walks, where ground water is absorbed by capillarity. Another common exhibition of them is in retaining or buttress walls exposed to seepage. In fact, so common are such conditions that they are accepted as the inevitable, and in the long run, a multiplication of such instances, caused directly by careless workmanship and lack of understanding and knowledge, are going to be factors in creating distrust of concrete in the popular mind, that will do a vast amount of damage to the concrete industry.

The subject of increasing hydration is a very important one. Results have indicated that much can be accomplished through lowering the surface tension of the mixing water by one means or another. These results, however, are not conclusive by any means. They are but tentative, and, although it was expected to have further results available at this time, this expectation was not realized through discontinuance of experimentation. This phase of the question, therefore, will be left for discussion until another time.

In conclusion, the author explains that in his paper defective concretes and causes of failure have been dealt with almost exclusively. This has been done because such concretes are those needing attention and study. Perfect concretes take care of themselves, and they are chiefly of interest in a critical study as forming bases of comparison. With this clearly understood, it is believed that there will be little cause for misinterpreting the attitude of the writer towards concrete as a material for general construction purposes.

PAVEMENTS ON HEAVY GRADES.

Grades greater than 15 per cent. on city streets are few and far between. Reports come in of 20 or 30 per cent. or even greater, but upon investigation these are generally found to be greatly exaggerated. Streets of even 10 to 15 per cent. are difficult of ascent for either horses or automobile traffic unless the pavement is both smooth and of such a character as to give a good gripping surface to horses' feet and automobile tires.

Mr. Stanley E. Bates, writing in Western Engineering, states that in Milwaukee there are two stretches of steep grade, namely, on Eighteenth and Nineteenth streets, where the grades are 13.5 per cent. and 15.3 per cent., respectively. Before improvement, these streets were little better than storm water courses and it was an extremely rare occurrence for any kind of traffic to try the ascent. In order to remedy this condition it was decided last year to pave them with concrete.

The concrete pavements of Sioux City, Iowa, some of which lie on 16 per cent. grades, were taken as a model for the construction, though some changes were made from the Sioux City specifications.

Both streets were paved 30 feet wide, the thickness of concrete ranging from 6 to 8 inches. Unprotected, transverse joints of tar and felt were spaced 25 feet apart and the concrete was crowned 4 inches.

The aggregates used in this work were sand, which was clean and well graded, and crushed granite ranging in size from 2 inches down. The surface was not corrugated but was finished rougher than is common for pavements on more level grades.

The Tagona Water and Light Company, with Ontario charter, has been dissolved.

DUCTILITY OF BITUMEN.

THE normal ductility of a bitumen is the distance expressed in centimetres that a briquette will stretch before breaking when tested under standard conditions. The standards and the method usually employed in ascertaining the ductility of a sample are outlined in the report of one of the sub-committees of the American Society for Testing Materials as follows:—

The mould used for making bitumen briquettes has the following dimensions:—

Total length (internal)	7.5 cm.
Distance between clips	3.0 cm.
Width of clips at mouth	2.0 cm.
Width of briquette at minimum cross-section (half-way between clips)..	1.0 cm.
Thickness of briquette throughout...	1.0 cm.

The clips containing the briquettes are pulled apart under water kept at 70° F. at a uniform rate of speed of 5 cm. per minute. They may be operated by any means that will give a uniform pull without appreciable vibration, the line of pull to be horizontal.

Some little work was done by the committee during the past year in the way of testing standard samples sent to different laboratories. Four sets of samples were sent to six different laboratories. The samples were selected by Mr. A. W. Dow, the chairman, from materials which were known by him as those on which it was difficult to obtain concordant results in this test. They were prepared with care in his laboratory so as to have the samples of each set as nearly identical as possible..

The directions accompanying the samples were as follow:—

Six briquettes from each sample should be pulled for ductility, pulling three of these at a time if the machine is so constructed. The sides of the mould may be either amalgamated or chalked, but please report which method is used. Make note of the way in which the moulds were filled. Give accurate measurements of the different moulds used, stating distance between clips, thickness of mould, width of smallest cross-section, width at clip and length-over-all internal measurement.

The asphalt sample must be melted by placing it in a hot-air oven heated to a temperature not exceeding 310° F. The sample must be thoroughly melted and well stirred, and at the time of pouring into the mould must be at a temperature between 290 and 300° F. (actual temperature of sample). The sample must not remain in the hot-air oven in a melted condition more than one hour. In filling the mould with the melted asphalt, pour in a steady stream into the centre of the mould, allowing it to flow both ways into the wider parts of the mould. When as much asphalt has been poured as will more than fill the centre portion of the briquette, the two ends of the mould may be filled, if necessary, by pouring asphalt into them. Allow the briquettes to cool in the laboratory at a temperature above 60° F. When they are sufficiently cool they must be levelled off in the mould by cutting off excessive asphalt with a hot putty knife. While this levelling is being done the centre portions of the mould must be squeezed together as tight as possible by hand so as to prevent them being forced out by the cutting. After this, the sides of the mould may be removed and the sample placed in water and kept within 1° of a temperature of 77° F. for at least one hour, and