This practically eliminates l , and the fact that the tips of the teeth are so rounded off that the pressure seldom comes on the extreme point of one tooth, and when it does, is diagonal to the line of least resistance, instead of vertical, enables me to do so entirely, and, as my table, made out in this manner, gives for a safe strain for a tooth of three-inch pitch, such as Mr. Cooper uses for his basis, with a factor of 8 to 1, a load of 4,162 pounds $\times 2.5$, or 10,405 pounds, while Mr. Nystrom, with the same factor, gives, by formula 20, 10,350 pounds, and by formula 21, 12,242 pounds, I think it is safe. S. W.

NOTE ON FRESH-WATER WELLS OF THE ATLANTIC BEACH.

Anything which will throw light upon the character of the drinking water which is supplied to the hundreds of thousands of sojourners by the New Jersey sea-coast, must necessarily have interest to the public, and especially to parents, for nowhere else does a sick child recover so rapidly as at the seashore, if other conditions are favorable.

The practice, during the last five years, has tended toward sinking artesian wells near most of the larger summer hotels. The supply of water by this means was so abundant and excellent that the New Jersey State Geological Survey, under the late able and much lamented Prof. George Cook, determined the water-bearing planes, and published the depths at which these might be expected in bore holes along the sea-coast from Sandy Hook to Cape May. The wells which have since been driven have amply proved the soundness of the data.

But in numbers of cases it is not possible to resort to deep boring, and in these cases the supply is by surface wells sunk a short distance below the sand. Of course, these wells are permissible only in cases where, for a considerable distance around them, the population is sparse and there are few cesspools or collections of decaying matter, and in some cases these conditions obtain sufficiently to justify the

use of surface wells, but sooner or later these must be abandoned and recourse must be had to artesian borings, which, fortunately, need not be very deep, to furnish an ample supply for all needs.

In order to give to the layman an idea of the condition of the strata and their relation to the water supply of the coast, it may be said that the famous marl beds of New Jersey, with the clays and sands which divide and intermingle with them, form impervious beds through which water cannot percolate. They cross the State from about Long Branch to the old town of Salem, near Fort Delaware, running approximately southwest, and inclining or dipping in a direction perpendicular to this (or southeast), at a gentle angle of about twenty feet to the mile. These are the water-bearing floors which supply the greater part of the artesian wells sunk along the coast between Long Branch and Cape May, though there are other and higher planes along which more or less good water is constantly flowing downward to and entering the sea at a greater or less distance from the coast. The permanence and purity of a supply will depend upon the extent of country which pours its rainfall upon the upper edges of these marl strata or the overlying clay beds. The outcrop of these strata is not parallel with the coast line, but runs inland to the southwest; it is, therefore, obvious that the farther one goes to the south from the intersection of these strata with the ocean border, the deeper must the well be bored in order to find water. One of the upper marl beds touches the sea line at Asbury Park, and the next higher marl at about Branchport. To reach the water flowing along the upper planes of the first deposit at the Beach House, Sea Girt, for instance, one would be obliged to sink about 160 feet; and to reach the probably larger supply of the marl next below at the same point, a depth of 240 feet would be required. But before coming upon these well-known horizons of good water, it is extremely probable that others would be found, representing higher clays, as was the case at Berkeley, on the Barnegat Beach.

But to return to the surface wells. There is at the

Beach House a well sunk by Commodore Stockton, when the middle house was his seaside home. This well is familiar to all who have visited this place. It is a prominent object on the lower porch of the hotel, and furnishes all the water consumed for drinking and cooking purposes. The depth of the bottom of the well is 20 feet 5 inches from the surface, and its average depth of water is three feet. One of its peculiarities which astonishes those unfamiliar with the behavior of streams of water at points near their confluence with another body of water of varying depth, is that the level of the perfectly sweet and fresh water rises and falls with the tide in the ocean 150 feet to the east of it. This is not at all remarkable when one reflects that the same ocean tide causes the fresh water of the Delaware and Schuylkill to rise, and their surface currents to retreat towards the mouths of those streams, though eighty-odd miles from the ocean.

The water which fills this well represents the drainage of a few square miles around Sea Girt, and is simply the rain water filtered through the sand and gravel of the coast belt, and collected on the surface of some local intercalated bed of clay. Were the region thus drained as thickly populated as a few other parts of the coastal belt the water would probably be unfit for drinking purposes; but it happens that the settlement of this area is sparse and its contamination from putrifying substances small. The writer has been in the habit of drinking the water of the Stockton well for eleven summers, and of seeing it continually used by invalids and children without ever having heard of any deleterious effect produced by it.

For the purpose of investigating whether or not it were potable as well as to learn something of the nature of the water from similar wells on the New Jersey coast, having first filled and rinsed a perfectly clean five-gallon demijohn twelve times with water, he collected a fair average sample. Subjoined are the results of this examination:

Water slightly alkaline:	<i>In a Million Parts.</i>	<i>Grains per Gallon.</i>
Free ammonia,	0.033	—
Albuminoid ammonia,	0.090	—
Chlorine,	—	4.2
Total solids in solution,	—	29.0

As to the two forms of ammonia this corresponds closely with an analysis by Wanklyn, of the water of the River Lea, supplied by the East London Water Company to the citizens of London. The percentage of albuminoid ammonia is only 0.01 higher than that found by the same distinguished analyst in the water of Loch Katrine, which supplies the people of Glasgow. While not extraordinary on account of its purity it is well within the limits beyond which chemical analysis indicates danger.

The same is the case with the chlorine and total solid constituents. They present no ground for suspicion of dangerous contamination, and indicate what a subsequent examination of the drainage system proved, viz: that the latter was in good condition, and carried all sewage in closed pipes to an inlet connecting with the Manasquan River about a mile away from the house. This is but one instance, and it may be an exceptional one, on the coast of New Jersey, where a surface well is still utilizable. The time will come when such supply can no longer be resorted to, but in this case it has not yet arrived.

PERSIFOR FRAZER.