for all practical purposes, and the ease with which a canal can be measured by this method is a strong incentive to its use.

At the time of the current meter observations in the canals, float measurements were also taken in order that comparisons might be made between the quite accurate current meter method and the approximate method of time floats over a given reach of canal.

The floats were operated in the following manner. A great many small sections of green wood were prepared by chopping willow or similar brush into pieces about two inches long. Green wood is desirable as it sinks low in the water beyond air resistance. Fifty or sixty of these were dumped from a hat into the swiftest part of the channel at the upper end of a measured reach of canal; generally the same reach as was used in computing the value of "n" for the major part of the experiment. The float first reaching the lower end of the reach was assumed to have taken the maximum threads of velocity throughout the reach, perhaps 1,000 feet long. Many floats must be used as they string out over perhaps 20 per cent of the course. When the final study was made by Mr. Harding he found that it was necessary to multiply the velocity as found by the fastes t float by a factor ranging from .60 for ditches having the value of "n" of about 0.030 and a cross sectional area of two square feet up to a factor of .91 for canals having a value of "n" of 0.012 and a cross sectional area of more than 30 square feet. Thus we see the co-efficient to be used varies with the size of the channel and also with the condition of the channel as regards smoothness. This information is not particularly new, being analyzed in Hering & Trantwine's translation of the original date of Kutter and Gangnillet, but somehow the standard works on hydrau is have advocated a co-efficient or factor of .80 to 0.83, but it is seen from the above statement of variation that his method can be but an approximation at best, and should only be accepted as such. Where the factor of .80 is used it is evident that the results are as liable to be from 20 to 30 per cent in error as to be right.

The Measurement of Water in Pipes.

In order to determine the actual earrying capacity of wood-stave pipe in commercial service, an extended series of experiments was conducted upon this type of pipe ranging in diameter from 8 inches to 13½ feet. The records obtained from these experiments were then analysed together with all other tests upon wood pipes and as the combined results were at variance with formulas at that time accepted for the flow of water in that type of pipe, a new formula was developed that did, as near as might be, fit all the experimental data. The result of this study was then submitted to several hydraulicians whose work qualified them to criticise it, and their discussions added to the original manuscript and the whole published as Bulletin 376 of the U.S. Department of Agriculture. The Flow of Water in Wood-Stave Pipe," by Fred C. Scobey. The formula offered in this paper has been accepted for designing purposes by the U.S. Reclamation Service, many of the pipe manufacturers in the United States, and by the engineers generally throughout the country.

A similar series of experiments was conducted for two years upon the various kinds of concrete pipes and a bulletin has been prepared for publication, but it is not yet available in pamphlet form. However, the elements of the results for any particular kind of pipe may be obtained upon application to brigation Division, Burean of Public Roads, Federal Bidg., Berkeley, California U.S.A.