FACTS ABOUT PIPE.

SECOND EDITION.

ISSUED BY

National Tube Works Co.

COMPILED BY

E. C. CONVERSE, *General Manager.*

1890.

National Tube Works Company.

New York City, January 1, 1890.

To Local Managers of our various Branch Houses:

Gentlemen:

In February, 1885, we issued the first of our compilation of data embodying facts in reference to the pipe systems in use for water, manufactured and natural gases, oil, compressed air, etc., and the respective merits of wrought and cast iron pipe for such purposes.

The first volume was issued to meet the exigencies of the times, and the amount of data was so voluminous and widespread that it was impossible to skillfully arrange it with any degree of brevity. So many new letters of recommendation, commendation and appreciation, have been showered upon us by the consumers of our Converse Patent Lock Joint Water and Gas Pipe Systems, that we have been obliged to condense this edition in order to present it in convenient form.

Having commanded, attained and maintained a prominent position as manufacturers of complete systems of this class of pipe for water, gas and compressed air purposes, we offer to you the following data.

In again calling your particular attention to the record of leakage in cast iron gas systems, we refer to the late explosions in the sub-ways of New York City, and the complete and indisputable evidence of the danger connected with old cast iron gas systems.

This data must be kept as a confidential communication, for it is mainly intended to give you ready reference and incontrovertible facts. Nothing herein contained is intended for publication.

Yours truly,

E. C. CONVERSE, *General Manager.*

WATER.

The first patent on the Converse Hub, was granted January 10th, 1882. After completing the necessary details for the manufacture of this specialty, we made the first shipment of Converse Patent Lock Joint Pipe, for water conduits, May 22d of the same year.

We give below, the exact number of feet of the various sizes of this pipe which we have shipped on orders for water, manufactured and natural gas, oil, compressed air and other purposes, from May 22d, 1882, to January 1st, 1890. The figures have been taken from our shipping order books and are accurate to the foot :

2-inch,	110,600	feet.
3-inch,	551,860	"
4-inch,	1,304,285	"
5-inch,	215,185	"
6-inch,	1,445,841	"
7-inch,	6,350	"
8-inch,	589,047	"
9-inch,	454	"
10-inch,	354,404	"
12 inch,	1,422,942	"
14-inch,	89,088	"
15-inch,	34,120	"
16-inch,	576,892	"
20-inch,	85,960	"
24-inch,	546	"
Total,	**6,787,574**	"

Or, over ONE THOUSAND TWO HUNDRED AND EIGHTY-FIVE MILES. A portion of this amount of Converse Joint pipe has been used in the construction of several hundreds of water works systems, either complete or in part, with the necessary fittings and appurtenances, among which may be mentioned the following :

Anaconda Commercial Company, Anaconda, Mont.
Aberdeen, City of Aberdeen, Dak.
Adams, Mass.
Albuquerque Water Company, Albuquerque, New Mexico.
Ashland Water Works, Ashland, Ore.
Aetna Mining Company, Springfield Junction, Pa.
Athens Asylum for the Insane, Athens, Ohio.
Aspen, Col.
Adrian Water Works, Adrian, Mich.
Aqua Pura Company, Las Vegas, New Mexico.

Baker City, Ore.
B. & O. Railroad Company's Water System.
Brainerd, Minn.
Billings, Dak.
Brookville City Water Company, Broookville, Pa.
Bozeman, Mont.
Buffalo, Wy. T.
Bessemer, Mich.
Buena Vista, Col.
Benecia, Cal.
Birmingham, Ala.
Berkeley, Cal.
Butte, Mont.

Calumet and Hecla Mining Company, Lake Linden, Mich.
Columbia Water Company, Columbia, Tenn.
Corsicanna Water and Ice Company, Corsicanna, Texas.
Colorado Springs, Col.
Columbia Water Works, Astoria, Ore.
Chicopee Water Company, Chicopee, Mass.
Columbus, Tex.
Charleston Water Works, Charleston, W. Va.
Clinton, Mass.
Council Bluffs City Water Company, Council Bluffs, Ia.
Coronado Beach Company, San Diego, Cal.
Chadron, City of Chadron, Neb.
Chamberlain, City of Chamberlain, Dak.
Chestertown, Md.
Crested Butte Light and Water Company, Crested Butte, Col.

Crookston, Minn.
Cheyboygan, Mich.

Dixon Water Works, Dixon, Ill.
Delta, Col.
Defiance Water Works, Defiance, Ohio.
Deer Lodge, Mont.
Doland, Dak.

East Dubuque Water Company, East Dubuque, Ill.
Enterprise, Kan.
El Paso Water Company, El Paso, Texas.
Evanston, Wy. T.
East Greenwich Water Supply Company, East Greenwich, R. I.
Ellendale, Dak.
Edge Hill Vineyard, Napa County, Cal.
Eureka, Nev.
Enterprise, Kan.
East St. Louis Water Company, East St. Louis, Ill.
East Chicago, Ill.

Ft. Benton, Mont.
Ft. Collins Water Works, Ft. Collins, Col.
Fulton. Ill.
Fergus Falls Water Works, Fergus Falls, Minn.
Ft. Benton, Mich.
Ft. Buford, Dak.
Ft. Snelling, Minn.
Ft. Pembina, Dak.
Fremont Centre, Mich.
Fairplay Water Works, Fairplay, Col.
Fairbault, Minn.
Ft. Coeur d' Alene, Idaho.
Ft. Totton, Dak.
Fredericksburg, Va.
Ft. Gratiot, Mich.
Fremont, Mich.

Gardner Water Works, Gardner, Mass.
Glenwood, Minn.
Glenwood Springs, Col.

Greenville Water Works, Greenville, Ill.
Gunnison, Col.
Golden, Cal.
Grand Haven Water Works, Grand Haven, Mich.
Grafton, W. Va.
Geneseo, City of Geneseo Ill.
Green Bay, Wis.
Gonzales Water Company, Gonzales. Texas.
Grand Forks, Dak.

Hancock, City of Hancock, Mich,
Hillsboro, N. M.
Huachuca Water Company, Tombstone, Ariz.
Houghton, Dak.
Huron, City of Huron, Dak.
Hailey, Idaho.
Honolulu Water Works, Honolulu.
Healdsburg Water Company, Petaluma, Cal.
Haddonfield Water Company, Haddonfield, N. J.
Hurley, Wis.
Helena Water Company, Helena, Mon. Terr.
Hammond, Ind.

Iowa, Cal.
Ionia Water Works, Ionia, Mich.
Iowa Hospital for the Insane, Independence, Ia.
Ironwood, Mich.

Jamestown, Dak.

Kearney, Neb.
Kewanee Water Works, Kewanee, Ill.
Kelseyville, Cal.
Kansas City Water Company, Kansas City, Mo.

Longmont, City of Longmont, Col.
Lake Village, N. H.
Lynn Public Water Board, Lynn, Mass.
Las Vegas, N. M.
Leadville Water Company, Leadville, Col.
Logan, Ia.
Laredo Water Works Company, Laredo, Texas.

Los Delicios, Sonora, Mexico.
La Peer Water Works Company, La Peer, Mich.
Laconia and Lake Village Water Company, Lake Village, N. H.
Los. Angeles, Cal.
Ludington, Mich.
Louisiana Water Company, Louisiana, Mo.
Los Carrilloa, N. M.

Milford Water Company, Milford, Mass.
Muskegon, City of Muskegon, Mich.
Mt. Pleasant, Pa.
Manistee, Mich.
Mamaroneck Water Company, Mamaroneck, N. Y.
Mandan, Dak.
Montevideo Water Works, Montevideo, Minn.
Midland, Mich.
McKeesport Water Works, McKeesport, Pa.
Merrill, Wis.
Marblehead Water Company, Marblehead, Mass.
Mount Vernon, Ind.
Marion, Kan.
Mission Water Company, Santa Barbara, Cal.
Montevideo, Minn.
Montrose, Col.
Menominee Mining Company, Iron Mountain, Mich.
Missoula, Mont.
Monticeto, Cal.
Montecito Valley Water Company, Santa Barbara, Cal,
Marin County Water Company, San Rafael, Cal.

New Haven Water Company, New Haven, Conn.
Newton, Kan.
North Platte Water Works Company, North Platte, Neb.
Newman, Cal.

Oscoda, Mich.
Ouray, Col.
Ottumwa Water Works, Ottumwa, Iowa.
Oregon City, Ore.
Ord, Neb.
Oregon Pacific R. R. Company.

Old Tacoma, Washington.
Omaha, Neb.

Pacific Improvement Company. Santa Barbara, Cal.
Pendleton, Wash.
Pendleton, Ore.
Peerless Mining Company, Arizona.
Portland, Ore.
Perkins Water Works Manufacturing Company, Nevada, Mo.
Pueblo, Col.
Perkins Water Works Manufacturing, Company, Nevada, Mo.
Phœnix, Ariz.
Paso Robles Water Company, Paso Robles, Cal.
Pierre, Dak.

Quincy, Mass.

Red Bluff, Cal.
Rapid City Water Works, Rapid City, Dak.
Roseberg, Ore.

San Diego Land and Town Company, San Diego, Cal.
Salida Water Works, Salida, Col.
Spokane Falls, Wash.
San Antonio, Texas.
Sioux Falls Water Company, Sioux Falls, Dak.
Socorro, N. M.
Smith Centre, Kan.
Savanna, Ill.
Spring Hill Water Company, Seattle, Wash.
San Gabriel Water Works Company, Georgetown, Texas.
San Francisco, Cal.
Seneca Falls Water Company, Seneca Falls, N. Y.
Spear Fish, Dak.
Swampscott, Mass.
Sun Dance, Dak.
San Diego and Coronada Water Company, San Diego, Cal.
St. Clair, City of St. Clair, Mich.
Sierra City, N. M.
San Bruno, Cal.
Springfield Water Works, Springfield, Ill.

Silverton, Col.
Sandwich, City of Sandwich, Ill.
Seattle, Washington.
Sauk Centre Water Works, Sauk Centre, Minn.
Salem, Ohio.
Sault St. Marie, Mich.

Texas Water and Gas Company, Terrell, Texas.
Tacoma, Wash.
Texas Water and Gas Company, Tyler, Texas.
Turners Falls, Mass.
Tuscarora Water Company, Tuscarora, Nev.
Tunichi Valley Smelting Company, Gunnison, Col.

Ukiah Water Company, Ukiah, Cal.
United States Wind Engine and Pump Company.

Virginia and Gold Hill Water Company, Virginia, Nev.

Wellsville Water Company, Wellsville, N. Y.
Wahpeton Water Company, Wahpeton, Dak.
West Point, Neb.
Wisner, Neb.
Wisconsin Construction Company.
Witchita Water Company, Witchita, Kan.
Washburn, Wis.
Warm Springs, Cal. Wade
Willington, Kan.
Walla Walla Water Company, Walla Walla, Wash.
Ware Fire Department, Ware, Mass.
Whitewood, Dak.
Woolaston, Mass.

From the very large number of complimentary testimonials regarding our Converse Patent Lock Joint Pipe for Water Works uses, we submit the following exact copies:

ABERDEEN, DAK.

"ABERDEEN, DAK., July 10th, 1885.

"In answer to your inquiry as to how your Kalamein water pipe, fitted with the Converse Patent Lock Joint, pleases us, would say that it *gives us perfect satisfaction.*

We have a constant pressure of from 165 lbs. to 250 lbs. per square inch and we have never had a leak since the works were completed and tested.

We have had occasion to examine the pipe when making connections for services and have found the pipe *in as good condition as when laid*, no signs whatever of corrosion, or rust, which fact is highly satisfactory when you consider the fact that our soil is highly impregnated with alkali.

With the thermometer at 52 degrees below zero we have had no trouble with our pipes freezing.

In conclusion we can say that your pipe has been all that you claimed for it and fills the bill perfectly.

(Signed.) JEROME H. SCHUTT,
Supt. of Water Works and Chief of Fire Department."

ADRIAN, MICH.

"ADRIAN, MICH., April 4th, 1885.

"In reply to your favor of a recent date, I will say we have used a large quantity of your pipe on services and extensions and are *well pleased and satisfied* that it is all you have claimed for it. We shall use considerable of it this year.

The Adrian, Mich., Water Works,
(Signed.) R. H. BAKER, Supt."

ALBUQUERQUE, N. M.

"ALBUQUERQUE, NEW MEXICO, May 27th, 1886.

"I beg leave to inform you that the Water Works at this place, constructed by me, for which your Company furnished

seven miles of 14 in. 10 in. and 5 in. pipe, are completed and have been accepted by the Water Company. Permit me to say a word regarding your Lap-welded Kalamein Converse Joint pipe. I find it much lighter, the joints (lengths) longer and more easily handled than cast iron pipe. Where freights are an item there is about one-half difference in favor of your pipe. It is more rapidly and cheaply laid, taking about one-half the labor and lead;—I can with the same men lay double the distance in a day. As to tensile strength; I tested the works here under two hundred (200) lbs. per square inch pressure, without a single leak, or developing any sort of weakness in the pipe. Our streams were fully satisfactory, reaching *double the height* required by my contract.

I can say from past experience with cast iron pipe, that all conditions being equal, a stream will reach ten feet higher for each sixty pounds pressure, through your Lap-welded wrought iron Converse Patent Lock Joint pipe, than can be done through cast iron pipe. I write this letter *simply on account of the satisfaction* your pipe has given me and the Water Company here.

Hoping to do further business with you in the near future, permit me to remain,

(Signed.) GEORGE F. WOOLSTON,
Constructing Engineer Albuquerque Water Company."

"ALBUQUERQUE, N. M., Jan. 19th, 1889.

"Replying to yours of the 16th, I would say that prior to my taking charge of the works here I was not disposed to regard wrought iron pipe for distributing mains, favorably. After three years' experience with your Converse Joint Kalamein pipe I have now no doubt in regard to its durability in this soil and as the soil here is strongly impregnated with alkali and minerals in different forms, *I would not hesitate to use it in any place.*

Having had occasion to lately cut into our old Converse Joint lines for the purpose of putting in branches, I found not the least corrosion and that the pipe was *as clean inside as when first put in.*

In regard to the cheapness with which the pipe can be laid, I will say that the entire cost of laying 7,500 ft. of 5 in. pipe, in-

cluding lead, distributing pipe, ditching and filling, drayage in moving from one part of town to another, making connections to old lines and setting 14 fire hydrants, was but 5 6-10 cents per foot. In one day four men put together, calked and laid, 750 ft.

(Signed.) C. J. STETSON, Supt."

AMERICAN WATER WORKS AND GURANTEE CO., LIM.

"PITTSBURGH, PA., Apr. 27th, 1889.

"During a number of years I have been building water works, first in individual partnership and subsequently as General Manager of the American Water Works and Guarantee Co., Lim., and during that time have *directed the construction of over thirty water works* systems located at various points in the United States, many of which involve the expenditure of hundreds of thousands of dollars, and as the Company of which I am General Manager owns and operates all of these different water works systems I have had quite an experience with Converse Patent Lock Joint Kalamein pipe, for during that time we have used in a number of places the Kalamein pipe and have found it very satisfactory indeed, having had ample opportunity of comparing its work with that of cast iron which we have also used a great deal of.

As to the Kalamein pipe, though, I would say that in some instances which I call to mind at this moment we have had this Kalamein pipe *under high pressure for over five years* and as far as I am able to learn at the present time, there is *no complaint or fault* to find with it in any way. I might say that the only weak point that I ever found in reference to it, (and this has been remedied since the time it was called to my attention,) was that the lead joint where the bell was leaded on to the pipe, at the works was sometimes not thoroughly calked, consequently would naturally allow water to leak, as the lead was not driven home; but, since the time we were troubled on account of this joint not being driven tight, we have always gone over each joint of pipe as we laid it in the ditch and driven the lead as tight as possible and since then we have had *no trouble whatever*. There are very

great advantages in the use of this pipe; usually the Company making it are able to give very prompt and satisfactory deliveries of it and then the question of freight is a very important one, in which there is quite a saving in favor of Kalamein. Other than that mentioned, which was slight and not the fault of the pipe at all, I do not call to mind any weak points regarding it. The points which have impressed themselves upon us favorably are that it has very great tensile strength and uniform thickness, which of course prevent it from breaking or leaking through the pipe, as we so frequently have occur with cast iron pipe, requiring expensive repairs from breaks after the line is under pressure. This is a thing that *never happens* with Kalamein pipe. Then, when properly coated with Kalamein and Asphalt treatment, I do not believe there is very much question as to its durability, for it seems, as I said, as far as we are able to judge, fully equal in life with cast iron pipe. We have noticed that the length of each individual piece of pipe is so much greater than that of cast iron pipe, that there is a great saving in the number of lead joints and of course a more effective service by less obstruction in the pipe and I am convinced it shows less friction than cast iron pipe.

We have used it both East and West and have seen no reason to change our good opinion regarding it.

(Signed.) W. S. KUHN, Gen'l Manager.

AMERICAN WATER WORKS AND GUARANTEE CO. LIMITED."

BENECIA, CAL.

"BENECIA ARSENAL,

BENECIA, CALIFORNIA, December 4th, 1889.

"Replying to your letter of the 3rd inst. I have the honor to state that the 6 inch Converse Wrought Iron Pipe, 2,700 feet in length, purchased from you in March, 1889, for use at this Arsenal, was laid above ground in June.

Water is pumped through it to a height of two hundred and three (203) feet; the pressure has not caused any leaks. Slight leaks at the joints—probably caused by expansion and contraction, are easily repaired by hammering the lead packing.

The pipe was readily laid by enlisted men, under the superintendance of one of our machinists. *I consider the pipe satisfactory in every respect* at this date.

(Signed.) JOHN A. KRESS,

Major Ordnance Dep't. U. S. Army."

BERKELEY, CAL.

"BERKELEY, CAL., March 15th, 1879.

"The lap-welded wrought iron pipe, purchased of you about three years ago, upon your recommendation, has proven satisfactory. We have had no occasion to regret its adoption over other pipe. Quality and price considered, we believe it to be the cheapest and best pipe in the market.

(Signed.) ROBT. E. C. STEARNS, Secretary,
University of California."

"BERKELEY, CAL., Dec. 4th, 1889.

"Your favor of yesterday requesting my opinion about your Converse Patent Lock Joint Pipe was duly received and in reply would say, that *for a number of years past* our Company has used your pipe to a large extent and has had a chance of giving it *a thorough, practical test.*

We have now from six to eight miles of it in our works, and I must say that it has given us *perfect satisfaction* and can recommend it for its lightness, strength, durability and the cheap, expeditious mode of laying it.

(Signed.) L. WELLENDORF, Supt.,
The Alamedia Water Company."

BILLINGS, MON.

"BILLINGS, MONTANA, Jan. 19th, 1889.

"In regard to your inquiry about the Kalamein pipe furnished us in '86 would say: We have about 5½ miles of this pipe which is laid in moist ground strongly impregnated with alkali and in which ordinary pipe will not last but a short time.

We have not found a place so far where this pipe has rusted a particle, nor have we had a single burst, although the pipe has been worked at times under very heavy pressures.

It has given us entire satisfaction and we most *heartily recommend it.*

(Signed.) H. W. ROWLEY,
Sec'y. & Eng. Billings Water Power Co."

We quote the following extract from a letter written by T. W. Brooks, water works engineer in the employ of the Dunham, Carrigan & Hayden Co., San Francisco, Cal:

"During the last three months I have visited every town and city of importance in Oregon, Washington and the West coast of British Columbia, and wherever I found Converse Joint pipe in use I have taken particular pains to learn what service and satisfaction it has been giving. I was very anxious to learn the condition of the pipe, so that I could make truthful assertions when urging the use of the pipe and talk with confidence when battling with competitors. *In every case* that I have investigated I find that where the pipe is Kalameined and Asphalted, it is in the best of condition and good repute with individual companies and municipalities using it."

BIRMINGHAM, ALA.

"BIRMINGHAM, ALA., September 30, 1882.

"We have finished laying the 2,000 feet of Converse Lock Joint Pipe for the Birmingham Water Works, and as plumbers and fitters, we would like to say what we think of it:

It is only *fun* to lay this size. Four of us laid 900 feet in seven hours. We managed it in this way: one man looked after the melting of the lead; two men coupled the pipe and prepared the joint; one man followed and did the calking. Then we lifted the pipe off bricks that were under each joint and turned on the water. *Every joint was perfectly tight.* The Superintendent was present, and all he said was: "Order some more;" and we did so. Over other pipe of the same size it has some merits, and among them the following:

It is easily handled; it does not require pits at the joints, as cast iron pipe; it requires less lead and less calking, consequently costs less; it will allow more water to pass and with less friction to the amount passed. All pipe men who have seen it like it.

(Signed.) R. KNAUFF & Co.,
Contractors."

BRAINERD, MINN.

"BRAINERD, February, 8, 1884.

"At our test to-day of your Indestructible Kalamein Converse Joint pipe, we put the pressure up to 230 pounds and held it there some time *without a break anywhere in our ten miles of mains.* Had the gauge been so graduated we would have run the pressure up to 300 pounds, with the firm belief that the pipe would have stood that or any pressure it was possible to put on it. With 100 pounds we connected two two and one-half inch hose, 400 feet long, from one hydrant, and from one-inch nozzles threw two splendid streams 100 feet high. As we have refrained from comments heretofore, let us now say that the pipe has proved *more* satisfactory to us than you gave us reason to *expect.* The expense of *freight, hauling, laying* and the lead consumed in caulking, is much less than for cast iron pipe, and we cannot account for the use of *any other* pipe where *this is known.* In conclusion let us say that the representatives of your Company leave with us and our people the impression that it is the determination of the National Tube Works Company to make their work *first-class in every particular.*

(Signed.) C. F. KINDRED,
President.
E. E. WEBSTER,
Treasurer.
N. J. SARVIERS,
Secretary."

" 'Northwestern Tribune,' Brainerd, February 9, 1884.

"THE WATER WORKS."

A FINAL SUCCESSFUL PIPE TEST—EVERY EXPECTATION MET—SPLENDID FIRE SERVICE SHOWN.

"Chief Engineer, Tom Shelton, of the National Tube Works, accompanied by Mr. T. W. Brooks, witnessed a pipe test of the works yesterday and Thursday, which was done under Mr. Kindred's personal supervision. At the first test the pressure reached 180 pounds, when the trial was postponed to next day. At that pressure results were perfect. Streams from faucets where the water was not shut off, would knock a glass out of the hand.

Yesterday the final test was made in the presence of all the officers of the company. A pressure of over 225 pounds was secured —in fact was near to 230 as the register would indicate, with results all that could be desired. The *Kalamein pipe was equal to every test.* During the test Chief Farnham and Assistant Chief French, assisted by Al Hawks, foreman of No. 1, laid a line of hose from the Fifth and Laurel street hydrant, and threw an inch and a half stream clear over the cross on the Catholic church steeple. With a "Siamese connection" two splendid fire streams were served."

BUENA VISTA, COL.

"'Rocky Mountain Mining Review,' December 13, 1883.

NEW WATER WORKS.

The Town of Buena Vista Delighted.

Mayor's Office,
Buena Vista, Col., November 28, 1883.

To Whom it May Concern:

"The Colorado Machinery Company has just completed the construction of the Buena Vista Water Works, and in a *very satisfactory* and workmanlike manner, and from the character of their work and straightforward manner of dealing, we take pleasure in stating that we consider the company thoroughly reliable and entirely competent. We therefore cordially recommend them to any town needing similar work.

(Signed.) G. W. Alden,
Mayor.
E. F. Hanly,
Clerk.
F. J. Campbell,
W. S. Spencer,
E. R. Emerson,
Members of Council.
John O'Connor,
City Engineer."

From the Buena Vista *Times*:

"Last Monday the town authorities, after testing the various hydrants and inspecting the reservoir, dam and other parts of the works, formally accepted them from the contractors, the Colorado Machinery Co., through their agent, D. H. Harris.

The town of Buena Vista is to be congratulated on securing so faithful a performance of the contract, and also upon having so liberal and enterprising people to deal with as the Colorado Machinery Company of Denver, and the National Tube Works of Chicago, whose wrought iron pipe was used.

This company has put in water works at Fairplay, Durango and several other points in the state, in every instance *giving entire satisfaction.*

The Buena Vista system consists of a dam and reservoir in Cottonwood Creek at a point about two miles above town, the total fall being 165 feet. The reservoir holds 10,000 gallons of water, the pipes 35,000, and the water collected behind the dam for a distance of 200 feet above the reservoir, is about 175,000 gallons. The pipe, which is wrought iron, is ten inches in diameter for the first 1,000 feet; eight inches for 10,260 feet, six inches for 2,770 feet, and there are 670 feet of four-inch pipe.

This gives a uniform pressure of about seventy pounds to the square inch, and tests through 100 feet of two and a half inch hose with a three-quarter nozzle, threw a stream over eighty feet perpendicularly and about 200 feet horizontally. Approximate estimates show that the quantity of water discharged is sufficient to give 150 gallons per day per capita for a city of 5,000 inhabitants. As Buena Vista can only claim about 2,500, it will be readily seen that we shall not suffer from drouth for some years yet.

The total cost of the water works has been, not including an extra contract amounting to about $1,500 on Railroad Street, $27,100. Bonds of the town to the amount of $30,000 were voted something over a year ago, and were negotiated by Lamb and Carey, of the National Tube Works and Colorado Machinery Company, respectively, in New York, at ninety-three cents, cash. Work was begun on the 25th of June, and after encountering many unexpected obstacles, in the way of water from

the irrigating ditches, and immense boulders in the trenches, requiring much blasting, the original contract was completed in full and turned over last Monday.

Competent judges say that the water works cost fully $5,000 less than the same work could be done for again. We advise all towns desiring water works to consult the Colorado Machinery Company of Denver, and the National Tube Works of Chicago."

"BUENA VISTA, COL., March 12, 1885.

"Your letter inquiring how the Buena Vista Water Works pipe system is working, was received. *The system gives good, entire and complete satisfaction.* No one has yet been able to find a single fault with it; there was no break at any place, of any kind, of the material used. There were a few insignificant leaks, occurring soon after the works were completed, which were repaired by the Construction Company and did not cost more than $25.00, due to carelessness in workmanship. The cost of repairing leaks and breaks is (to the town) 0000! The total cost of maintaining the system is the same, as the town marshal merely "looks after it." One man, twelve days in one year, could do all the work required to maintain it.

Will be glad if you send me your catalogue, or anything describing your different kinds of materials which you supply, their cost, etc., as I am often asked questions about water works.

If a railroad is built to Aspen, (this State,) this year there will be water works constructed there at once, and I can, with confidence recommend the National Tube Works Company's Converse Patent Lock Joint pipe.

The results of the system here far exceed the expectations of those who were most hopeful and contradicts and disappoints those who "knew it" and were opposed to its introduction.

There were four fires here, any one of which would have completely destroyed the town had not the water works been available—a fire can gain no headway after the moment water from these pipes touches it.

A great advantage, and principal to be observed, is the uninterrupted and "smooth flow."

(Signed.) JOHN O'CONNOR,
City Engineer."

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The Buena Vista system consists of a dam and reservoir in Cottonwood Creek at a point about two miles above town, the total fall being 165 feet. The reservoir holds 10,000 gallons of water, the pipes 35,000, and the water collected behind the dam for a distance of 200 feet above the reservoir, is about 175,000 gallons. The pipe, which is wrought iron, is ten inches in diameter for the first 1,000 feet; eight inches for 10,260 feet, six inches for 2,770 feet, and there are 670 feet of four-inch pipe.

This gives a uniform pressure of about seventy pounds to the square inch, and tests through 100 feet of two and a half inch hose with a three-quarter nozzle, threw a stream over eighty feet perpendicularly and about 200 feet horizontally. Approximate estimates show that the quantity of water discharged is sufficient to give 150 gallons per day per capita for a city of 5,000 inhabitants. As Buena Vista can only claim about 2,500, it will be readily seen that we shall not suffer from drouth for some years yet.

The total cost of the water works has been, not including an extra contract amounting to about $1,500 on Railroad Street, $27,100. Bonds of the town to the amount of $30,000 were voted something over a year ago, and were negotiated by Lamb and Carey, of the National Tube Works and Colorado Machinery Company, respectively, in New York, at ninety-three cents, cash. Work was begun on the 25th of June, and after encountering many unexpected obstacles, in the way of water from

the irrigating ditches, and immense boulders in the trenches, requiring much blasting, the original contract was completed in full and turned over last Monday.

Competent judges say that the water works cost fully $5,000 less than the same work could be done for again. We advise all towns desiring water works to consult the Colorado Machinery Company of Denver, and the National Tube Works of Chicago."

"BUENA VISTA, COL., March 12, 1885.

"Your letter inquiring how the Buena Vista Water Works pipe system is working, was received. *The system gives good, entire and complete satisfaction.* No one has yet been able to find a single fault with it; there was no break at any place, of any kind, of the material used. There were a few insignificant leaks, occurring soon after the works were completed, which were repaired by the Construction Company and did not cost more than $25.00, due to carelessness in workmanship. The cost of repairing leaks and breaks is (to the town) 0000! The total cost of maintaining the system is the same, as the town marshal merely "looks after it." One man, twelve days in one year, could do all the work required to maintain it.

Will be glad if you send me your catalogue, or anything describing your different kinds of materials which you supply, their cost, etc., as I am often asked questions about water works.

If a railroad is built to Aspen, (this State,) this year there will be water works constructed there at once, and I can, with confidence recommend the National Tube Works Company's Converse Patent Lock Joint pipe.

The results of the system here far exceed the expectations of those who were most hopeful and contradicts and disappoints those who "knew it" and were opposed to its introduction.

There were four fires here, any one of which would have completely destroyed the town had not the water works been available—a fire can gain no headway after the moment water from these pipes touches it.

A great advantage, and principal to be observed, is the uninterrupted and "smooth flow."

(Signed.) JOHN O'CONNOR,
City Engineer."

"BUENA VISTA, COL., Jan. 5th, 1889.

"The material furnished by your Company, in 1883 *has never shown the smallest defect* as yet, consequently we can form an opinion of its present condition through tapping for service pipes only. Having personally tapped some of the first and all of the last will say I cannot detect any loss of metal or evidence of decay. Our pressure averages 60 to 70 lbs. per square inch.

(Signed.) E. M. KEMBLE,
Supt. Water Works."

BOSTON, MASS.

"BOSTON, March 13, 1885.

"In reply to your inquiry concerning Wrought Iron Pipe for Water Mains, would say that in several most important respects I consider it *far superior to any other kind of pipe* in use at the present time.

Its strength and semi-flexibility make it secure against fracture or rupture either in handling, laying or service. Of the some 35 miles of it that I have laid I have not known of a single case of injury from either of the above causes and have seen a recorded water hammer on it of 145 lbs. per square inch. My impression is that it is safe to use under very excessive pressures even approximating 300 lbs. per square inch.

Your Converse Patent Lock Joint makes an almost perfect continuity of the interior surface which is very smooth and conducive to large carrying capacity for any given size. In my opinion, your outside diameter wrought iron pipe with this joint, and its long lengths, will convey more water, under a given head, than the same size of internal diameter cast iron pipe, as usually made and laid.

Early in 1883 I laid about 8 miles of this pipe, coated with asphalt; the soil was a peculiar mixture of clay and gravel, quite moist. On account of a street being regraded we were obliged to take up and relay about one-half mile of this in the fall of 1884 and *it was found to be perfectly free from rust or corrosion of any kind.* At many other points where it has been dug up for the purpose of making connections etc., it has always been found in equal good condition.