In Chancery of New Jersey.

Between THE WATER COMMISSIONERS OF THE CITY OF RAHWAY, *Complainants,* AND THE CITY OF ORANGE, *Defendants.*	*On Bill, &c.*

Take notice of the taking of affidavits in the above stated cause, on Friday, the twentieth day of October instant, at ten o'clock in the forenoon, before Horace Stetson, Esquire, an Examiner of the said Court, at his office in the National Bank Building, in the City of Orange, said affidavits to be taken under the rule heretofore made in the cause, and to be used upon the argument of the motion for an injunction therein, upon the part of the defendants.

Dated, October 18, 1882.

JOHN L. BLAKE,
Solicitor for Defendants.

To G. R. LINDSAY, Esq.,
Solicitor for Complainants.

(I.) Examination of witnesses, &c., in a cause depending, in the Court of Chancery of the State of New Jersey, wherein The Water Commissioners of the City of Rahway are complainants, and The City of Orange is defendant, taken before the subscriber, one of the Masters of the said Court, at my office on Main street, in the National Bank Building, in the city of Orange, N. J., on Friday, the twentieth day of October, and Saturday the twenty-first day of October, in the year one thousand eight hundred and eighty-two, pursuant to the annexed notice, in the pres-

ence of Gilbert R. Lindsay, Esq., and J. Henry Stone, Solicitor and Counsel for the said complainants, and John L. Blake, Esquire, Solicitor and of Counsel for the said defendant.

HORACE STETSON,
Master in Chancery.

ORANGE, N. J., October 20, 1882.

(II) By consent of Counsel, the taking of affidavits in above stated cause was adjourned to Saturday, October 21, 1882, at the same hour and place.

HORACE STETSON,
Master in Chancery.

ORANGE, N. J., October 21, 1882.

Pursuant to adjournment, witnesses were examined in above stated cause in the presence of Counsel as stated, on Saturday, October 21, 1882, at 10 o'clock in the forenoon.

It appearing that Horace Stetson was not an Examiner in Chancery, all objections on that account were waived by Counsel for complainants, and the examination proceeded.

(III) George H. Hartford, a witness produced on the part of the defendant, being duly sworn, according to law, upon his oath, deposeth and saith: I am Mayor of the city of Orange and have been for five years past; the territory of Orange is about three square miles; population by census of 1880, is 13,207; average growth for the last ten years is about four per cent. per annum; population in 1870 was 9,343; manufacturing interests are principally hatting; there are also sash and blind manufactures, shoe making, &c.; I have been an ex-officio member of Water Committees of the city during the past two years, having in charge the examination of water supply, so that I have become more or less familiar with the subject; ascertained in connection with local supply that there were springs

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connected with Wigwam and Parrow brooks from which the supply would be inadequate; hat factories are located on Parrow brook, are using the water and contaminating (IV) the springs; investigated Wigwam brook thoroughly and found that there would be only a temporary, not a permanent supply; if Wigwam brook had been used, the city would be put to great expense for building a reservoir, pumping, machinery, &c., which would constantly be of expense to us; the east branch of Rahway river is partly within the city limits, and on the boundary line between Orange and West Orange and empties into the main stream at Millburn; came to the conclusion that the availability of the east branch of the Rahway river was entirely out of the question; present source of supply is sunken and driven wells; have suffered intensely from wells becoming dry; during past few years, it has become a business to pump water from driven wells and sell to citizens; the difficulty in connection with insufficiency of water supply has existed for the last ten years, more so for the last three or four years; I have bought water for the last three seasons for (V) family use; the water is very hard and almost unfit for domestic purposes; Orange has a paid Fire Department, consisting of 2 steamers, 1 hook and ladder company, with full complement of men; there has been very large loss by fire during the past ten or fifteen years, but cannot give figures; source of supply for fire purposes is cisterns, and from the brook; after the special election in March last, by which the law of 1876 was adopted, the Common Council empowered the Mayor to appoint a Citizen's Committee, two from each ward; I appointed such committee and was added to it afterwards; this Committee, known as the "Water Commission," subsequently reported to the Council, which report was published; the Commission recommended that the west branch of the Rahway river be used as the source of supply.

Question. Will you give me, in brief, the reasons which influenced the Commission to recommend the taking of (VI) such supply from the west branch of the Rahway River?

[Question objected to by counsel for plaintiff.]

1st. On the ground that if the reasons are embodied in the Committee's report, that report would be the only competent evidence of it, if such evidence were competent at all.

2d. Because the witness is not competent to give the reasons which operated upon the minds of others.

Answer. The principal reason was getting the water by gravity and saving the city continued expense from year to year.

The city has borrowed the sum of $400,000 for the purpose of constructing the works and carrying out the recommendations of the Water Commission, upon five per cent. bonds running 30 years; the loan has been negotiated with Abbett & Fuller of New York city, at par; part of the money has been received and a portion of it expended for land to build the reservoir upon; have bought thus far about 66 acres, and have agreed to buy about 40 acres more, (VII) making about 100 in all; this land is situated in the bed of the west branch of the Rahway River, and both banks, for about $\frac{4}{5}$ of a mile, in the township of West Orange, between the mountains; have agreed to buy three millrights lower down at an expense of $46,000.00; in connection with right of way for pipe line, I think some settlements have been made; this pipe line is to go around the base of the mountain through Wyoming and South Orange,—about 6 miles to the city line; by the base of the mountain, I mean the southern limit of the mountain, at Millburn; six contracts have been made for the building of reservoir and dam, furnishing and laying pipe and furnishing gates and hydrants, the cost amounting to about $242,000.00; we propose to take a very small part of the water that runs through that stream, meaning the west branch of the Rahway River, and do not propose to damage or injure any one below, by taking this water; we propose to take only the surplus water which is not wanted by the people below; pecuniary (VIII) condition of Orange is that of solvency, and we are abundantly able to pay our bills.

Question. What is the present indebtedness of Orange, and what is the amount of the Sinking Fund?

[Question objected to by counsel for complainant, intending thereby to cover all subsequent questions relating to the financial condition of Orange, on the ground of irrelevancy.]

Answer. Exclusive of the water loan, the bonded debt is about $320,000.00, with about $67,000.00 in the Sinking Fund.

Question. How was the Water Commission advised by their Engineer as to the average flow of the stream during dry weather?

[Question objected to by counsel for complainants on the ground of calling for hearsay testimony.]

Answer. I think his idea was to store the water during the Winter and Spring months, so as not to injure any one; I don't remember anything more being said than that.

I understand that efforts have been made to meet with the authorities of Rahway about this (IX) matter; several appointments were made, but no meeting took place; wanted them to visit us and look into our scheme and to show them how little water we would take; had no intention whatever of injuring anybody; the City of Rahway served us with a notice, which I have never seen; I knew about the notice at the time of service; when the notice was served, we had bought land, negotiated for rights and I think had signed contracts, but am not positive about that; have no system of sewerage, except cesspools, which have to be emptied very frequently; have no scheme of sewerage projected; there is no thought or intention of sewering into the Rahway River; such a thing has never been heard of; the plan with reference to use is an economical one, and water metres may be adopted; we have no large manufactories that will use it; anticipate no difficulty in the future upon the subject of sewerage because of the introduction of water; relative growth of Orange (X) as compared with East Orange is small.

Witness being cross examined by Gilbert R. Lindsay, Esq., of counsel for complainant, further saith: Wigwam Brook, with reference to Orange runs along and through the westerly portion; rises in the mountain and is a stream the width and depth of which I do not feel competent to give; it is a very small stream; the water is spring, but a great deal of surface water gets into it; I believe it empties into what we call Little river and from there into the Passaic river.

Question. Is it not as wide and deep as upon that point of the river where you propose to construct reservoir and take water?

Answer. I could not say; I could not say what is the width and depth of the Rahway River at the point where we propose to take water.

(XI) I do not claim to be an expert, a civil engineer or chemist; or to have any more than such knowledge that is common among intelligent laymen, not civil engineers; when notice was served upon the city, I have not a distinct recollection as to how far the city had advanced with the work; on the 25th day of August I was not in the city; my impression is that we had got along rapidly, but cannot tell how far advanced; I was not aware of progress of work during my absence; I returned, I think, about September 1st; the bonds had not then been negotiated; no contract had been executed before my return; I think land had been purchased before my return; and before August 25th, I think so; I am not positive; I could not say how much land; no money had been paid before that time; no deeds had passed to my knowledge at that time; previous to my return, I do not know whether any rights of way for pipe line had been purchased; (XII) mill rights bought by the city are below the reservoir; they were purchased because the owners claimed damages and we made the best settlement we could and bought them out; I mean that these owners claimed damages by reason of the proposed construction of water works; they claimed that they would be damaged by taking their water which they use in their mills; and that the diversion of it would work an injury to them; have purchased three mill rights;

cannot give the distance from proposed reservoir: not for any of them; the city is trying to settle other mill rights; do not know the distance from the reservoir to the mill right furthest down, that the city is trying to settle for; I am not positive about the name of the owner of the mill right furthest down; I have heard of a mill called Henderson's mill; the city has been negotiating for that mill right; I do not know in what township the right is located; $46,000.00 it has been agreed to pay for mill rights.

(XIII) On re-examination in chief the deponent further saith:

Very soon after I returned from my Summer vacation, I negotiated the bonds.

Question. You have said in your direct examination that at the time of the service of this notice by the City of Rahway, the bonds had been negotiated, did you intend to say that?

Answer. My impression is that I had negotiated the bonds before I knew of any action being taken by the City of Rahway.

I think the water scheme was adopted at the meeting held August 7, 1882. There was a meeting of the Common Council held on the 27th day of June last, at which the Water ordinance was passed, and approved June 30, 1882;—between the meeting held June 27 and the meeting held August 7, 1882, it is my impression that the purchase of water rights had been negotiated; the Council at the meeting held August 7, 1882, approved such purchase.

(XIV) On further cross-examination, a paper purporting to be the notice referred to by the witness as having been served by the City of Rahway upon the City of Orange—marked "Exhibit notice" on the part of the complainant, and which counsel on both sides agree is said notice,—being shown witness, together with the minutes of the Common Council of the City of Orange, the deponent says:

The notice shown to me is the notice referred to in the minutes of the Common Council, at a meeting held August

28, 1882; I think that at that time no contracts had been accepted by the city.

Sworn and subscribed before me on this 21st day of October, A. D. 1882. } GEO. H. HARTFORD.

HORACE STETSON,
Master in Chancery.

(XV) William B. Rider, a witness produced on the part of the defendant, being duly sworn according to law deposes and saith:

I am engineer of the Water Works of Orange, and was the consulting engineer of the Water Commission, appointed in pursuance of resolution of the Common Council; my residence is South Norwalk, Connecticut; I am, also, one of the State Board of Engineers of the State of Connecticut, appointed by the State for the supervision of dam and reservoirs; I have built 8 water works and 59 dams; the cities where water works have been built by me are South Norwalk, Wolcottville, Bethel, Greenwich, Thomaston and Kent, in Connecticut; Walton, Oneonta and Hornellsville in New York; am somewhat acquainted with different methods of obtaining water supply in New England; the two villages of Winsted,—East Winsted and West Winsted,—in Connecticut, have their works located on a small stream, which flows into the Naugatuck river; the Wolcottville Works take supply from small stream which is a tributary to the (XVI) Naugatuck river; the Thomaston works take supply from small tributary of Naugatuck river; Waterbury has three sets of works which take from three tributaries of Naugatuck river; and Ansonia has works taking water from tributary running into the Naugatuck River; New Briton and Meriden take water from the same stream; all these works are under the gravity system; Norwalk and South Norwalk practically take from the stream; on these streams there are numerous mill privileges, in active operation, and the Naugatuck river is the river most largely used for manufacturing purposes in our

state; I devised the scheme of water works in which Orange is now engaged and believe it the only way to get a good and reliable supply of water: the scheme is upon the gravity system, by building a large storage reservoir, as the streams in this vicinity are very small in the Summer months and it is necessary to store up a large amount of water to carry us through the dry season; store up the surplus water which naturally runs to (XVII) waste in the Fall, Winter and Spring months as our heaviest rains occur in the Fall, during the last of January and the Spring months; our dam and reservoir, from limits of city in direct line, are about 2½ miles, but I have not measured it, but this is all guesswork; the dam is about 2,200 feet north of South Orange avenue; I cannot tell about how far from Rahway following the stream; the difference in elevation between the point of diversion and the dam at Rahway I cannot give; the elevation of the bed of the river at the point of diversion is 293 ft. above tide water; I cannot give the elevation at Rahway River accurately; there are 20 tributaries, I think, of the Rahway River between the Orange dam and the Rahway dam; these are large and small, as I have counted them from Prof. Cook's map,—on the topographical map of Northern New Jersey, prepared by the geological survey of the State prepared in 1882.

[Counsel for defendant offers in evidence the said map marked "Exhibit one," which is on part of the defendant.]

(XVIII) I cannot tell how many of these streams are larger than the stream from which Orange proposes to take; at the point of diversion, except the east branch which flows through this City of Orange; of which the area of water shed as measured by me is nearly double; the ordinary width and depth of the stream at the point of diversion during the Summer months of present year; Augnst 4, 1882, the depth was $1\frac{9}{16}$ inches, width 25 inches; August 5, 1882, $1\frac{8}{16}$ inches in depth, same width; August 10, $1\frac{5}{16}$ inches in depth, width same; August 14, $1\frac{2}{16}$ inches in depth, width same; August 17, 1 inch deep, width same; August 22, $1\frac{2}{16}$ inches deep, width same; August 26, $1\frac{1}{16}$ inches deep; August 29, $1\frac{9}{16}$ inches deep; August 31, $1\frac{4}{16}$ inches deep; these measurements show the average

size, depth and width of stream at the point of diversion; I have measured every few days during the past Summer the daily flow of the stream at the point of diversion; the daily flow was as follows:

(XIX) August 4, 210,600 gallons.
" 5, 199,800 "
" 10, 162,000 "
" 14, 126,900 "
" 17, 108,000 " lowest.
" 22, 126,900 "
" 26, 116,100 "
" 29, 210,600 "
" 31, 148,500 "
Sept. 9, 116,100 "
" 17, 108,000 "
" 21, 1,215,000 " the day on which the recent freshet commenced.
Sept. 23, 947,278,000 gallons.

All the measurements except the last, were taken at the dam; the last was taken at the Northfield avenue, nearly a mile above the point of diversion, which is the dam; have made measurements on the line of the stream: Oct. 5, 1882, at the dam was 969,480 galls.; Oct. 7, 1882, 1,162,800 galls.; Oct. 15, 864,000 galls.; Oct. 18, 1,031,000 galls.; Oct. 19, 885,931 galls.; have made measurements near Rahway works, on west branch, just below Millburn; (XX) on October 19th inst., I measured the flow of water in the west branch below Millburn but above junction with east branch and found 11,482,000 gallons; I also made a measurement of the flow of the east branch, above the junction, and found the same to be 6,155,700 gallons; I also made a measurement of the flow in Campbell's brook, at the Springfield bridge, and found 1,515,500 gallons,—marked Summit brook No. 1; Summit brook No. 2, 1,837,200 galls.; I also measured on Rahway River, at Milltown, 19,969,800 gallons; I also measured on Rahway River, perhaps from $\frac{3}{4}$ to a mile above the works, 26,019,000 gallons; the flow at our dam on the same day was 885,931 gallons; by period of daily flow, I mean 24 hours; according to

Cook's map we will use 5 square miles of water shed; in this locality, according to the experience of engineers, general average of 60 to 65 per cent. is lost, by evaporation and otherwise; I assume that one half of the total rainfall runs off by freshets; through this locality (XXI)12 inches of the annual rainfall can be relied upon; the daily allowance per capita of population allowed in making calculations for water works, is 60 gallons; the water shed will supply about 47,000 inhabitants; the reservoir will cover a little over 60 acres, with a storage capacity of about 300,000,000 galls.; and will probably be increased to 320,000,000 galls. before I am through; 300,000,000 gallons will supply, with 60 galls. per diem, assuming the population to be 13,000, the city 384 days; as a rule my experience teaches me, that with small streams, the leakage and waste keeps the stream in a better condition through the dry season than before the erection of the dam; by better condition, I mean that there will be a larger amount of water flowing in the stream below the dam than before its erection; there is not only leakage through the dam itself, but, also, waste through the gatehouse and by percolation (XXII) through the soil below and at the ends of the dam; the character of the rock shows that it is full of seams which are open to the passage of water; this I have found by actual experience on the premises; in my judgment as an expert, if that dam were built and the parties below had no knowledge of it, during the dry season they would never know of its existence; in my judgment as an expert, I do not consider that there will be any loss or injury to the mill owners below, or the City of Rahway; on the other hand, during the dry season, I think they would be benefitted, as there would be more water than previous to the construction of the dam; the water stored up is really the water which otherwise would be wasted and flow out to sea; we take and store up water which by no possibility could be utilized by Rahway; the injury to Rahway, if any, will be inappreciable; with Rahway's present dam and pond, there will be a sufficient supply for both cities for all time to come; I have examined the construction (XXIII) of the dam at Rahway; the dam is nothing more

than loose random stone, thrown in, making a ridge across the river; don't think any cement or puddle was ever used in building it; this dam is not tight, and leaks, probably ten per cent., though I have not measured it; will build a timber dam for $400.00; in my opinion, Rahway, at small expenditure, could increase supply, by building a small dam, and storing; have not examined south branch or Robinson's branch of river; the project of sewering into the Rahway River does not enter into the Orange water scheme; all that I have ever heard about it is that some persons have said that some day or other, sewerage would have to come; have found no other available source of water supply, either within the city or elsewhere within the vicinity; not available, because, 1st not in sufficient quantity; 2d because polluted; have examined water from several sunken and driven wells of Orange; I found them all impregnated with sewage without (XXIV) a single exception; some with lime, which is not injurious except in large quantities; I found water taken from a well in the very centre of Orange which contained 27 grains of foreign matter to the gallon; one of the principal wells contains 9 grains to the gallon, probably used more than any other in the city; I refer to the well at the Park House; this proportion is far beyond the safety line, which is 5 grains; I have also examined water at the point of diversion, also, from wells in the vicinity; it contains a small percentage of vegetable matter, lime and sulphur and iron in small traces.

The witness being cross-examined by J. H. Stone, Esq., of counsel for complainant, saith:

I have made the analyzing of water a special study, under the direction of Prof. St. John, formerly of Yale College; when I made examinations of flow of water, as stated in direct examination, I did not keep any record of rainfall in vicinity of points (XXV) where I made measurements; during the month of August last I know if there was rain or not; there was August 23d; I do not know the extent of rainfall; I could not state whether it was trifling or not; that was the first rain during that month in this vicinity; there was no other rain during the

month; the next rainfall in September was on the 9th, when it rained a little, also, on 11th, again on 20th, 21st, 22d, 23d, 24th, 25th, 28th; increase of flowage does not always follow fall of rains; when the ground is dry, the soil takes up the water and streams are not affected a particle.

Question. During an extended rainless season, other things being equal, would you not expect a gradual diminution in the quantity of flowage?

Answer. If it was not molested or obstructed in any form, I should expect it. If there were molestations or obstructions on any of the days when I made my measurements, I should say, to (XXVI) that extent, the measurements would not be an accurate test of the average daily flowage; in making up my daily flowage, I would consume perhaps an eighth of a minute in making my measurements; I would compute the quantity of water flowing through a given space, per minute, knowing depth and width, and multiply by the number of minutes in a day, and that will give what I call the average daily flow for that twenty-four hours; I used a weir to pass the water through, and a graduated rule to get the depth; a weir is a board with a rectangular notch, placed across a stream, set in earth and clay, water tight, so that all the water is obliged to pass through that notch; knowing the width and depth of the stream itself, computing the velocity from the head, and having the velocity and area of the section of water passing through the notch,—which can be reduced to solid inches and then to gallons; (XXVII) by "head" I mean the depth of the water from the bottom of the notch to the surface of the quiet water above the weir; by "quiet" I mean at a point above, where the curve for the fall begins.

Witness offers an illustrated cut, purporting to represent a weir dam, and says: this is substantially a correct representation of a weir, similar to the one used by him; the difference of the level between the lowest part of the notch, or bottom of the notch, and the surface of the water, at the place where the gauge is being held in the cut, is the head.

Counsel for complainant offers the cut in evidence, and it is marked Exhibit "Weir dam."

Witness further says:

It is not necessary for me to calculate the time consumed in making measurements; time of making measurements is not a necessary element to be considered in any part of the work.

Question. How do you account for the quantity of flowage on the 22d of August being larger than on the 17th, and the same as on the 14th, there having been no rain up to the 22d during that month; (XXVIII) and for its being larger than on the 26th, there having been a rain between the 22d and 26th?

Answer. I presume that it was owing to the opening and closing of the gates of the small dam above that point; I cannot account for it in any other way.

Question. Do you in the same way account for the considerable increase on the 31st over the 26th, and the very much more considerable increase on the 29th over both of those days?

Answer. I find by looking over my book, that it rained a little on the 26th, and this is the way I account for the difference; I do not recollect whether the rainfall was greater on the 26th than on the 23d; I don't take into consideration anything but the rainfall; I have heard it said that the month of August during the present year was an unusual dry month in this vicinity; I do know that the latter part of the month of September was an unusually wet month in this vicinity; the west branch, when I measured it, had a larger volume than it generally has; (XXIX) I assume the time of measurement you refer to was that of the large freshet, as you gave no date; unless I know the time of taking the measurement, I do not know whether the volume of water was greater than usual or not; as a matter of personal knowledge, I don't know anything about it; in giving amount of rainfall I take it from data furnished by others; during the last storm in September. the reservoir could have been filled three times in one day; without a freshet, I have made a calculation but have not the figures with me; in making a cal-

culation for time the reservoir, when full, would supply Orange, due allowance for leakage, &c., was made, and included in the 60 gallons per capita; I made an allowance of 15 per cent.,—a liberal allowance; I did not advise the the purchase of the mill rights already secured by the city; my advice was sought; I advised against it, also, to let them sue and collect actual damage; I know that other mill rights further off are (XXX) being negotiated for, but I have not advised it; I do not know how far from the dam the mill and pond, proposed to be bought and furthest from the dam, are situated.

Question. Do you know if there are any streams mentioned by you as running into Rahway River above any of the mill rights already purchased or proposed to be purchased, in consequence of the establishment of your water works, and if so, how many, and what?

Answer. I know that there are some streams alongside the mountain, which run into the west branch between that point and Millburn.

The east branch is below some and above some of the water rights spoken of.

Rahway has a larger water shed than the Croton river which supplies New York.

On re-direct examination by John L. Blake, Esq., the witness testified, as follows:

(XXXI) *Question.* Are you positive that the water shed of the Croton River is 41½ square miles?

[Objected to by counsel for complainant on the ground that it is an evident attempt to make the Counsel's own witness contradict himself.]

Answer. I am not positive about it; the statement is made only from memory, and I so stated on my cross-examination.

Sworn and subscribed this 21st day of October, A. D. 1882, before me } WM. B. RIDER.

HORACE STETSON,
Master in Chancery.

(XXXII) George H. Cook, a witness produced on the part of the defendant, being duly sworn, deposes and says:

I am State Geologist of the State of New Jersey; I am familiar with the geological formation under the city of Orange; under the surface there is a red sandstone rock, at depths varying from five feet, or even less, to sixty feet; between the surface and the rock is what is known as "drift," made up of gravel, boulders, sand, clay, intermixed very irregularly and not in strata; the water supply is water from rainfall that soaks down into this drift material and is limited to the rainfall upon the territory of the city; as a matter of necessity the sewage of the city above must find its way sooner or later into the wells, whether sunken or artesian; it is generally the experience here that water from driven wells is hard and unsuitable for domestic purposes; I know of no other available source of water supply for the city of Orange, which is so convenient and unexceptionable as at the point where the city proposes (XXXIII) to erect its works; there are a little over 5 miles of water shed available for the filling of the reservoir;—for the last 37 years the average rainfall in the city of Newark has been over 40 inches; the average rainfall at South Orange, where the record has been kept for nine years, is a trifle less than at Newark; the statements in the Geological Report of the State for the year 1881, with reference to the rainfall at Newark, Orange and South Orange, are accurate; the lowest rainfall mentioned in those records is 34 inches per annum; some engineers have stated that so much as 20 inches of the yearly rainfall may be saved, and the lowest that I have ever seen is 12 inches; having used rainwater myself for the last 25 years, I am satisfied that the lowest estimate is a low one; at my residence in New Brunswick, N. J., 12 inches of rain fell during the three days of the great storm in September; I have been told that 17 inches of rain fell in (XXXIV) Paterson, the accuracy of which has been verified; the minimum rainfall in this locality during the series of observations of which I have spoken, for the months of July, August, September, which are the dry months of the year, was $5\frac{22}{100}$ inches; with 60 gallons, per

day, a water shed 5 miles square will supply about 50,000 people; I have thoroughly examined the scheme of water works proposed for the City of Orange; the proposed reservoir will supply the present population of Orange for 320 days, 60 gallons per head, assuming the storage capacity to be 250,000,000 gallons; if the capacity is increased as proposed to 300,000,000 gallons, it will furnish a supply for 384 days; I think that the scheme of Orange to collect and save up the water which falls in the Autumn and Spring months, including the melted snow, upon their proposed five square miles of water shed is a feasible one, and a very desirable one for Orange; in my opinion, as an expert, I do not (XXXV) believe that the City of Rahway will ever miss the quantity proposed to be taken by the City of Orange; twelve inches of rainfall, upon any given square mile of area of water shed, will yield 60 gallons per capita daily to a population of 9,544; the whole area of the water shed of the Rahway River would in this way suppiy a population of 368,720; 5 square miles is but a little more than one eighth part of the whole water shed; these calculations which I have given, are based upon the idea of the saving up of twelve inches; it is not necessary to have reservoirs of a storage capacity for this whole quantity of water, for each three months of the year will yield one quarter of the whole quantity; in each year, according to this calculation, there passes 8,074,978,560 gallons over the dam at Rahway; this is based entirely upon the saving of 12 inches of the yearly rainfall; it is impossible for me to make an estimate of the total quantity that passes down that stream; in my judgment, there is (XXXVI) an abundant supply of water passing down that stream for the wants of both cities, for all time to come; I do not think that the proposed diversion of a supply of water for Orange can be of any sensible or appreciable injury to the City of Rahway.

Sworn and subscribed this 21st day of October, A. D. 1882, before me } GEO. H. COOK.

HORACE STETSON,
Master in Chancery.

The cross-examination of last witness, and examination of further witnesses on the part of the defendant, were adjourned to date to be agreed upon by Counsel.

HORACE STETSON,

Master in Chancery.

TO THE CITY OF ORANGE:

Take notice that the Board of Water Commissioners of the City of Rahway propose to contest your pretended right to take your supply of water for your city from the Rahway River or on any branch thereof on the ground:

1st. That such taking of water will diminish the present and prospective demand upon the Water Works of the City of Rahway, and

2d. That we understand that your proposed system of Water Works contemplates a system of sewerage emptying into the Rahway River which will pollute the waters of said river.

Dated August 25th, 1882.

By order of the Water Board of the City of Rahway.

G. R. LINDSAY,
Attorney for said Board.

Service acknowledged by J. L. Blake, as Att'y of the City of Orange, Aug. 25, '82.

Exhibit "Weir dam," on part of complainant. See cut.