REPORT OF PROF. ISRAEL C. RUSSELL ON ARTESIAN WELLS

(Continued from page 1.)

above the ground the discharge was from fifteen to twenty gallons a minute. The deepening and recasing or adjustment of the old casing since the date mentioned, as the writer has been informed by Mr. Libby, resulted in increasing the flow of 105 gallons a minute. The water is clear, tasteless, without appreciable quantities of gas, and evidently of good quality. The temperature, as measured by Mr. John Adams on December 8, 1900, was 58¾ degrees F. A copious spring a few rods distant had a temperature of 54 degrees, and the air a temperature of 48 degrees.

"Wells Nos. 2, 3 and 4 are in a group within a radius of about 150 feet, about 1,000 feet west of Mr. Dowd's house, and approximately thirty feet higher than the surface at well No. 1. The temperature of these wells, as determined by Mr. John Adams, is from 66 to 68 defrees F.

"Well No. 2 has a diameter of 5 inches, and is reported by Mr. Dowd to pass through the following strata:

Section at Well No. 2, on Farm of Charles Dowd

	Feet.
Yellowish clay, with quartz pebbles	30
Soft yellowish clay	70
Basalt	1.5
Sand, soft, "clay sand"..(a few inches)	
Total depth about	100

"This well is poorly cased, and water rises to the surface and overflows both within and outside of the pipe. The flow is estimated to be from four to five gallons a minute.

"Well No. 3 has a diameter of five inches, narrowing to four inches near the bottom, and passes through essentially the same materials as did well No. 2. Water overflows both within and outside of the casing, and is about the same in volume as in well No. 2.

"Well No. 4 has a diameter of five inches, and passes through the following strata:

Section at Well No. 4, on Farm of Charles Dowd

	Feet.
Clay	75 to 80
Basalt	200
Greenish clay	30
"Slate," soft	3 to 4
Total depth about	314

"There is a small surface flow, and the casing is defective.

"In reference to wells Nos. 2, 3 and 4 there seems no reason to doubt that if they were cleared out and properly cased a good surface flow of water would be obtained.

"About one mile north of the wells just described, on the farm of J. A. Nelson, in Tammany Hollow, near its northern border, a well was put down in 1898-99 in which the following layers were passed through, according to the recollection of Mr. Charles Dowd:

Section at Well on Farm of J. A. Nelson

	Feet.
Clay	100
Basalt	20
Coarse, sharp sand	3
Basalt	80
Total depth about	200

"When the three-foot layer of sand was penetrated water rose to within thirty-feet of the surface, and has since remained at that level. The well is not cased. The water in the porous layer is under pressure, and if the well were properly cased it might be expected to rise to the surface and overflow.

"About two miles east of the Dowd wells, and in the same valley or hollow, on the farm of A. S. Wisner, where the surface is about 100 feet, by aneroid measurement, above Dowd's well No. 1, a drill hole was put down a few years ago which is reported to have passed through the following strata:

Section on Farm of A. S. Wisner

	Feet.
Gravel	25
Clay, compact	105
Basalt	86
Total depth	216

"No water was obtained.

"A surface well a few rods distant penetrated the following strata:

Section at Well on Farm of A. S. Wisner

	Feet.
Sand and gravel	25
Yellow clay, changing to bluish below	25
Total depth	50

"The clay in this well is highly charged with volcanic dust and contains leaf impressions. Water was obtained, by percolation, at the base of the layer of sand and gravel, and the excavation below that level furnishes a reservoir for storing the water which comes in from above.

"In addition to the drilled wells noted, there are reports, without details, of a dug well forty feet deep about one mile north of Wisner's well, at a surface elevation fifty feet higher, which is all in basalt and failed to reach water. Also about one mile south, on the farm of F. Crutinger, where the surface is about 125 feet higher than at Wisner's well, a well 200 feet, all in basalt, failed to reach water.

"At many localities in Tammany Hollow water is obtained in surface wells at depths of from thirty to forty feet, and along the sides of the valley there are several springs.

"The bearing of the evidence obtained in Tammany Hollow, with reference to the artesian conditions in the Lewiston-Clarkston basin generally, may be summarized as follows:

"Tammany Hollow is a basin due to erosion which has cut through the surface sheet or sheets of basalt and exposed a layer of sand and gravel resting on clay. These sedimentary beds are the same as those penetrated by the drill hole on Ira Small's farm, and outcrop on the south side of Clearwater river, as already explained. Tammany Hollow owes its exceptional width (about one mile at the bottom) to the widening of the excavation made by the creek which flows down it, in the soft sedimentary beds lying above the sheet of basalt through which the creek has cut. Downstream the valley becomes narrow and the stream flows over basalt. Most of the springs along the side of the valley are fed by water percolating through the upper member of the sedimentary beds, and offer favorable opportunities for increasing their flow by means of horizontal wells, as already explained.

"The drilled wells, the records of which, so far as available, have been presented, all start in the sedimentary beds referred to, but, with the possible exception of the Nelson well, evidently do not derive an appreciable portion of their water supply directly from that source. This is evidenced by the fact that the porous upper member of the sedimentary beds has been cut through by erosion, and although furnishing springs it can not be expected to retain water under sufficient pressure to cause a surface flow in a well begun at an elevation of a hundred feet of more above the bottom of the hollow. More than this, the same sheets of sedimentary material have been cut by Snake river, Sweetwater creek, and other streams, and can not be expected to convey water from a distance. Additional evidence is furnished by the temperatures of the Dowd wells, which, as already recorded, are 58¾ and 66 to 68 degrees. The mean annual temperature in Tammany Hollow, as near as can be judged from the climatic records of the region in which it is situated, is from 48 to 49 degrees F. As is well known, seasonal changes in temperature in localities of similar geographic position to the one under consideration disappear at a depth of about 50 feet below the surface. At that horizon there is a uniform temperature which corresponds with the mean annual temperature at the surface. Below that horizon there is an increase in temperature of about 1 degree F. for approximately each sixty feet in depth. The well at Mr. Dowd's house has a temperature of 58¾ degrees, which indicates that its water comes from a depth of at least 540 feet, while the three wells about 1,000 feet to the westward have temperatures ranging from 66 to 68 degrees and must be supplied from a depth of at least 1,140 feet.

"Here we are met with the apparently anomalous fact that well No. 1, with a strong flow, is 10 degrees lower in temperature than the neighboring well, with a weak flow; but as wells Nos. 2, 3 and 4 are practically uncased, the actual amount of water rising from a depth is perhaps even greater than is discharged by well No. 1, which has a fairly good casing. Well No. 4, however, is about 100 feet deeper than well No. 1 and should have a somewhat higher temperature, and under the conditions present it may be expected to influence the temperature of the wells drilled near it.

"The only conclusion which seems justifiable in reference to the source of the water at the Dowd wells is that it comes from a depth of more than 1,000 feet below the surface, through fissures in the Columbia river lava, and in part spreads out in the interstratified porous sedimentary beds. The spring near Mr. Dowd's house has also a deep source, as is shown by its temperature, but, the water rising less freely than in the neighboring wells, in its passage upward it is cooled to 54 degrees. The recent deepening of well No. 1, which increased its flow, is also in harmony with the conclusion that its water is received from fissures.

"Recommendations—The success of the Dowd wells must be considered highly favorable to obtaining artesian water throughout a large area within the Lewiston-Clarkston basin, but it is not as reassuring as might be wished, for the depth below the surface from which the water comes is not definitely shown. It is very encouraging to know, however, that at a depth of about 1,000 feet a porous stratum probabl yexists which contains water under sufficient pressure to cause a surface flow at an elevation of more than 500 feet above Lewiston. A word of caution is perhaps necessary here, inasmuch as the facts in hand do not prove the presence of a water-charged stratum. There is a possibility that the water referred to finds its way from distant uplands through fissures, but what is known concerning the presence of sedimentary beds at various horizons in the Columbia river lava does not favor this view.

"Having before us all of the facts which it is practicable to obtain at the present time concerning the general question of procuring artesian water in the Lewiston-Clarkston basin, the conclusions must be largely controlled by considerations of expense. No one can say positively that success would follow the putting down of a drill hole at a certain locality, but from a geologic point of view the experiment is well worth trying.

"The most favorable location for the pioneer well is in the lowest part of the basin, and, fortunately, that is where the demand for water is greatest. The lowest level of the basin is at Lewiston-Clarkston, but the test should be made at as great a distance as practicable from the Clearwater escarpment. The writer recommends that a boring be made in Lewiston, preferably on the upper terrace on which the newer portion of the city is built, as, for example, in proximity to the public-school building. The chances, however, are equally good, and possibly better, in Clarkston. If the latter locality is chosen, the boring should be made in the western portion of the city, near the base of the "first bench." If a trial is made at either of these localities, the boring should be carried down to a depth of at least 3,000 or 4,000 feet, unless a sufficient water supply is obtained at a less depth, or the formations which underlie the Columbia river lava are reached.

"There would be on excuse for continuing to drill after granite, diorite, mica-chist, limestone, shale, etc., are entered; but soft beds containing the debris of such rocks must not be mistaken for the rocks themselves in place. A successful boring at either of the localities recommended would establish the artesian head of the basin and indicate the horizon below which other wells might be expected to yield a surface flow. Owing, however, to the lack of knowledge concerning the topography of the old land surface over which the Columbia river lava was outpoured, all portions of the basin below the artesian head determined from a pioneer well might not yield equally favorable results.

"The presence of diorite ("granite") blocks on the hillside a mile or two southeast of Lewiston and the reported discovery of similar rock in place near the same locality seem to indicate that the older formations there rise through the lava. If this be true, the region immediately about Lewiston-Clarkston would probably be cut off from the source of water which supplies the wells in Tammany Hollow."

PRESIDENT'S COUSIN WEDS

Miss Cornelia Roosevelt Scovel Marries an Italian Count at Florence, Italy Today

(Special Telegram to Evening Teller.)

NEW YORK, Nov. 25.—Dispatches received here from Florence, Italy, tell of the wedding there today of Miss Cornelia Roosevelt Scovel, daughter of Chevalier and Mrs. Edward Scovel, to Count Riccardo Fabbricotti. The marriage was performed at St. James' church and was followed by a brilliant reception at the Villa Terrazza, Viale Macchiavelli, the beautiful home of the Scovels, who have lived in Florence for many years.

The bride is a cousin of President Roosevelt, once removed, her mother being a first cousin. Last winter she and her mother were in this country and passed some time in Washington and New York.

LANGDON-STUDEBAKER

Widow of the Great Vehicle Manufacturer Marries Again

(Special Telegram to Evening Teller.)

SOUTH BEND, Ind., Nov. 25.—A number of guests from out of town are here for the wedding of Mrs. Jacob F. Studebaker, widow of the great vehicle manufacturer, and Andrew Langdon, a wealthy resident of Buffalo. The wedding is to take place this evening, and it is expected to be one of the social events of the season. The couple will spend their honeymoon in Europe.

MURDERER HAS HIS CHOICE

Utah the Only State in the Union Where Condemned Criminals Choose Mode of Death

Utah is the only state in the union where criminals condemned to death are allowed to choose between hanging and shooting as the means of their execution.

In all other states where the death pealty is inflicted, the statute allows neither the prisoner nor the court any discretion as to how it shall be administered.

Two states, Wisconsin and Michigan, have abolished capital punishment. Kansas has a provision that the condemned man remains in prison until the governor signs the death warrant. As no Kansas governor has ever signed such a document, the effect is that of a life sentence for murderers.

Electrocution is the legal mode of death for criminals in New York and Ohio. In all other states, except those mentioned, the extreme penalty of the law is carried out only by hanging.

G. A. R. ENCAMPMENT

National Encampment Will be Held in Boston Next Month

(Special Telegram to Evening Teller.)

BOSTON, Nov. 25.—A conference here yesterday decided to hold the national encampment of the Grand Army of the Republic in Boston the week beginning the 15th of next month.

The Evening Teller prints today's news today.

An Old Favorite

TO THE LORD GENERAL

By John Milton

AMONG the best lines of English verse are—
"Peace hath her victories
No less renowned than war."
They are taken from the following poem, by John Milton, to Oliver Cromwell, lord protector of England, whose portrait is reproduced herewith. Worcester, Dunbar and Darwen are names of three of Cromwell's victories over the royalists. Milton, who was one of the strongest advocates of the dethronement of Charles I., was at one time secretary to Cromwell.

CROMWELL, our chief of men, who through a cloud,
Not of war only, but detractions rude,
Guided by faith and matchless fortitude;
To peace and truth thy glorious way hast plowed;
And on the neck of crowned fortune proud
Hast reared God's trophies, and his work pursued,
While Darwen stream, with blood of Scots imbued,
And Dunbar field resounds thy praises loud,
And Worcester's laureate wreath. Yet much remains
To conquer still; Peace hath her victories
No less renowned than War: new foes arise,
Threatening to bind our souls with secular chains:
Help us to save free conscience from the paw
Of hireling wolves, whose gospel is their maw.

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Coming events cast their shadows before

True, but the coming event of Thanksgiving cast a shadow for no one except the turkey.

On the contrary we all welcome this dear, old, home coming, feasting holiday—this day of family reunions!

May it be a day of pleasure to you, May the dinner be good, the cigar fragrant, the cider just tasty, and when night comes may you feel that Thanksgiving day, 1903, to be the happiest you ever spent.

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