shed of the north branch above Peter's ranche is extremely high. This is accounted for by the fact that this part of the river is fed by many springs, most of which have a continuous flow all summer. This condition exists in a lesser degree along the river as far down as Knight's ranche. It will also be noticed on consulting the data, and also the sheets headed "Milk River, Alberta, daily discharge sheet," that the discharge at certain stations is greater than that at the station next below it on the stream. This may be accounted for to some small extent by inaccuracies in the stream measurements, but the large differences shown on these tables are certainly not to be accounted for in this manner. The explanation of these differences (which the writer thinks is the correct one) is that the stream has a large sub-surface flow at some stations while at other stations this flow is brought up into the bed of the stream by underlying impervious strata. Some observations made at Writing on Stone constitute a certain evidence that this condition does exist along the river.

At this station the width of the river channel between banks is about 126 feet, and during the summer the actual width of the channel through which the water ran was only about 60 feet. This left a stretch of bare sand on one side of the stream about 60 feet wide, and the average elevation of its surface above the water was about 1 foot. Several holes were dug in this stretch of sand, and in each one the water was seen to have a quite perceptible motion in the same direction as the stream, proving that there was a considerable flow of water through this stretch of sand which could not be measured at this station.

Proposed Permanent Section Structure.

It has already been stated in this report that the sections used were all found to have shifting bottoms and that this condition is accentuated as one follows the river down stream from the western crossing of the north branch to the eastern crossing, and it was pointed out that this condition makes it necessary that gaugings be made at very close intervals in order to be able to plot an accurate discharge curve to cover a season's work. It is also probable that, owing to this same condition, the sections on the river will vary so much from season to season that a station rating curve developed from one season's work will be of little value for estimating discharges from gauge heights recorded during any succeeding season, which means that during all the years that information is required of the discharge of the river, gaugings at close intervals must be kept up continually.

There are also certain evidences, as already noted, to show that the Milk River has a considerable sub-surface flow and that this flow at certain stations is brought up to the bed of the stream where it is measurable, while at other stations it flows below the bed of the stream and is not measurable. It is thought that this flow is never far below the bed of the stream and it would be desirable to be able to measure this sub-surface flow at all stations.

It is thought that perhaps the best way to overcome these difficulties, and to prepare the river so that reliable information regarding discharges can be easily obtained in future years, would be to establish permanent sections along the river by artificial means.

Fig. 7 shows a plan of proposed structure for establishing a permanent section station at Spencer's lower ranche.

The section at Spencer's lower ranche was used because it is typical of the conditions existing along the river and also because, having the greatest width of any section used and being the most difficult point at which to obtain materials, the estimate of the cost of this structure shows the maximum cost of establishing a structure of this kind at any point on the river. This plan is not intended to be a final plan nor have the minor details of construction been closely looked into, but it merely shows the type of structure which the writer thinks would be practicable. The idea kept in mind in designing this structure was to create a permanent section where all the sub-surface flow would be brought to the surface and to have the floor of sufficient width and with a sufficient depth of water flowing over it to admit of the use of a current meter. It would be necessary to establish these structures at points on the stream where the slope of the stream below the structure would be sufficient to ensure against its being buried by silting up.

A structure of this type would not back up the water in the stream to any appreciable extent, and at flood periods it would be liable to complete immersion.

The artificial section created by the structure would be designed to carry the whole volume of the stream at all ordinary stages and after the station rating curve had been once developed to cover all the range of gauge heights, accurate discharges could be estimated at any future time simply by reading the gauge height at the section.

The total cost of this structure is estimated at $3,343.15.

Tables D, E, and F, attached to this report show the several items which constitute this total in detail.

The writer has not been able to find any record of this type of structure having been used before, but he feels confident that the information gained by its use would be very satisfactory and reliable. The writer's main object in including the discussion of this proposed structure in this report, is to have it on record so that the idea may be kept in mind and its merits looked into more carefully in the future than it has been possible to do at the present time.

RECOVERING CEMENT FROM "EMPTY" CEMENT SACKS.

An interesting investigation has recently been conducted by the Aberthaw Construction Co., of Boston, Mass., relative to the economy of treating empty cement sacks to recover cement adhering to them before bundling for return shipment. Instructions were sent to a number of jobs to have the man who was bundling the bags stretch each one over two sticks, mouth down, and then beat well. The cement was collected in a box. A careful account was kept of the number of bags shaken, the amount of cement saved, and the amount of the man's wages. Strength tests were made on the recovered strength, as it was probable that dirt or other foreign substances might be mixed with same. The total number of bags reported was 7,598; the amount of cement saved 4,130 pounds. The cost of shaking, bundling and tagging the above bags was $22.44, or about one-third more than the average cost of bundling and tagging without shaking. Hence the net cost of the cement saved was $7.48.

Comparative tests were made of the tensile strength of the shakings and of fresh cement from the same lots. An average of these tests showed a loss of 59 per cent. in strength after a 24-hour set, but a loss of only 35½ per cent. after a 7-day set. On the basis of this last figure, the 4,130 pounds of shaken cement is equivalent to 2,664 pounds of fresh cement. At 380 pounds to the barrel, there was an equivalent of seven barrels of fresh cement recovered. The average price paid for cement on these jobs was $1.41, so the value of the recovered cement was $9.87.