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# PRELIMINARY TEST

*Gerry M. Blake,*

*CIVIL ENGINEER*  
—OF THE—

*Taunton, Mass.*



## SOUTH BEND WATER WORKS,

DECEMBER 25, 1873.

REPORT OF ENGINEER BIRKINBINE AND  
DESCRIPTION OF THE WORKS.

PUBLISHED BY

THE TRIBUNE PRINTING CO.,  
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# A CARD.

Although extra editions of the DAILY TRIBUNE of the 24th and 25th Instant were printed, and a much larger number of the WEEKLY TRIBUNE of the 27th Instant were circulated, we were unable to supply the demand for papers, and have therefore at the request of some of our patrons published the following items in pamphlet form.

TRIBUNE PRINTING CO.

December 29th, 1873.

## THE SOUTH BEND WATER WORKS.

### Public Test of the Stand-Pipe System.

### GREAT REJOICING OVER THEIR GRATIFYING SUCCESS---THREE SEPARATE TESTS.

Perfect Pumps, Perfect Pipes, and Perfect System Throughout.---  
Nine Streams Rising High Above the City at One Time.

### A RE-UNION OF CITIZENS AND A SPEECH BY HON. SCHUYLER COLFAX.

### Report of Engineer Birkinbine in Regard to the Test--A Detailed Description of the Works.

The city was crowded at an early hour yesterday by people from different points of this and adjoining counties, attracted here to witness the public test of the stand-pipe Waterworks. The day, for a December one, was unusually favorable for the display, and everything passed off in the most auspicious manner. The programme printed in Wednesday's TRIBUNE was carried out to the letter. Chief Engineer Nicari, had his men posted and they moved in line, with military precision, to the places allotted them in the trial.

The following is a copy of the programme as published :

**Programme to be Observed During the Preliminary Test of the South Bend Water-Works, December 25th, 1873.**

At 9:45 a. m., water will be pumped over the top of the stand-pipe if the engineer thinks the foundations will not be injured thereby, or that falling ice will not damage the guys.

At 10 a. m., an alarm of fire will be

rung, and the various hose companies of the Fire Department will run from the places designated, connect their hose with specified hydrants, and throw streams on the Presbyterian Church at the corner of Washington and Lafayette streets.

Hose Company No. 1, will start from the house on Monroe street, and lead out from the hydrant at Lafayette and Jefferson streets.

Hose Company No. 3, will start from the Dwight House, and lead out from the hydrant at Lafayette and Market streets.

Hose Company No 4, will start from the house on Jefferson street, and assisted by the Hook and Ladder Company lead out from the hydrant opposite Goods Hall, the hydrant at the corner of Lafayette and Washington streets; and the hydrant opposite the high school.

As soon as each respective line of hose is laid and connected with the hydrant

and nozzle the water will be thrown, and the time noted that was required to get each stream in operation. During this test the pumps will be stopped and the streams will be continued as long as they in the opinion of the Engineers of the Fire department, show a satisfactory fire protection. This will show the value of the stand-pipe as a reservoir. The hydrants will then be closed and connections made so that streams can be thrown from the stand-pipe when the pumps are in operation. During this test the water will be kept at an elevation of from 125 feet to 150 feet in the stand-pipe; showing what power we have to spare and exhibiting the streams thrown at comparatively low heads.

After this test while the hose companies are taking up the hose, a public meeting will be held at the court room.

The meeting will adjourn at 11.40 and proceed to the vicinity of the Studebaker Brothers Wagon Works, or distribute to the various localities where streams are to be thrown.

Work is being pushed so as to have all the pipes thoroughly tested and if no accident occurs before the time selected and the weather is favorable considerable fun may be expected.

As the hour for the test approached excitement ran high and all sorts of wagers were made as to what the works would do or would not do. As our readers are only interested in what was done we cannot do better than give the report made by the Engineer, J. Birkinbine, at the close of the test, to the Waterworks Committee.

#### MR. BIRKINBINE'S REPORT.

GENTLEMEN: In accordance with your direction I arranged with E. Nicar, Esq., Chief Engineer of the Fire Department for a preliminary test of the water-works, as far as related to stream throwing and now take this opportunity of reporting to you the result: first pre-

mising that the test was rather premature and that I have perfect confidence that your water-works will show to even better advantage, in a month or two. They labored under the following disadvantages yesterday:

1st. The head and tail race had accumulated in them considerable debris which could not be removed during the high stage of water; and I feel confident that they were noticeably obstructed.

2nd. The wheels had been on hand for a long time and there had not been the necessary opportunity of running them sufficiently before the test.

3rd. The pumps and gearing being new did not work to as good advantage as they will after they have been in use for some time. The two pumps used yesterday had been running before but twelve hours and there had been no opportunity of recharging the air vessels.

4th. There had not been sufficient time allowed to properly swell up the joints of the wooden pipes, and there may have been leaks which though not noticeable still used some of our power. I believe (if they existed) a few days will show all of these leaks to have repaired themselves. Several hydrants were leaking, and they could not be repaired in time for the test.

5th. The nozzles used were not of the most approved form, and some of them were very defective.

The programme for the day was as follows: At 9:45 a. m., the stand-pipe was pumped over. This was done to show that it was a possibility, but I would recommend that it be not adopted as a practice, as the volume of water has a tendency to damage the foundations of the stand-pipe and of the ascending mains.

At 10 a. m. an alarm of fire was sounded and in four minutes thereafter a stream was being thrown upon the spire of the Presbyterian Church, and



in two minutes more an additional four streams were throwing on the same structure. The streams were cut off as follows: One one-and-an-eighth inch stream which had been thrown through 500 feet of hose after throwing twelve minutes. One inch-stream which had been thrown through 450 feet of hose after 13 minutes. One inch-stream which had been thrown through 500 feet of hose, and one inch-stream which had been thrown through 300 feet of hose after 15 minutes. And one inch-stream which was attached by fifty feet of hose to the hydrant at the church, at 23 minutes.

During this test the pumps at the water works were not in operation, but notes were taken of the pressure at various times which when compared showed that the pressure when alarm was sounded was 96 pounds when the streams had all been thrown for five minutes the pressure was 75 pounds. When the first three streams were cut off it was 66 pounds and when the last stream was cut off it was 61 pounds. Demonstrating the facts that there was over 120 feet of water to spare in the stand pipe and that in 23 minutes 12,000 gallons had been thrown on one building. From this you can judge of the value of your stand pipe as a reservoir, being *always ready* without notice for an emergency.

After this test the stand-pipe was filled to a height of 145 feet and without giving notice at the pump works, nine one inch streams were thrown high over all adjacent buildings and continued until Chief Engineer, Nicar, ordered them stopped, on account of the volume of water in the streets. The intention was to throw more streams, but pipes and nozzles could not be procured.

There was no means of accurately measuring the height of stream thrown during either test, but while they were all in operation the one opposite the

High School building, in presence of hundreds of spectators, threw water over the turret which I understand is over 100 feet high.

This test was made to demonstrate that with a comparatively low head of water in the stand-pipe there is an ample fire protection. There was no trouble in keeping up the supply of water for this trial.

It was my intention to have increased the head to 200 feet, but learning that the Studebaker-Pine wager was to be settled at noon, I considered it to be amply sufficient to satisfy the citizens.

This wager consisted of throwing simultaneously in different parts of the city, six streams—located as follows: One 1½-inch stream at the Studebaker wagon works, and five inch streams, one at the Birdsell Manufactory, one at the Studebaker Carriage works, one at the High School building, one at the South Bend Iron Works and one near the stand-pipe.

The stream at the Studebaker Wagon Works was to be the test, and it was thrown far above the top of the cupola, probably 130 feet. Of the other streams I can best repeat the report of the judges of the wager—that “they could see the five streams rising high above every building in the city and that the stand-pipe was also running over.”

A. A. Webster, Esq., who was stationed as a judge on the High School turret, reports in writing that the stream there was thrown fifteen feet or more above him, and he, too, could see all the other streams.

During the second test two pumps were in operation and at the last test but one was used. The third pump was not used at all during the day.

The unanimous opinion of those who were in the pump house during the tests, is that the operation of the machinery was highly satisfactory, and that the pumps could evidently have met a much greater demand.

I desire to bear testimony to the systematic arrangements made by E. Nicar, Chief Engineer of the Fire Department, every thing being done to the minute as per programme, and also to the efficiency which the Fire Department exhibited. The more noticable as this was the first time the fire hydrants were used by the Department.

To-morrow I anticipate completing the temporary main across the river so as to supply the Fourth Ward; and will then stop work for the winter.

I have no hesitation in saying that the display of yesterday demonstrated beyond cavil, that you have a reserve sufficient not only to extinguish a fire in its incipency, but also to deluge a considerable conflagration; that with the stand pipe but half full of water, there is ample pressure for a fire protection; and that no matter how remote from the works, satisfactory streams can be thrown simultaneously in various parts of the city. My only regret is that your distributing pipes do not reach all portions of the city.

Respectfully, JOHN BIRKINBINE,  
Engineer.

To Hon. WM. MILLER, Mayor.

JOSEPH WARDEN,	} Committee on Water-Works.
SEELEY R. KING,	
ALEX. STAPLES,	
PETER WEBER.	

At the conclusion of the second test, and while the hose was being reeled the immense crowd which witnessed the display assembled in the Court House square where a genuine ratification meeting was held.

His Honor, Mayor Miller, presided and made a few congratulatory remarks.

#### MR. COLFAX'S SPEECH.

Mr. Colfax, being called out, responded by wishing them all a Merry Christmas and many of them. He said this magnificent Christmas day opened a new era in the history of our busy and prosperous city. Over 30 years ago the building of the three story Washington

Block, the largest frame building, at that time, in Northern Indiana, was commemorated by a special celebration and opened the first era of the advancement of our town. Next, the construction of the dam, by the free and generous subscriptions of rich and poor alike, gave us our great water power and was another and most important forward step. Then the great manufactories which have caused our city to be known throughout the length and breadth of the land, gave us another impetus. While to-day, with the water works, which, from the experiments this morning, seem so sure to render efficient fire protection, we continue our advancing progress among the cities of our State and take another onward stride toward the future before us. When he received, last March, that cordial and warm hearted welcome home, irrespective of party, which he could never forget, he found his townsmen in a sharp, bitter contest between opposing systems of water works. In it he took no part, having no familiarity with hydraulic controversies, and being satisfied with any effective system. The majority decided the question and now he trusted all the asperities of the past year would be forever forgotten. Our prosperity heretofore has been because we were all united in whatever concerned our city's interest and we must be so hereafter if we hope for continued success. He was sure that our people would save the yearly interest on the water bonds in insurance premiums alone, and save the principal, over and over again in the preservation of property from destruction; and he hoped the bonds, with their liberal interest, would be taken and held at home, so that the interest would not go to non-residents, but be both paid out and spent here. He complimented Mr. Birkinbine's remarkable engineering talents and his well deserved success, highly, and stated that when in Washington he heard that Mr. B., whom



he had known for years, was to Engineer the works, he was sure they would be a success. He closed by saying he knew they all wanted to go up to the wagon works of that firm which has done so much to advance the prosperity of the city, the Studebakers, and see them throw the water over "J. M." in their belfry. And then with cheers for the manufacturers of South Bend, the water works, and Engineer Birkenbine, the meeting adjourned.

#### THE STUDEBAKER-PINE WAGER.

Considerable interest has for several months been drawn to an amusing wager made by Messrs. Leighton Pine and J. M. Studebaker. The following correspondence and agreement will explain itself:

SOUTH BEND, Dec. 23, 1873.

*Messrs. Leighton Pine and J. M. Studebaker:*

GENTLEMEN: In reply to your request of last evening, that I name five (5) hydrants from which streams can be thrown at the same time that a sixth stream is being thrown upon the Studebaker Brothers' Wagon Works; and to so distribute the streams as to show a fire protection upon the various business and manufacturing districts, I have selected the following:

1. The hydrant near the northeast corner of Division and Carroll streets, being nearest to the Birdsell Manufacturing Company's works.
2. The hydrant at the steam fire engine house, being nearest to the Studebaker Brothers' Carriage works.
3. The hydrant at the intersection of Pearl, Jefferson, and Carroll streets.
4. The hydrant at the northern continuation of St. Joseph street, being nearest to the manufactories along the race.
5. The hydrant opposite the High School building on Washington street.

You will notice that in accordance with Mr. Studebaker's suggestion, I have selected one on low ground (No. 4),

and one near the stand pipe (No. 3.)

I have not selected any across the river for the reason that the four-inch temporary main, crossing the bridge, is not completed; if it is completed in time I have no doubt a satisfactory fire stream, or streams, can be displayed in the Fourth Ward; but they would be at the disadvantage of a small supply pipe, and be too far removed for convenience of inspection. No hydrants were selected on Michigan or Washington streets in the business portion of the city; for fear that, if the cold should be severe, the amount of water thrown would produce ice sufficient to interfere with the business and pleasure of the citizens. You will also notice that two of the streams thrown are supplied by six-inch mains (the smallest size used in the plan of distribution), and that none are taken from our largest mains (16 or 20 inch). Should you not approve of my choice, you can substitute any hydrant across the river, or the one at southwest corner of Lafayette and Water streets, (being nearest the Coquillard wagon works), or one on Washington or Michigan streets. I will endeavor to have all the mains supplying these hydrants tested by the 25th. If this is impossible I will notify you and substitute other hydrants for those which cannot be used.

Respectfully, JOHN BIRKINBINE.

SOUTH BEND, Dec. 23d, '73

*J. M. Studebaker, Esq.—*

DEAR SIR:—Enclosed herewith please find articles of agreement, as decided on last evening between us, which, if consistent with your views, please sign and return by bearer, or to either of the judges, that it may be understood by them all, and aid in deciding the result of the proposed trial.

Yours very truly,

LEIGHTON PINE.

P. S.—I would suggest that the judges select some one whose duty it shall be to lead the cow or deliver her to the

lucky victor at his residence.

J. M. STUDEBAKER.

#### AGREEMENT.

This agreement entered into by and between Leighton Pine and J. M. Studebaker, this 23d day of December, '73.

WITNESSETH, That said Pine agrees to throw, or cause to be thrown, one stream of water, no less than one inch in diameter, direct from a fire hydrant through one length of hose, into the belfry of the Studebaker factory, opposite the L. S. & M. S. Railroad Depot. Said Pine further agrees that, during the time the before mentioned stream is being thrown, five (5) additional streams shall be thrown, (of not less than one inch in diameter) from hydrants mentioned in a letter from John Birkinbine, Esq., water-works engineer, of even date herewith, addressed to the said Pine and Studebaker. Said Pine further agrees that all the before-mentioned streams shall be adequate for fire protection.

It is agreed by the parties hereto, that in case the foregoing is not fulfilled, said Pine is to present said Studebaker with a cow, but in the event of the full performance of Pine's agreement named herein, then said Studebaker is to present him with a like animal. The question "Who is entitled to the cow?" will be decided by a majority of the three following named gentlemen, who have consented to act as judges: E. Nicar, J. C. Knoblock and C. A. Kimball.

J. Birkinbine, Esq., Engineer, will decide whether the works are in proper condition for making the test, and if he report favorable, Christmas 1873, at 12 o'clock noon, the test will be made.

This agreement to be signed and deposited with C. A. Kimball, Esq.

LEIGHTON PINE,

J. M. STUDEBAKER.

P. S.—In addition to the above I will add that the test shall be made and decided when the Engineer orders all streams on for the same and shall not stop for any leak or breakages during the test.

J. M. STUDEBAKER.

The crowd then surged up Main and Lafayette streets toward the new Studebaker Wagon Works where the wager between J. M. Studebaker and Leighton Pine was to be decided.

Mr. Studebaker, although in poor health was up in the belfry, accompanied

by Mr. Colfax and the three judges mentioned in the agreement. At the signal the water shot upward from the nozzle and the occupants of the belfry beat a hasty retreat, to avoid getting a complete drenching. As it was they looked as if they had been in a hard shower. The water was thrown far above the belfry and the judges there could see all the other streams so Mr. Studebaker gracefully acknowledged that he had lost the wager and transferred an animated dairy to Mr. Pine. The cow was gaily decorated with ribbons, and preceded by the Band and a number of carriages filled with prominent citizens marched down the street to Mr. Pine's residence.

An amusing incident occurred in leading the cow down near Cushing & Co.'s corner. She made a lunge for the side-walk, and some officious individual seized her by the tail to help her off. To the astonishment and indignation of the crowd, he pulled so hard that her tail came off, but indignation soon gave way to laughter when it was ascertained that the cow had an abbreviated narrative, and had been decorated with a false tail for the occasion.

Before the crowd left the vicinity of the wagon works Mr. Pine had to respond in answer to the enthusiasm of the assemblage, and accepted the cow in a few felicitous remarks. He stated that if the cow proved as satisfactory as the water works he would be well pleased.

Mr. Birkinbine was then called for and spoke from a carriage. He stated that the citizens of South Bend could boast of the most quickly constructed water-works of its magnitude in the country, and that no small share of the honor was due to the Mayor and Committee who had labored hard, and firmly sustained the Engineer. He also said that the patent for this system of water-works was 6,000 years old, and no injunction need be feared as long as



God gave us the water to raise, and gravitation continued its functions. to protect our city within four months after they were begun.

In response to calls Mayor Miller made one of his pleasant little speeches.

### Description of the Water Works.

#### THE WATER POWER.

Water is taken from above the dam by means of head gates and carried by a flume under ground to three wheel pits, in each of which is placed a sixty-six inch "American" Turbine wheel. The tail-water is carried by means of a tunnel under the head race of the Dam Company discharging into the river below the dam. The head race, tail race and wheel pits were constructed by the former committee of council.

#### JOHN BIRKINBINE, ESQ.

We cannot proceed with this article without saying a word for John Birkinbine, Esq., of Philadelphia, the engineer who planned and has had charge of the construction of these works. He has been unremitting in his duties, and guarded the interests of the city as closely as if he had been building the works from his own private funds. His care and watchfulness have, without doubt, saved to the city five times the amount paid him for his services and his advice to the Water Works Committee has also been of incalculable value. Mr. Birkinbine, although a very young man has already achieved an enviable reputation as a Hydraulic Engineer, and the construction of the works under consideration will add greatly and deservedly to his reputation.

Mr. Birkinbine has been very ably assisted by his brother Harry, who during the former's absence has had charge of the construction. These gentlemen, as Hydraulic Engineers, have a brilliant future before them.

The gentlemen comprising the Water works committee are also deserving of much credit for the great energy they have displayed in pushing things. Similar works, so far as magnitude is concerned, have been years in building, yet these works are now in a condition

#### THE PUMPING MACHINERY

Consists of three sets known as the Flanders Pumps, manufactured by the Vergennes Machine Company of Vergennes, Vermont, and are each capable of raising one million gallons to a height of 230 feet per day. Each set consists of two pumps working at quarter centres. Water is taken from the flume and discharged into a 12-inch pipe. The gearing from the wheels to the pumps consist of a pair of 30-inch bevel gears one of them morticed and a 20-inch spur pinion, driving a 60-inch morticed wheel.

The pumping machinery is a very creditable job, and impresses one by its stability. It is being neatly painted and when finished will show to better advantage. We have no fears that either South Bend or the Vergennes Machine Company will ever be ashamed to have them examined.

#### PUMP HOUSE.

To properly utilize the work done by the former committee, a frame structure had to be constructed and the size of the flume necessarily restricted the dimensions of the building. It is a neat Swiss structure 43x37x20 feet, with a sloping slate roof. The ornaments on the outside are painted so as to be more prominent than the body of the building. The pump-house is not yet finished inside. The entire inside of the building, ceiling, walls and floor will be of oak, walnut, and ash oiled. This building is being constructed by our townsman, W. H. Read, Esq.

#### FORCING MAIN.

The twelve inch pipes leading from each of the pumps connect into a common forcing main 20-inches in diameter and about 200 feet long leading into the stand-pipe. Each of the 12-inch mains is controlled by a separate stop-



valve and a 20-inch valve is placed at the foot of the stand-pipe also. These mains are all secured by heavy wrought iron bands shrunk upon ears cast on the pipe. A fire hydrant is also placed on the 20-inch main.

#### THE STAND-PIPE.

The stand-pipe is erected upon a foundation prepared for it near the Waterworks. The length of the tube is 200 feet, diameter five feet, weight 43,382 pounds and capacity 29,500 gallons. It is made of 108 plates of iron, fastened by 9,856 rivets, and has 1,300 feet of caulked seams. The weight of base casting is 40,920 pounds. With one exception it is the highest stand-pipe in the world. The public has already been made acquainted with the great feat accomplished by Alex. Staples in raising it, so we will not refer to it here. It was built by the National Boiler Works of Chicago, and is a remarkably creditable piece of work; the leakage being practically nothing.

#### DISTRIBUTING PIPES.

The water from the stand-pipe is passed out by two pipes, one 20-inches in diameter and the other 12-inches in diameter, each controlled by a stop-valve. The 20-inch main is laid down Pearl street to Washington street, and on Washington street to Michigan street, there connecting with a 16-inch main, laid out Washington street to Lafayette street, a 10-inch main laid on Michigan street to below Wayne street, and a 16-inch Main to be laid on Michigan street. At the latter point the 12-inch submerged main to be laid across the river is to be taken off the 16-inch main. The manufactories along the race are protected by a 6-inch main connecting with the 20-inch pipe at Pearl and St. Joseph streets. The 12-inch main leaving the stand-pipe is laid up Pearl street and supplies the 8-inch main running on Carroll street to Division street. The balance of the pipes laid in the various streets branch off from the

16-inch main on Washington street.

The 20 and 16 inch pipes, and the necessary connections of the pumps, and the submerged mains, are of iron, and were furnished by the Gaylord Iron and Pipe Company of Cincinnati, and laid by our townsmen Walker & Baxter. The wooden pipes, which form the greater part of our distribution, is known as the

#### THE WYCKOFF PIPE.

So little has been said about the wooden pipes used in our water works and so well did they stand the test yesterday, that we think them worthy of a passing notice in this connection. This pipe is manufactured by the Northwestern Gas and Water Pipe Company, of Bay City, Michigan, and is made of of white pine logs, bored out, then turned in a lathe and laid away for season. After seasoning they are bound with iron and coated with asphaltum, to preserve the outer surface, while the inner surface is protected by the flow of water. The sections of pipe which are each eight feet long are connected with a socket or thimble joint, and, as our citizens here have seen for themselves, can be laid easily and rapidly.

It was feared by some of our citizens that a mistake had been made in using wooden pipe, but the committee looked over the ground carefully and found that the Wyckoff pipe stood the test of the most severe hydraulic pressure, and lasted equally well in gravel or clay soil. The pipe here was laid under the direct supervision of Mr. T. B. Farrington, a member of the company, and the test shows that the work has been well done. Its strength was most severely tested down the slope north of the stand-pipe, where it is under a pressure of 225 feet, and it stood it nobly.

The pipe's lines are controlled by 33 stop-valves, and supply 40 fire hydrants. The valves and hydrants were furnished by Messrs. Samuel Cummings & Son, of Cincinnati.

That our people are more than pleased with the water works is evinced on every hand in the expressions heard. Some of the strongest opponents of the stand pipe system now look upon it with favor.