STATE JOURNAL.

DAVID ATWOOD,
PROPRIETOR.

[illegible]
INVARIABLY IN ADVANCE.

Entered at the Post Office at Madison, Wis., as [illegible]

TUESDAY, APRIL 27, 1880.

First Assembly District Convention.

A Republican Convention for the First Assembly District, will be held at [illegible], Saturday afternoon, May 1st, at one o'clock, for the purpose of choosing two delegates to represent said district in the State Convention, to be held May 5th. Each town and incorporated village of the district will be entitled to five delegates to said Convention.

PER ORDER COMMITTEE.

26th Senatorial Convention.

A Republican Convention for the Twenty-sixth Senatorial District will be held at Cross Plains, on Saturday, May 1st, at 1 o'clock P. M., for the purpose of electing two delegates to represent said district in the Republican State Convention to be held at Madison on the 5th day of May next. The towns of Berry, Black Earth, Blue Mounds, Cross Plains, Dane, Fitchburg, Montrose, Middleton, Montrose, Perry, Primrose, Roxbury, Springdale, Springfield, Verona, Vermont and Westport will each be entitled to two delegates in said Convention.

I. P. BACON,
Ch'n District Committee.

Water Supply.

EDITORS OF STATE JOURNAL:—The most delightful drink we remember was from a clear, bubbling spring of sparkling cold water, but when these conveniences were not at hand, the fact may not be wanting in our experience when we sought the clear spot in a marsh to slake our thirst.

One of the greatest commodities about a dwelling is a good well, from which a small community may draw their supply and the well yields a better quality when taxed to its capacity, but when its capacity no longer will supply the demand, another well becomes necessary, and another, and so on. From this it would appear that a city of any size could be supplied simply by a number of wells sufficient to yield the quantity of water required by the increased population. But as the business capacity of a city increases, merchants and manufacturers soon discover that the capacity of their well is not sufficient, and the bucket is no longer the proper implement for conveyance; the wells must be made deeper and wider and machinery must be applied to obtain and distribute the water. But does this satisfy our wants? No. Although we may disregard the expense, we find another or more serious and unavoidable objection: our water is no longer what it used to be; it is unfit for use. Why? Not only the ordinary accumulations of filth on our streets, barn and stable yards, etc., but the contents of sinks, cess-pools and privies enter into solution with the water in the earth and find their way into our wells; some of these impurities which enter into only mechanical combination with water are partly filtered out, but others chemically united get to our wells just as they are, as they cannot be separated by any known process of filtration. Now what is the result? Sickness, disease, death.

It makes one shudder to read the reports of some, or I may say all, sanitary boards and committees and boards of health, while we know that nearly, if not all our wells are contaminated and contain the seeds of disease and death. Nearly every instance of typhoid fever and diphtheria are traced to bad water. We have reports from all over our own and every other State, and they all tell the same story,—the fatal well.

There is no use in mincing the matter; our city is in a lamentably bad condition with regard to well-water, and is growing worse every minute, and although there are those in this State who may say that a brook will correct its impurities in running one rod, or that impurities will not penetrate forty feet in any direction, I say that an impure brook remains impure, although its impurities may be subdivided, and that impurities will penetrate forty feet and forty hundred feet, and the best evidence in the States is on my side. These things being undeniably so, what can be done?

In some cities, they have gone for miles to obtain water, from some natural or artificial lake. But what do they get? The city of Chicago reaches two miles into one of the great lakes, and what have they? Milwaukee reaches one thousand feet into Lake Michigan, and must go another thousand or more, and although Milwaukee has a reservoir of nearly thirteen million gallons capacity, to correct mechanical impurities, yet the consumers preferred the water direct from the lake, and the authorities were obliged to order the pumping direct into the pipes from August 7th to August 14th, 1877. Now, what are we to do? Perhaps take water from our lakes. But in what do our lakes differ from other lakes? In nothing whatever. They drain the surrounding country for some distance. The amount of vegetable matter that is carried into them in a state of decomposition, or to decompose there, can scarcely be estimated; the filth and foul matter is washed from the roads, barns, stables and farms into the lakes. The sewage from the city and other places is deposited in the lakes. Dead fish, and animals that die on land or in the water, or are thrown there, decompose, and are taken up in solution by the water. I might go on and without exaggeration enumerate everything that is filthy and offensive. But, supposing this was not quite so bad, it is a well-known fact, and there are few who have not experienced the same, that a change of water is liable to produce intestinal maladies, and if we consider the change which takes place in our lake water, and in other lake and river water, sometimes in a remarkably short space of time, we may cease to be surprised at the periodical mortality in cities from such maladies.

From the fact that the cause of disease [illegible]

[illegible] fly, which is a providential means of purifying the lakes of organic matter, almost as the fly-blow removes the pestilential [illegible] the sickness and mortality that should be a misfortune, but I am sorry to say it is not.

The action of our health officer during the past season has been admirable, many nuisances which contaminated the air have been removed, and it is to be hoped that the good work once begun will continue. Now it is only necessary to decide the question of water, and there is no reason why we should not have the healthiest city in the country.

I have had this water question under consideration for a long time, but have not arrived at the solution until quite recently. I could not reconcile myself to the idea of taking water from the lakes by any of the methods known at present, among which are filters and reservoirs, constructed at enormous expense, but which fail to accomplish the whole purpose. What we want is an inexhaustible supply of pure, unchanging water, and this we will only find in the Potsdam sandstone directly beneath our feet, and all we have to do is to take it; the manner of doing this in an economical and at the same time sufficient manner, is what I shall now endeavor to illustrate. The large number of flowing wells in our State which produce water from this geological formation, leave the presence and supply beyond a doubt, and the well in the Capitol grounds yields a large supply of pure water, but I have been told, a fact which is self-evident, that we here cannot obtain a flowing well. We do not need one, but from those that are already operating we can determine just what we can get, which is the information we need. The situation of Madison is in one sense favorable, and in another unfavorable, for artesian wells. Geologically, we are situated very low, while barometrically, we are very high. At Fond du Lac flowing wells are obtained from the boulder clay near the surface, some from the Galena limestone, and some from the St. Peter's sandstone; now all these formations are missing at Madison, together with the lower magnesian limestone, and a portion of the Potsdam sandstone, Madison sandstone and Mendota limestone, the latter being partly replaced by drift. From this it is evident that we are located above a source of water not requiring a penetration of the hard superstrata of limestones. The surface of the ground at the Capitol well is 332 feet above Lake Michigan; the surface of the water in the well is 65 feet lower or 266 feet above Lake Michigan, or 4 feet above Third Lake. The well at the West Madison depot corresponds with this. Prairie du Chien has a flowing well which is 960 feet deep, and discharges 600 gallons of water per minute through a 6 inch pipe. The well in the Capitol has been pumped to this amount without lowering the surface more than one foot. The top of this well is about 60 feet above Lake Michigan and, geologically, 150 feet higher than Third Lake, but barometrically, we are about 200 feet higher. The Geological Report, Vol. II, page 584 gives the distance between the Mendota limestone and the Archæan rocks as 777 feet. [*Ibid*, "If unaided nature has provided us any means of escape from this prolific source of danger, it is quite certain to be found in our deep-seated springs." "So far as possible, all cities should be supplied by water from springs or artesian wells."]

This formation being about 40 feet above Third Lake, we would have to go but about 700 feet to obtain the best source of a water supply; this would leave us relatively at a depth equal to the well at Prairie du Chien. Of the 700 feet, probably 50 to 70 feet would be through drift, while the well casing would have to advance to a depth of perhaps 200 feet before the sand rock would safely support the sides of the bore.

The arrangement and necessary process for obtaining and distributing the required volume would be the following:

1st. The volume required is obtained from a knowledge of what is required in other cities. Only a few of many cities are using to exceed 60 gallons per day per capita, and by a fair comparison it is safe to say that Madison will never require to exceed this quantity; estimating for a population of 12,000 which may not be exceeded for some time to come, we would require 720,000 gallons per day and the necessary machinery, in duplicate, to deliver the same. The plan of distribution is such as to admit of extension in the direction of the location in which the population would be most likely to increase.

2d. The supply for which I design to drive two eight-inch wells from 700 to 750 feet below Fourth Lake level, the wells to be six feet apart; the upper portion through the drift, and until the sandstone would be of sufficient strength to support the sides of the bore, would be cased with well-tubing. The extent of this tubing cannot be estimated, and may be from 80 to 200 feet. After penetrating 300 to 400 feet below the surface, the volume to be tested at every 50 feet by a steam-pump capable of lifting 300 gallons per minute, and observe the amount which this lowers the surface permanently, and ascertain at what point the volume increases materially, and locate all hard strata exactly. After the two wells have reached the aforementioned depth of 700 to 750 feet, or that the drill reach the archæan rock, the two wells are united at the bottom by blasting with small charges of quick-burning powder, or nitro glycerine, discharged by a current from the nearest telegraph wire. Having previously ascertained at which point the volume was materially increased, and the next hard strata above this point, the wells are to be lined with 6-inch well tubing to this strata and sealed by seed-bag. This is to guard against a loss of volume and of pressure upwards into a looser upper stratum, which I have no doubt exists; the pumps are to be attached directly to the tubing.

3d. There will be duplicate pumps and boilers, each of a capacity to deliver 720,000 gallons in twelve hours (this is [illegible] the volume required by a population of 12,000, at 60 gallons per day), [illegible] of it that would be required [illegible] six to eight times the capacity of the pumps, to prevent the lashing of the suction arising from the intermission of [illegible]. The discharge of each pump is connected with the force-main and is supplied with a gate, each suction to have a large air cock to be closed on the one running and open on the other so that either pump will take water freely from both wells. The pumps will be direct double acting plunger pumps that may be run at any desired velocity to suit the demand.

4th. Boilers will be cylindrical, horizontal, tubular ones, set in brick work, furnace lined with fire brick, of 480 square feet heating surface, consuming 1,400 pounds of coal in 12 hours, doing the duty mentioned, and may be increased to 1,900 pounds with corresponding duty. The boilers will be run with natural draft, but so arranged as to use artificial draft in either boiler from either pump; this will be found convenient to raise steam quickly in emergencies in case of fire or breakage.

5th. Pipes.—The pipes will be of the usual kind, made of scrap and grey pig, with a tensile strength of 16,000 pounds. The quantity or number of miles of pipe varies with the density of the population. In some of our large cities the proportion is as low as ⅓ of a mile per 1 000 inhabitants, while in some cities of 80,000 population it is as high as 1⅓. The average of seven cities from 28,000 to 70,000 population, is 1¼ miles. In this proportion we would require for a population of 12,000, 16 miles of pipe. The actual amount required is given in the estimate for distribution.

6th. Reservoir and standpipe.—Reservoirs are an expensive comodity and serve only to keep a moderate supply in reserve. The water we obtain is too pure to need exposure to air or sun, and the more direct we obtain it the purer we will find it.

A standpipe has always appeared to me to be a monstrosity without reason, and an expensive one at that. Now what is the sense of erecting a pipe and protecting tower to obtain pressure when the same thing can be accomplished at a less cost and to better purpose.

The effect of overcoming the inertia of a great load of non-elastic water at every stroke is damaging to the pumps, as it gives a blow of 10 lbs. or more per square inch on pumps and pipes, and furthermore, the pipe is of no service as a supply, from the fact that the volume is inconsiderable.

Better results are obtained from a large air chamber, placed over the main. This can be so regulated by a relief valve as to give the proper pressure, and at the same time present an elastic cushion to the impact of the pumps. A cylinder, 3 inch diameter, 25 feet long, set on end, of ⅜ inch best iron, properly stayed, supplied with air valve and water guages, will be the whole outfit to do the duty of stand pipe and water tower.

7th. Size of pipe.—The pipe should always be sufficiently large to supply the demand without great velocity, as the friction increases directly as the length of the pipe and the square of the velocity, and materially reduces the head. A further loss arises from branches and bends, so that a system of pipes will differ somewhat from a single line of continuous pipe. A 12-inch pipe will deliver 720,000 gallons in 12 hours, or 750 gallons per minute — 109 cubic feet, with a velocity of 140 feet a minute, or 2⅓ feet per second, while a head of 160 feet — 73 lbs. pipe pressure, would deliver the same quantity at a velocity of 1,147 feet per minute, or 19 feet per second, through 1,000 feet of pipe, so that we find a 12-inch main abundantly large for the origin of the system. The pipe system will be planned so as to be circulating, *i. e.*, the pipes should circumscribe a certain district, so that the supply will be more perfect, and a sudden large demand will not draw from a single line, but from the whole system, thereby reducing the head but very little. It is also more convenient for repairs or tapping, as a portion of the district may be shut off without stopping the whole supply. After crossing one end of the main district, the size will be quickly reduced to 10, 8 and 6 inch, and 4 inch will be used in long lines of supply in some resident districts, and so connected with the circulation that the delivery will be ample. A sufficient number of stop gates will be placed in each circuit to cut out a portion of the district for repairs, etc. The number of hydrants will be reduced by using the double discharge, with a saving of 30 per cent.

The following is a table of pipe, giving the weight per foot lineal, of three classes, A, B and C. Class A will be used from lake level to 35 feet above; class B from 35 to 70 feet, and class C at 70 feet and higher:

	4 in.	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.
A........	24	34	49	65	85	110	[illegible]
B........	21	31	44	58	75	[illegible]	125
C........	19	28	40	53	69	[illegible]	[illegible]
Lead per joint, lbs	4½	6¼	8¼	10¼	12	15	24

By this classification, there will be considerable saving effected, still leaving the pipes of uniform strength for the work performed by them.

ESTIMATE.

Cost of ground	$4,000 00
Engine house and stack	[illegible]
Two wells of 750 feet, at $5 per foot	[illegible]
Two pumps	[illegible]
Two boilers	[illegible]
Setting	[illegible]
Air chamber and house	[illegible]
	[illegible]
Sixteen miles pipe at $7000 per mile	[illegible]
	[illegible]
Ten per cent. contingent	[illegible]
Total	[illegible]

RUNNING EXPENSES.

[illegible] tons of coal	[illegible]
Engineer	[illegible]
Engineer	[illegible]
Fireman	[illegible]
Repairs, etc.	[illegible]
Per annum	[illegible]
Per day	[illegible]

[illegible]

The cost in other cities [illegible] from 30 to 40 cents, owing to the [illegible] value of fuel and labor, and [illegible] pumped.

[illegible]

A dispatch from Galena says that Gen. Grant will leave that city [illegible]