and gravel beneath, and rock was found at elevation —90, below ground level.

The test was made in caisson No. 163, which was 4 ft. 3 ins. in diameter and 64.7 ft. below ground level, or at an elevation of —51.17 ft., Chicago City Datum.

The apparatus consisted of a loading platform, extra bearing plate, wedges, 12-ft. rod, steel tape, straight edge, carpenter's level, platform scale, 13 tons of pig iron and tripod with drum for raising and lowering pig iron. The apparatus as used is shown on the screen.

The timber loading platform consisted of a central post 12 x 12 ins., with two 8 x 8 pieces crosswise at the top and covered with 3-in. planking. The post was shod with a steel plate 12 x 12 square by 1½ ins. thick. The extra bearing plate was a steel plate 12 x 12 x 2 ins., and was used beneath the loading platform, resting directly on the hardpan. Four wedges were used to steady the platform, loosely placed, as shown in the sketch. (See Figure.)

The steel rod, 2 ins. in diameter and about 12 ft. long, sat in a babbitted hole, 14 ins. deep, in centre of the platform. To the upper end of this rod the steel tape was attached. The rod projected up through the pig iron and thus permitted the tape to be unfastened while pig iron was being lowered into well. The tape was an ordinary steel tape, graduated to feet and inches.

The straight edge was as shown in detail and was found perfect when tested by reversal of the carpenter's level, which latter was of more than ordinary sensitiveness and accuracy. The platform scale was obtained from the hospital and was found correct by checking same against known weights. Thirteen tons of pig iron was on hand, but only about twelve tons of this was used, this amount being considered sufficient by all concerned. The tripod was of ordinary construction, such as was used on the work for excavating and filling wells.

Water had been standing in the well for several days and this water was removed Friday morning, on Jan. 26th. It is also necessary to deepen well between 2 and 3 ft. in order to remove earth which had been softened by the standing water.

As soon as this was done a hole 4 ins. deep and about 18 ins. square was dug in the centre of the bottom of the well and the bottom carefully cleaned and leveled. The extra bearing plate was then set, leveled and centred in this hole. It had been intended to enclose the central hole in a wooden box of four sides, to be backed up with concrete and clay to keep all water out of hole, but water sprinkled in from above directly into hole, so this had to be abandoned.

At 5.30 p.m. (Friday) a start was made at lowering the platform, but due to the fact that the platform had to be rotated so that notches would clear lugs in rings of lagging, the platform was not in place until 7.25 p.m. Platform was raised and dropped several times onto bearing plate in order to force out as much as possible of the earth which had sloughed off into hole.

Loading of pig iron onto platform was begun at 8.40 p.m. Pig iron was weighed out in batches averaging about 600 lbs. as fast as lowered and placed. The pigs were of varying size and were placed in layers of stretchers and headers radiating toward centre and bonded together in addition by small pieces of wood as deemed necessary. No pig iron was placed closer than 1½ ins. of the lagging, the pile when completed being about 4 ft. in diameter and a little over 12 ft. high.

Five readings were taken at intervals, the method being as follows: A permanent bench mark was established upon water table of present hospital building, within 4 ft. 7 ins. of the centre of well. Elevation of B. M. = + 17.49 C. C. D. This was leveled across from the B. M. to the tape by means of straight edge and read tape to the nearest 1/16 in.

The readings taken were as shown in the following table:—

Time.	Load.	Reading Ft.	Ins.
Jan. 27—			
12.15 a.m.	4,079	52	4 3/16
6.30 a.m.	10,887	52	4 15/16
9.35 a.m.	17,362	52	4 15/16
12.00 a.m.	23.189	52	4 15/16
Jan. 28—			
9.00 a.m.	24,189	52	5 1/8

The well tested was a very wet one, due to the fact that two sewers, 6 and 9 ins. in diameter, were cut into in sinking. This well was the wettest one encountered. From about 12 ft. to 14 ft. of water stood in the well during test.

When the platform and bearing plate were removed it was noted that 1/8 in. of compressed earth adhered to top of loose bearing plate.

The caissons were designed for 44,000 lbs. per square foot at top of caisson and were belled twice the diameter of the shaft. Considering hardpan at 60 ft. below the surface, the unit designing load on the latter is about 13,300 lbs. per square foot, or about one-half of the test load. The test load was applied to 1 sq. ft., while the area of the well was about 16 sq. ft. It is not known how much bearing value of the hardpan is increased when the caisson is completed and the well completely filled, but it must be a very material increase. The results indicate that the hardpan stratum will carry the load designed for with safety. Doubtless a portion of the settlement was due to the compression of the loose soil which sloughed in as platform was being lowered.

The test was conducted by Morey, Newgard & Co., under the personal supervision of the author. The W. J. Newman Company, contractors for the caissons, supplied labor and material. The total cost of the test was $400.

GROUND WATERS.

Underneath the surface of the earth is a vast body of water which may be likened to an underground lake, called the ground-water. It is into the upper surface, frequently termed the water-table, of this ground-water that wells are sunk for domestic and other water supply. In "The Water Powers of Canada," issued by the Commissioner of Conservation, it has been estimated that, if all the moisture resident in the upper 100 feet of the ground were collected, the amount would be the equivalent of a lake of water some 17 feet deep; that is, the equivalent of about seven years' rainfall. During periods of plant growth this ground-water yields, chiefly by capillary action, part of its moisture to the plants; and then, during seasons of excessive rainfall, is again replenished from the rainfall. The annual fluctuation in level of the ground water-table under normal conditions is but a few inches.

The underground waters of Canada, in some places, are now being tapped and wasted. State after State, in the United States, has enacted laws designed to conserve the underground waters.

BRITISH ENGINEERS ARRIVE.

The engineering party, under the direction of Mr. Henry W. Crees, of London, Eng., arrived in Montreal on Saturday, April 27th last, by the Canadian Northern liner Royal George.