "Pitchmac" by its inventor, J. A. Brodie, city engineer of Liverpool, England, has been used to a considerable extent in that country and has been adopted as a standard type by the English road board. It is constructed on a foundation of stone. The wearing course of broken stone varies from 2 to  $4\frac{1}{2}$  inches in depth, dependent upon traffic conditions. If the wearing course is from 2 to 3 inches in thickness, it is constructed in one layer; and if from 4 to  $4\frac{1}{2}$  inches, in two layers. The single layer (or, in the case of two layers, the upper layer) is composed of broken stone ranging in size from  $1\frac{1}{4}$  to  $2\frac{1}{2}$  inches. After thorough rolling, the tar compound is applied to the single layer or to each of the layers of the two-layer wearing course. The tar compound used in England consists of hot sand mixed with tar pitch. From  $1\frac{1}{4}$  to 2 gallons per square yard are used for the one-layer wearing course, and from  $3\frac{1}{4}$  to  $3\frac{1}{2}$  gallons for the two layers.



**Right Way to Use Pouring Cans**

To assist in completely filling the voids, chips varying in size from  $\frac{3}{8}$  to  $\frac{3}{4}$  inches are applied during the rolling of the tar-grouted layer.

The oldest sample of Pitchmac in Liverpool was laid in Princes Avenue, in 1901, near the end of Eversley Street, and has been in continuous use ever since without repair. This avenue carries a large volume of light motor