(3) The determination of the carrying capacity of wood-stave and concrete pipes.

(4) A comparison of results obtained by various methods used in the operation of the current meter in irrigation and power canals.

(5) A comparison of results obtained by floats and the more accurate current meters and weirs.

(6) The determination of velocities, from which discharges may be ascertained, by means of colors in pipe gagings.

(7) The testing of many types of special measuring devices to determine their adaptibility to irrigation and power conditions.

In order to design irrigation or power channels correctly or to estimate the capacity of canals which at the time of inspection are carrying but a part of their maximum capacity, a long series of experiments was conducted upon canals in commercial service. The results of these tests are embodied in "The Flow of Water in Irrigation Channels," Bulletin No. 194, U.S. Department of Agriculture, by one of our Senior Irrigation Engineers, Fred C. Scobey. This work may be considered as following the experiments made along the same lines by the writer more than twenty years ago, and described in Water Supply Paper No. 43, U.S. Geological Survey, entitled "Conveyance of Irrigation Water in Channels, Flumes and Pipes." The value of "n" in Kuter's formula, as listed by Mr. Scobey, confirm those recommended by the writer in so far as the types of channels are the same, but the later work covers some materials that were not in general use in the late eighties. For detailed information as to these values of "n" you are referred to the above publications, but in general they are as follows:

No values of "N" less than 0.011 are suggested for commercial construction. In isolated cases smaller values have been found, but we are of the opinion that these values are, for the most part, just those points on the low side of a general curve such as are found in any experimental work or that the conditions for experimentation were more nearly comparable to those obtaining in a laboratory than to those found in commercial use.

N=0.011 for smooth steel flumes under best of conditions. Some exceptionally high grade concrete and wood-stave pipe also show this low value.

N=0.012 to 0.016 for concrete lined channels and concrete flumes, the value to vary according to the conditions making for smoothness; a good design value for the average work to be about 0.014.

N= 0.013 to 0.016 for timber flumes: the lower values to hold for the best lumber, alignment and workmanship, and the upper values to be used for unsurfaced lumber, in crooked alignment subject to deposits of rock ravellings and gravel.

N=0.016 to 0.025 for earth canals in materials ranging from smooth clays, without vegetable growth, up to old ditches in a fair state of maintenance, the accepted value for designing moderately sized canals that will receive pretty fair treatment being 0.0225, while small farm ditches are usually designed with a value of 0.025.

N=0.027 to 0.032 for mountain canals with cobble stone bottoms.

N=0.035 to 0.050 for rock cut canals, depending on the way the material breaks.