to $1\frac{1}{2}$ -inch width are provided along either curb, and are filled with the bituminous filler.

Methods of pavement construction in France closely resemble those adopted in England. No cushioning medium is used, and in addition to the usual longitudinal expansion joints, transverse joints are provided at intervals of 100 feet or more. All such joints are filled with heavy paper box fillers, or in some cases with collapsible metal joints. Cement grout is generally used as a jointfilling material, although apparently pitch is adopted in some cases.

In America there is at present an even greater variety in methods of construction. Until comparatively recently sand cushioning has been in favor for all types of brick or block pavement. Such a cushion varies from one-half inch to 11/2 inches or more in depth, according to the regularity of the surface of the foundation. This has been a frequent source of trouble. Particularly on grades and on heavily crowned streets the sand flows with the water which finds its way below the block surface, and this results in unequal settling of the blocks. This tendency to shifting of the cushioning material is apparently greater where the pavement is subjected to excessive vibration, as between car tracks. This defect is now being generally recognized, and leading authorities in pavement construction in the United States and Canada advocate a modification of European practice. They prefer a cement mortar bed of from one-half inch to I inch in depth of 3: I sand and Portland cement mixture, laid dry and struck off to a uniform depth with a template. The blocks are laid on this, and the pavement is sprinkled before and after laying and rolling the blocks. Sand filling for body joints has also been largely used, but is being displaced by bituminous material which should be selected of such composition that it will not run or become brittle at the extremes of temperature to which the pavement is exposed. American practice closely agrees with methods in vogue in England as to expansion joints and sand surfacing. It is claimed by some authorities that a more liberal allowance is necessary for expansion in American pavements. Whether this difference is due to climatic conditions, or to the difference in the woods used and methods of treatment is not entirely clear. A feature of construction that has been introduced into the United States, apparently with successful results, is the laying of the block courses at an angle to the street line something less than 90 degrees. Inclinations of 45 degrees and $67 \frac{1}{2}$ degrees have been adopted, the latter apparently having given the best results. This practice was first introduced as a possible means of more evenly distributing the joint-wear from traffic, and to provide a longitudinal component of expansion movements.

It is generally admitted that the success of European wood-block paving has been largely due to the high standard of workmanship secured. American operators now require more uniform methods and more careful work in actual construction than were formerly thought necessary.

Defects of Early Wood-Block Pavements.—In earlier wood-block paving practice, faulty methods of treating and failure to appreciate the importance of such factors as the selection of proper timber-stock and careful workmanship in construction were responsible for unsatisfactory results which have developed a prejudice which has been slow to disappear. Insufficient impregnation was an error in French practice which has persisted until quite recently. The absorption of 3 pounds or 4 pounds per cubic foot, secured by simple immersion, proved quite inadequate to prevent decay, and the blocks so treated had a comparatively short life. In England, practice has become well settled in the adoption of a 10-pound or 12pound impregnation. In America a much heavier treatment is generally favored, and this is held by some authorities to be at least partially responsible for another difficulty which appears to have been peculiar to American "Bleeding" or exudation of the oil from pavements. treated blocks has been a rather frequent source of trouble in the United States. This condition, where it appears, develops in hot weather during the first season of use, and is probably due in large part to excessive treatment with an oil that is not adapted to such conditions of service. The character of the wood is probably to some extent a factor in causing this condition, inasmuch as heavier treatment is permissible, or even necessary, for some species. It has been claimed by some investigators that bleeding is largely due to the stresses developed in the pavement sheet as a result of the absorption of even comparatively small amounts of water. It is doubtful if this idea is confirmed by actual observation. A case has been noted of a pavement laid on a Chicago street, where the blocks used on the north side and south side of the street were obtained from different manufacturers. "Bleeding" developed on one side only (the north side) and apparently, all other conditions being uniform, the cause lay in the character of the oil used.

However, the responsibility for this trouble has not been finally distributed to the several factors which have been suggested as causes, and the matter is now under investigation in the United States.

Heaving and buckling of the pavement sheet have been frequent causes of trouble where insufficiently treated blocks have been used, and where adequate provision for expansion has not been made. Apparently not much difficulty is experienced from this cause in English practice, and it is probable that climatic conditions are in part responsible for the freedom from expansion troubles. It has been suggested that because of the comparatively high humidity, the blocks are in a condition of maximum expansion during the greater part of the time, and are not subject to the extremes to be met in the United States or Canada.

A criticism which has been directed against woodblock paving from some quarters is that it presents a dangerously slippery surface, when newly laid or when wet. However, this difficulty has been overcome in part by the adoption of a clean hard sand surface-dressing, as a final step in construction or at such later intervals as may be necessary. The sand is worked into the blocks by traffic, and serves the manifold purpose of developing a hard, resistant and non-slippery wearing surface, and reducing the nuisance from exudation of oil, where that occurs.

The difficulties due to insufficient impregnation are fairly clearly recognized. American practice is perhaps inclined to err on the other extreme, and, comparatively recently, attention has turned to the possibilities of certain processes which are claimed to secure maximum waterproofing and antiseptic effects with the use of less creosote oil than has heretofore been regarded as necessary.

Expansion troubles have been largely overcome by the provision of ample longitudinal joints. The American practice of laying the block courses at an angle of from 60 degrees to 70 degrees to the street line is claimed to reduce the tendency to buckling, in addition to reducing the wear along the joint lines.

The difficulties from the use of sand cushioning have already been referred to, and it is significant in this con-