at this time to my examining Mr. Wentz a little beyond your examination.

MR A. C. HATCH: No.

MR. RAY: A cross relative to those things last week.

MR. A. C. HATCH: Mr. Tanner suggest there is one other matter Mr. Wentz ought to testify to first.

Q Have youprepared a diagram showing the measurements, all of the measurements made by yourself and those testified to by Mr. Swendson and other witnesses of the flow in the flume of the power company?

Q Yes.

Q MR. KAY: I want to examine him as to that.

MR. A. C. HATCH: This is diagram Exhibit 193, we submit it.

MR RAY: I have seen it.

Q Now, explain that, Mr. Wentz

A Exhibit 193 is a graph of the Utah Power & Light Olmstead flume showing the discharge and gauge height of water in the flume at the Donnan's and Nunn's rating stations. This is platted upon millimeter paper. Near the center on the vertical line running--beginning at point fifty and extending to the top of the plat to 5.50 are the gauge heights in feet. Along the bottom of the plat, beginning at zero and extending to 330 plus, on the map from 10 is the discharge in second feet. On this scale a second foot is equal to five millimeters, or one millimeter is equal to two tenths of a second foot, and twenty second feet is equal to one decimeter. The vertical scale one millimeter is equal to one one-hundredths of a foot. The yellow curve on the map marked on the back of the curve and also marked with the capital letter "A" is, as marked, Cutter curve coefficient .015, with the width of eight feet and slope of one foot in one thousand.

Curve B. is Cutter's curve for a coefficient of .0135, with a width of eight feet and slope of one in one thousand and is so marked on the back of the curve.

Curve C is Cutter's curve for the coefficient of .0132, with a width of eight feet and slope of one in one thousand, and is so marked on the belly of the curve.

Curve D is Cutter's curve with a coefficient of .012, with width eight feet, slope of one in one thousand, and is marked on the badk of the curve.

Curve E. is Cutter's curve, coefficint .011, width eight feet, slope one in one thousand and is marked on the back of the curve.

Beginning with gauge height .50, and extending to 5.50 at every half foof of gauge height the points on each of these curves from A to E respectively have been calculated and carried to three decimal places. Each of these points as calculated on each of the horizontal lines is marked with a small circle representing the calculated point. The small black circles filled in and with the different dates marked opposite each of them---

MR. RAY: Mr. Wentz, with the court's indulgence, we will admit as to those markings, the legend correctly shows what they indicate and I have examined the map and think it is perfectly clear. Different kinds of dots indicate different measurements and the legend shows it on the map. That is what I suppose he is going to explain and we will admitthe legend correctly shows it.

MR. A. C. HATCH: The only purpose then would be, if the court fully understands the matter, without going into it in detail.

THE COURT: I don't know whether I do or not.

MR. RAY: I think it is so clear.

MR. A. C. HATCH: I will say I did not until it was gone over with me by the engineers, that is the purpose of detailing.

MR. RAY: Detailing wont take so long as the explanation.

Q Proceed.

A Black circles filled in on the map are the discharge measurements correctly platted on their gauge height made by myself at the Donnan station.

The red, small red circle filled in is the measurement of Mr. Thomas.

The blue circle is a measurement of Mr. Pharis.

The yellow circles filled in are the discharge and gauge heights given in the small tabulation Exhibit No. 148.

The small red circle with the black circle a roundit is the measurement of the discharge made at Nunn's station.

Small black circle with the red circle around it are the measurements at Nunn's station as given by exhibit 147.

I believe that is all. There is one other.

The line in orange which I will mark on this sketch as X-Z is a line in the same position as the line drawn in pencil on Exhibit 146.

Q Now, what is the maximum flow shown at Nunn's station, that is the highest that you have there?

A Two hundred and fifty-eight second feet.

Q And what is the inflow between the intake flume and the Nunn station inflow into the canal into the flume?

A The flume of Lost Creek runs a maximum, as I have found about 6.41 second feet. Bridal Veil falls into the flume runs from 3.8 second feet to 4.11. Guardquarters Springs will aggregate, as I remember, about one half second foot.

Q That will be then in the flume probably above the Nunn station about 248 feet, or above the inflow?

A Yes.

CROSS EXAMINATION by Mr. Ray.

Q Now, Mr. Wentz, the exhibit 193, as I understand your testimony, contains all of the data contained on exhibit 185 and 186 as introduced;in addition thereto the data of the measurements introduced by the plaintiff and embodied in exhibit 148 and 147?

A And 146, yes.

Q And in additionto that, your measurements at Nunn's station during the year 1914?

A Yes.

Q So that this map now contains all of the measurements introduced in evidence in this case, either at Nunn's or Donnan's, so far as you know?

A Yes.

Q And they are projected with Cutter's curves upon millimeter paper?

A Yes.

Q Now, you report here a measurement of Mr. Pharis?

A Pharis.

Q My memory is that no such measurement is in evidence here. If I am wrong on that I want to be corrected, and ask Mr. Wentz where he secured his data for the Pharis measurement. Mr. Thomas testified Mr. Pharis made a measurement but it was objected to. I think there was no Pharis measurement in as I understand it. I want to ask Mr. Wentz where he secured his data for the Pharis measurement?

A From the records of Mr. Thomas.

Q From the records of Mr. Thomas?

A Yes.

MR. A. C. HATCH: Those records are part of the--

MR. RAY: If it is in, I admit my unfamiliarity with this testimony. My memory is it is not in.

Q Now, in the determinations of the coefficient of roughness,

one of the important elements is the grade, is it not, Mr. Wentz?

A Yes, that is one factor.

Q In your determinations you have taken as the grade factor one foot for one thousand, have you not?

A Yes, sir.

Q You know as a matter of fact that during the years 1914 '15 and '16 there has not been a uniform grade along this flume of one foot per one thousand, do you not?

A Well, I have not run the levels over that flume, but whether it is uniform or not that doesn't make any difference if the fall is there.

Q I am asking you whether it is uniform not whether it makes any difference. I want to know whether it is uniform.

A I could not say about the grade there, the only place I have measured the flume is the change in elevation of the sides of the flume. I have not run any levels over it, don't know anything about the irregularities in the grade.

Q There have been referred to in the testimony here an a racing section?

A Yes.

Q Where is that racing section?

A That is near the gate-house.

Q How far down the flume does it extend?

A The gate house is at station 10, the end of the racing section is 10 plus 85, the Donnan station is at 18 plus 48. Those stations are each a hundred feet apart.

Q So, how long is the racing section?

A The racing section is probably forty or fifty feet.

Q How far down does the racing section affect the flow of the water so as to make the surface more or less turbulent?

A Well, not very far below where the racing section goes into the standard flume. The fillaments there don't meet parallel and we have a back wave and disturbance there, but

the turbulence and waves on the flume at the Donnan station and for some distance above are not any greater than they are further down the flume, even as far as Bridal Veil falls, the waves are just the same.

MR. A. C. HATCH: Understand this is your examination of him, beyond the direct examination?

MR. RAY: Oh, no, indeed not.

MR. A. C. HATCH: I take it it is outside.

MR. RAY: He has not been cross examined upon his testimony at the last session. I take it we have a right to cross examine him.

MR. A. C. HATCH: As to that, I was taking into consideration only his testimony here this evening. If he was not cross examined heretofore--

MR. RAY: I think it is cross examination of this Exhibit 2, Your Honor.

THE COURT: I am inclined to think so. I think it is cross examination of this evidence, with relation to this plat, as to whether he took into consideration the rapidity of the flow in determining the coefficient of roughness that he was applying to these curves.

MR. RAY: That is the purpose of it.

THE COURT: I took it that was the purpose.

Q I observe from the Exhibit 193, Mr. Wentz, that the measurements made at the Nunn measuring station during the years 1914, '15 and '16, platted on this exhibit group themselves very closely around the D curve which is the coefficient of 12.

A .012.

Q Point 012?

A Yes.

Q Is it not a fact that at the Nunn rating station the flow of the water has assumed a more normal condition than obtained at Donnan's rating station?

A Yes, sir, that is true.

Q The actual roughness of the flume would be about the same at the two places, would it not? I mean the mechanical roughness?

A Yes.

Q And the difference in these measurements would be accounted for, would it not, Mr. Wentz, by the fact that at the Nunn rating station, the flow of the water in the flume had been free from all the effects of the racing section?

A Yes.

Q Have you considered the mean coefficient of roughness, taking into consideration all of the measurements made and reported at the Nunn rating station?

A No. I have not, but I could get that very quickly off the plat.

Q It would approach very closely to coefficient .012, would it not?

A .012, plus.

Q What is the best coefficient shown by any of the measurements upon this plat?

A .0114.

Q Is it not a further fact, Mr. Wentz, that the coefficient of roughness of a new flume in good alignment is less than the same flume though kept in repair after a constant use of ten or fifteen years?

A Yes, in good alignment, it is in better shape.

Q So that taking the Nunn station as a normal station and assuming its coefficient of roughenesss to be about 12, what would you say the coefficient of roughness of this flume was at the time of its construction, assuming it to be of the same dimension and upon an even grade of one foot for one thousand?

A At the Nunn station I would say it would be at .012.

Q That is substantially what it is now?

A Yes.

Q Would you not say that when it was new it would have a less

coefficient of roughness then than it has now?

A No, the condition of the curves near Nunn's station are a controlling factor on that flume. If it develops any extra speed those curves knock it out. The curves are a limiting factor on that flume and the difference in the coefficient at the time of its new construction and the time now I don't think would be very much difference.

Q There is one measurement here now made after the flume was twelve or fourteen years old showing a coefficient of .0114, is there not?

A Yes.

Q Might the coefficient of roughness at the time of the building of the flume have been as low for the mean as that measurement?

A No, I think on the curves there, as I have stated, are a material factor in there. This discharge measurement of .0114 is rather isolated. The other points at Nunn's station range near the point 012, and above the point 012. I think 012 would be nearer the measurement taking everything under consideration at this station.

Q As a matter of fact, there are three measurements below and three on the projection of a coefficient of .012, are there not?

A Yes, and nine above.

Q And those all taken at a period when the flume was at least twelve or fourteen years old?

A Yes.

Q Now, again, after going through that, the plat to which I have called your attention embodies all of the facts contained on Exhibits 185 and 186, and the data furnished in Exhibits 147 and 148?

A Yes.

REDIRECT EXAMINATION by Mr. A. C. Hatch.

Q As an engineer, Mr. Wentz, which would you say was the proper place to determine the capacity of that flume, to take the coefficient, at Donnan's station or the coefficient of rugosity at the Nunn station?

A At Donnan's station. The capacity of that flume, of course, is limited by its point of minimum capacity, at wherever on that flume the coefficient is the highest, then that is the point of maximum capacity, and is a limiting factor in the discharge of that flume. If there is any place in that flume that the coefficient would reach say 16, that is the coefficient for the limiting capacity of the flume.

RECROSS EXAMINATION by Mr. Ray.

Q Mr. Wentz you stated at the outset of my examination that the grade of the flume was one of the factors necessary to determine the coefficient of roughness?

A Yes.

Q You now state---

A Not the coefficient of roughness, the discharge.

Q Discharge?

A Yes, coefficient of roughness is not determined on the grade.

Q But you used the grade in getting this one, didn't you?

A Used the grade in getting the discharge, the velocity and the coefficient of roughness is shown here by the curves.

Q You say the point of minimum capacity, of course, is the point also of maximum carrying capacity, isn't it?

A Yes.

Q As far as the canal is concerned. Now there is a difference in grade at Donnan's, is there not, affected by the racing section, or that it is it is preceded by a section of the flume which is of greater grade than the average?

A Yes, there is a short stretch of flume, the racing section

that is higher than the average flume grade.

Q And you stated to me that the water was not freed from the effects of that until below the Donnan station, did you not?

A No, I didn't state that.

Q I understood you to so state, that it assumed more normal flow at the Nunn station than at the Donnan's station?

A No, I said at the Nunn station there was no effect of the racing section, but the wave heights and disturbance at the Donnan station were no more pronounced than they are at Bridal Veil falls or Nunn station.

Q How is the relative speed as affected by the racing section?

A You mean the relative speed through the racing section?

Q No, at Donnan's and at Nunn's?

A Well, the speed at Donnan's is lower than the velocity at Nunn's.

Q Why?

A Well, on account of the--possibly on account of the disturbances created by the racing section.

Q As a matter of fact, water piles up there, doesn't it, because of the fast water flowing in from the racing section? Piles up there a little, don't it?

A Right at the end of the racing section, yes, a heavy back wave.

Q And does not get unpiled until it gets below Donnan's where it takes on additional speed, does it, normal speed?

A That word, "unpiled" in there.

Q That was your word, wasn't it?

A No.

Q I think I originally used it; you agreed with me first, so that I tried it again. You know what it means, I think.

A The height of free board just below the racing section and the height of free board near the Donnan station are approximately the same. The speed just a short ways below

the racing section is practically the same as it is at the Donnan station. Of course, there is one local disturbance at Donnan's station, I have noticed in two or three instances, but it has only been in those two or three instances. There is at the time, I think, of the measurement in May, just immediately after I got through making the measurement, there seemed to be an extremely heavy wave go through the station. I have noticed that other times. Now, that is, of course, caused at the racing section, but outside of that the free board immediately below the racing section and the free board down at the Donnan station are practically the same.

Q Which would indicate that the speed of the water was substantially the same from Donnan's station up to where you observed the free board, would it not?

A Up to just below the racing section.

Q And through all that section the speed of the water is less than it is down at the Nunn's station, you testified, did you not?

A Yes.

Q And that is because of the coming in of the water from the racing station, is it not?

A Yes, the water at the Donnan station is not as high as the velocity at Nunn's station, and I attribute it, of course, to the disturbance at the lower end of the racing section.

REDIRECT EXAMINATION by Mr. A. C. Hatch.

Q. What is the difference, if any, in the alignment of the flume at Donnan's station and at Nunn's station?

A The Donnan's station is rather close to the curve above. it is on a long tangent of approximately a thousand or twelve hundred feet, and it is located approximately one hundred and thirty feet belowthe center of the curve above. The Nunn station is a better station and is located

on a tangent, a longer tangent,--not a longer tangent, but a longer straight piece of flume above the station to the curve.

Q Wouldn't the better alignment at Nunn's station tend to increase the velocity of the water so it would be greater than at the Donnan station?

A Yes, any betterment of the alignment, of course, increases the discharge.

Q Then, wouldn't the fact of the curve near the Nunn station, near the Donnan station be the cause of the difference in the flow?

MR. RAY: I object to that as leading.

THE COURT: Objection is overruled.

A Yes, that is one cause of the---

Q I think that is all.

9:00 P. M., Recess to 10:00 A. M., January 25. 1917.

T. F. WENTZ - - - - - - -

REDIRECT EXAMINATION By Mr. A. C. Hatch continued.

Q Did you prepare the tabulation that we asked for yesterday?

A No, I haven't that complete, I can prepare for it by the afternoon session.

Q That will be all then.

MR. A. C. HATCH: We have a witness from Salt Lake City, the watermaster, who promised to be here at the opening of the court these morning to testify.

THE COURT: That is the last witness you have?

MR. A. C. HATCH: Yes.

THE COURT: You can put that evidence in out of order.

MR. A. C. HATCH: If the court please, there is that matter last evening as to the use of water as between Wasatch county users above Midway dam and the users of water below the Midway dam that is still undetermined and unsettled. There seems to be some misunderstanding between counsel in the case as to what the stipulation covers.

MR. THOMAS: Judge Hatch, before you enter that this morning could we clear the docket of everything else.

MR. A. C. HATCH: Not before I make my statement; pardon me just a moment, but we don't wish to close our rebuttal or close our case until that is determined definitely in some way, and in saying that we have just one more witness, I don't want to be understood --

THE COURT: I understand that.

MR. THOMAS May it please the court, Mr. Coleman's notes as to what had been introduced did not agree with the court reporter's notes, and to prevent any disagreement in the record I want to make a few more offers. Mr. Davis's record shows that

the minutes of the meeting of Provo Council held on the first day of August, '97, was admitted, but the report of the City Council, January 1, 1884 was not admitted. Then was presented the statutes of the second of February, 1851, and the third of March, or the sixth of March, 1852, and 22nd of September, 1852. Mr. Davis has these noted as not offered. Those were the old statutes.--

THE COURT: City ordinances.

MR. THOMAS No, one was called an ordinance of the State of Deseret, that was pead and presented, and then the laws of the Territory of Utah. Mr. Davis has those marked not offered Those were the statutes. Our position was that the court would take judicial notice of the laws that have been passed in the State and Territory. Then there were certain sections which were offered in a printed volume that was presented, but the printed volume cannot be found by the clerk, printed volume of the ordinances and granting certain charters. Those were all xx printed and we all remember having the book and having presented it, but no trace of it can be found.

MR. THURMAN: Were they read into the record, the sections you refer to?

MR. THOMAS: The sections were all read.

MR. THURMAN: What is it now?

MR. THOMAS: We want leave to represent them, and in lieu of that printed volume which has been lost evidently in the shuffle to have typewritten copies of these various ordinances presented. Then I want to present two or three other ordinances which were not then presented, which are along identically the same lines.

MR. THURMAN: That is another question, but those that you have read into the record, why present them again, what is the purpose of that?

MR. THOMAS: Mr. Davis' record shows that certain

sections of Provo City under date of the first of February, 1877, that was the date of the passage of the revised ordinances, compiled ordinances of Provo City was identified and not offered. Now, the notes we have--

THE COURT: Have they been read into the record?

MR. THOMAS According to Mr. Davis' record they have not, and I want to present it so that they might be in the record.

MR. A. C. HATCH: Pardon me until I offer a few exhibits. We offer the Exhibit 193 at this time in evidence.

THE COURT: It may be received.

OMISSION.

Stipulation as to Pioneer Ditch Company, Jackson R. Allen, et al.

MR. THOMAS: May it please the court, I wish to offer from the City Ordinances of Provo City these ordinances which I will have copied, certified copies made thereof and filed in lieu of leaving this volume of the city.

I wish to offer an ordinance granting to George T. Peay the right to take water from Dry Creek for machinery and other purposes, the said ordinance was passed and approved February 9, 1867.

MR. RAY: Your Honor Please, I object to it as irrelevant and immaterial upon the ground that it does not appear Provo City had any authority to grant the right to the use of this water, or ever had a right to appropriate waters for the purpose of alienation.

THE COURT: Objection is overruled, I will not pass on the effect of it this time, it may be made part of the record.

MR. THOMAS: Also ordinance granting to James G. Snider, Martin L. Snider, P. R. Johnson, James E. Daniels the right to the use of waters of Dry Creek for the purpose of driving machinery, etc., approved April 15, 1867.

MR. RAY: May we have the same objection and exception?

THE COURT: Yes.

MR. A. C. HATCH: The further objection to it except it be shown the water was appropriated by those parties at the time and continually used since, that evidence is immaterial, that the grant even though it were made would not be perpetual under any law we have ever had and if the use has been made proving the ordinance is surplusage.

MR. THOMAS: The evidence on that is all before the court, and the court has indicated now he would not pass upon the effect.

THE COURT: The court will consider it for whatever it may be competent for; it may be evidence of the abandonment of water right theretofore acquired.

MR. THOMAS: Also ordinance authorizing and defining

the duties of the City Watermaster, and regulating irrigation. This ordinance was approved April 25, 1872.

Also an ordinance granting to Provo Manufacturing Company the right of way for water. This ordinance was passed and approved April 4, 1874.

Also an ordinance granting to Provo Manufacturing Company the right of way for water. This ordinance was approved April 4, 1874.

An ordinance granting to Myron Tanner the right of way and use of water for machine purposes passed and approved March 11, 1876.

An ordinance granting to George T. Peay the right of way and use of water for machine purposes passed and approved March 11, 1876.

Also an ordinance granting to George Beebe the right of way and use of waters for machine purposes passed and approved March 15, 1876.

Also an ordinance amending an ordinance entitled "An Ordinance Creating the Office and Defining the Duties of Such Watermaster and Regulating Irrigation" passed February 2, 1875. This ordinance was passed and approved March 22, 1876.

Also Chapter 2, Sections 261 to 264, both inclusive, of the Revised Ordinances of Provo City, passed February 1, 1877.

Also Chapter 3, Sections 265 to 268, both inclusive, of the same ordinances.

Chapters 4 and 5, Sections 269 to 276, both inclusive, of the same ordinance.

Also an ordinance granting to Hans Poulson a certain right for power purposes, Sections 1, 2, 3 and 4 thereof, which includes the entire ordinance passed and approved February 24, 1879.

Also an ordinance granting a right of way and water privileges to Provo Lumber Manufacturing & Building Company, passed and approved April 21, 1879.

Also an ordinance granting to August Sward a certain water right, passed June 19, 1882.

Also an ordinance providing for furnishing the city with water for irrigation and other purposes and to regulate and control the same, passed and approved February 19, 1886.

Also a resolution granting a franchise to Warren N. Dussenberry, passed April 1, 1889.

Also a certain water contract between Provo City and the Territorial Insane Asylum of Utah Territory, entered into the fifteenth day of February, 1892.

MR. A. L. BOOTH: May I ask here, wasn't that contract to last only twenty years?

MR. THOMAS: I am offering it.

MR. A. L. BOOTH: I am asking you if that is what it is.

MR. THOMAS: I think it is, but the contract will show for itself when presented.

Also an ordinance providing furnishing the city with water for irrigation and other purposes, and to regulate and control the same, passed and approved on the seventeenth day of March, 1902.

Also an ordinance granting to the Knight Woolen Mills, a corporation, its successors and assigns, the right to the use of water of the Mill race for power purposes, and right of way for conveying said water, and the right to reconstruct and maintain on Second West Street a dam containing walls and all other necessary work and appliances for the utilization of said water for such purpose, passed the 7th day of July, 1913.

These are all offered on behalf of Provo City.

THE COURT: They may be received subject to the same objection and exception taken to the first one.

MR. RAY: And to Judge Harch's.

THE COURT: All the objections that were made to the

first offer may apply to all of these

MR. A. C. HATCH: The second offer is the one I raised the additional objection to.

THE COURT: Whichever one it was.

OMISSION.

Tabulation of water users in Summit County.

CHARLES F. BARRETT, called by the plaintiff, being first duly sworn, testifies as follows:

DIRECT EXAMINATION By Mr. A. C. Hatch.

Q What is your full name?

A Charles F. Barrett.

Q Where do you reside?

A In Salt Lake City.

Q What is your occupation?

A At present superintendent of water works for Salt Lake City.

Q Have you knowledge of the use of water of Salt Lake City for supplying its inhabitants?

A I have, yes sir.

Q And for all city purposes?

A Yes sir.

Q What is the amount of water per capita used by Salt Lake City through its water system, pipe system?

MR. THOMAS: Just a moment, we object to this testimony as not proper rebuttal, the plaintiff made its showing as tothe amount of water to be used by municipalities through its witness, Mr. T. F. Wentz, andmade its complete showing.

THE COURT: Objection is overruled, I think this is proper rebuttal of evidence that you introduced as to the necessities of the city.

MR. THOMAS: Exception.

Q You may answer, Mr. Barrett.

A For the year 1916, for all purposes 208 gallons per capita, basing the population on the figure of 115,615 people.

Q That would be to take 208 gallons per day?

A Yes sir, per capita

Q What was the use for the years prior to 1916?

A For the year 1915, 197.7 gallons for the year.

Q 1914?

A For the year 1914, 186.2 gallons.

Q Have you the figures for 1913?

A My recollection was 185 gallons for 1913.

Q To what uses is the water applied under that system for the years that you have given us? and does it include, does the amount you have given include all the water that is used through the city, whether city water pipe system for all purposes?

A Yes sir.

Q Now, what is included in the use to which the water is applied?

A We divide it into domestic, public and commercial purposes.

Q To what does domestic apply?

A To the consumption by homes and their surroundings.

Q Does the surrounding of the homes, does that include sprinkling of lawns. A. Yes sir.

Q The commercial use, what is that?

A Commercial use means such consumption as railroads, manufacturing plants, stores, business blocks and so forth.

Q Regardless of the purpose for which it is used by the different commercial institutions?

A Yes sir.

Q And the public use, what does that cover?

A That includes street sprinkling, gutter flushing, sewer flushing, parks and cemeteries, sprinkling and so forth.

Q You have a system of parked streets in Salt Lake City?

A Yes sir.

Q Does that include the sprinkling of those parks within the streets as well?

A That was not included in the public consumption except where the parking is in the denter of the street. It is included in the domestic.

Q But it is included in the water taken from the pipes of the city?

A Yes sir.

Q For how long have you been engaged in the business or occupation in which you are now in?

A In the water business I have been something over twenty years.

Q Are you a civil engineer? A. No sir.

Q Have you made a study of the uses of water by cities?

A During my connection --

Q Necessities of cities and the inhabitants of cities for the use of water?

A To some extent, yes sir.

Q Have you a judgment as to the necessity of a smaller city and its inhabitants?

A I didn't catch the forepart of the question.

Q Have you a judgment as to the necessities of a smaller city than Salt Lake City, say one of ten thousand inhabitants?

A Yes, I have a judgment of what is necessary.

Q What would you say would be the necessary quantity for a city of say ten thousand inhabitants, where the uses cover the same uses as in Salt Lake City, and where the conditions are the same, or very similar except as to number of inhabitants and number of commercial uses?

MR. THOMAS: I object, if the court please, on the ground that the witness has not shown sufficient knowledge or familiarity with smaller cities to give an opinion.

THE COURT: Objection is overruled.

MR. THOMAS: Exception.

A The consumption of any city depends entirely on what the extent of its commercial use and public use is. With a city of ten thousand using the same per capita for commercial and public purposes as Salt Lake City, the consumption should run somewhere between 120 and 150 gallons per capita.

Q What would be the difference as to quantities, if you can tell us, for the several purposes in the smaller cities, the domestic, commercial and the public uses.

A I find that where there is a fair proportion of business consumption an allowance of as much as 50 gallons per capita can be made for that purpose. Salt Lake City for the year 1916 actually

used, we know by actual measurement they used 49 gallons per capita for business purposes, or commercial purposes. The public consumption depends of course on the extent of pavements, sewer systems and amount of sprinkling which is done on streets. Salt Lake City's per capita ran last year estimated 31 gallons per capita for those purposes.

Q Of course, all these reference all apply to per capita per day?

A Yes sir.

Q With the smaller cities what would you say would be the necessity for the domestic use, including the sprinkling of lawns?

A Where the water is properly controlled it should not run over 70 gallons. I mean by properly controlled, if it is measured to the consumer.

Q Have you had experience, or made a study of the necessities of cities per capita other than Salt Lake City?

A I cannot say that I have actually studied their necessities, but I have studied the question generally by reason of my association with other water works men.

Q And your discussion of the subject with them?

A Yes sir.

Q And I will ask you whether or not you have had reports made up by other waterworks men of other cities?

A I have, yes sir.

Q And gone over them?

A Yes sir.

Q About how many cities?

A I have reports gotten out by a committee of the American Waterworks Association for the year 1914, covering 144 cities.

Q All within the United States?

A No, not all within the United States, I think there are several in foreign countries, including Yokohama in Japan.

Q Does it cover the western cities, western states and within the

arid region?

A Yes sir, some of them.

Q About how many of those cities?

A All the principal cities.

Q Now what, if you know without reference, is the average for all the cities mentioned in those reports per capita per day for all purposes?

A Average of those 144 cities per capita per day is 120 gallons.

Q Can you say what is the average per capita per day for all purposes in the cities within the arid region of the United States?

A I can by referring to the report.

Q I wish you would do so.

MR. THOMAS: Before you begin reading from the book, what is the book from which you are about to read?

A This is the annual report of the -- or the journal of the American Waterworks Association for the year 1915.

MR. THOMAS: Under what auspices or authority was it published?

A Under the auspices and authority of the American Water-works Association.

MR. THOMAS If the court please, I object to the introduction of any statement from the volume, and the whole of the testimony, as being incompetent and immaterial and not within the issues of this case; does not purport to show anything that pertains to conditions similar to those existing in the defendant city, Provo City.

THE COURT: I hardly know what your objection goes to. The witness is asked if, from his information he could give the information of water consumption required per capita per day of cities in the arid region. As I understand it that is the question.

MR. A. C. HATCH: That is the question.

THE COURT: Now, you are objecting to the introduction

of some book.

MR. THOMAS: Mr. Barrett, were you about to read from this volume which you have described?

A I was about to read from the list of the 144 cities.

THE COURT: Objection may be sustained to the introduction of this book or any part of it, I don't think it is competent, but if from Mr. Barrett's reading and information he can give an answer to this question, he may give it.

Q Can you, Mr. Barrett, give it without reading from the book?

A My memory is not godd enough to give the pr capita consumption of the individual cities.

Q Well, can you give approximately the average of the cities within the arid region?

A I can remember a few of them, I think, for instance, Denver, Cheyenne.

Q Give us Denver?

A Denver per capita consumption for the year 1915, I understood to be 234 gallons.

Q Cheyenne?

A Cheyenne is 216.

Q Have you any others in this intermountain region?

A Miles, Montana is given.

Q You have the data as to that?

A I have it within this list.

Q Do you haveit within your memory?

A No, I don't remember

Q Have you any of the Utah cities other than Salt Lake?

A No, I think there are none of the Utah cities that actually measure the water outside of Salt Lake City.

Q Then there is no data to be obtained from any of the cities in Utah outside of Salt Lake, that is, they keep no record of their daily use so far as you know?

A My understanding very few of them, if any at all.

Q Now, what have you to say as to whether the quantity per capita

used by Salt Lake City is a reasonably sufficient supply for 1916.

A My opinion as a superintendent of water-works is it is too much.

Q It is too much? A. Yes sir.

Q That there is a waste of water then by the users?

A Yes sir.

CROSS EXAMINATION By Mr. Thomas.

Q How large a city is Cheyenne, Mr. Barrett.

A I don't remember the population.

Q Are you familiar at all with the conditions existing in Cheyenne?

A Very slightly.

Q You have made no personal inspection of the system of the character and method of use in Cheyenne, have you ?

A No sir.

Q So you have no opinion to offer as to whether or not that is an excessive use.

A So far am any opinion based on actual information is concerned I have not.

Q You have made, or have you made any personal investigation of conditions as to soil and use of water here in Provo?

A Well, I have not made any exact investigation with the idea of investigating it in mind. I have noticed conditions at times?

Q When?

A During the last twenty years at different times.

Q Just a passer through?

A Just a passer through. I think I visited the superintendent of water-works and city engineer here one or two occasions.

Q When?

A Two or three years ago.

Q What was theoccasion and purpose of those visits?

A One occasionwas reason of the fact Iwas a witness in another case here, and incidently visited the superintendent and city

engineer.

Q Was the visit of a social character?

A To a certain extent.

Q Chiefly, wasn't it?

A Well, with the idea of getting acquainted as much as anything else, yes.

Q Now with a view, however, of making any analytical investigations concerning the system,

A No, only as we discussed it in a general way.

Q Your observation, I take it, was limited to whether or not you had enough water , or some such question, wasn't it?

A No, my recollection was the discussion was more along the line of wastage by reason of hydrants and unreasonable use.

Q Have you made any investigation as to the necessities and use of water here for lawn purposes, irrigation purposes, in Provo City?

A As to what would be required?

Q As to what would be required?

A No, sir, I have not.

Q Have you made any investigiation at all as to the use or alleged waste of water here in provo City.

A So far as personal investigation is concerned I thinknot.

Q Assuming Provo City to have a population of ten thousand douls would you say that a use of fifty gallons per capita here in Provo would be an excessive use for culinary putposes?

A For culinary alone?

Q Yes.

A I should say that was excessive in any community.

Q And to what extent would you say it would be excessive?

A I should say forty would be enough.

Q Are you familiar with the use of water in apartment houses in Salt Lake City?

A I am.

Q Is there usually less water used or consumed in apartment houses than in the ordinary residence?

A Generally a little more.

Q Per capita.

A Yes sir.

Q Would you say that Provo City having fifty-three and a half miles of streets to be sprinkled, that a use of 24,750 gallons per mile would be excessive?

A I don't think I should say so.

Q If Provo had twenty-six and one half miles of sewer to be flushed, would you say that the use of 377 gallons per mile would be an excessive use for that purpose?

A I should want to go over those figures from the standpoint in the manner in which we compile ours before I answered.

Q And that would necessitate a pretty thorough investigation of the system of sewerage in Provo City, wouldn't it?

A Only in so far as the manner in which they are flushed.

Q And in the manner or the general construction also, wouldn't it?

A That would have a bearing on the matter.

Q Have rather an important bearing, wouldn't it?

A Yes.

Q So you have no such knowledge upon which to base a judgment with reference to provo City, have you-- I am speaking now, Mr Barrett, of your own knowledge?

A As to actual knowledge of the sewerage system, its construction and so forth.

Q Yes.

A I have not, no sir.

Q If there were nine public drinking fountains in Provo City, would you say that a use of 1440 gallons per day each would be an excessive use for public drinking fountains?

A That is not excessive, no sir.

Q If there were three horse troughs, would you say that the use of 5000 gallons per day per trough would be an excessive use?

A I hardly think it requires quite as much as that.

Q In your judgment, Mr. Barrett, what would you fix the figure to be?

A Three.

Q Three thousand each?

A Three thousand each, yes sir.

Q Have you any data which would enable you to give a judgment as to what would be necessary to irrigate and sprinkle lawns here in provo City?

A Only as compared to Salt Lake City.

Q And that is without having made any investigation as to soil conditions here in Provo?

MR. A. C. HATCH: Just a moment, if the court please. As to irrigation outside of sprinkling of lawns we don't understand Provo City water system is used for the purpose of irrigation other than the sprinkling of lawns.

THE COURT: When you speak of the Provo City water system, you mean that part--

MR. A. C. HATCH: The pipe system only, and that is all we questioned this witness about.

THE COURT: That being the case you need not cross examine as to that.

Q Now then, do you remember the question, Mr. Barrett; leave out the word irrigation there -- let me reframe the question, it will be quicker-- can you give a judgment based upon your personal investigation and knowledge as to how many gallons are required to sprinkle one hundred square yards of lawn in Provo?

A Only as based on my knowledge of what it would require in Salt Lake City. I have made no investigation of the matter in provo.

Q You don't know whether the conditions of soil are the same here as in Salt Lake City?

A No. While I one time leved here for a few years, and while I made no experiments in the soil, I have some knowledge of it.

Q When was that, Mr. Barrett that you lived here, how many years since?

A I left here in the spring of 1896.

Q Did you have a lawn at the time you lived here?

A Yes sir.

Q Did yiu do any sprknkling?

A We did.

Q You recall having made any measurements to determine the amount of water you were using.

A We made no measurement whatever.

Q Now then, can you state what anount of water would be required to sprinkle 100 yards of lawn in Provo?

A Only as based on my knowledge of like conditions in Salt Lake City.

Q Would you say that the use of 345 gallons for 100 square yards would be an excessive use per day.

A Yes, it is slightly excessive.

Q In your judgment what figure would you place?

A 250 gallons.

Q Are you familiar with the city cemetery of Provo City and the use of water there, Mr. Barrett?

A I am familiar with the cemetery, but so far as the use of water is concerned, I don't know much about it.

Q Would you say that where there were seventeen separate hose connection that had a use of 92 cubic feet per hour per hose, amounting in all to 117,300 gallons per day would be an excessive use of water in the Provo City cemetery?

MR. A. C. HATCH: Just a moment, the question does not give the area of the cemetery, and unless the witness knows it is immaterial. It is not how many hose connections there are, it is the ar-ea to be covered.

MR. THOMAS: He said he was familiar. Of course if the witness doesn't know that he would not be competent to answer If he were competent to answer, any answer he might give would be material.

MR. A. C. HATCH: If the court please, further, unless it is based on some area or some element other than the question

we object to the question as being wholly immaterial and irrelevant and incompetent.

THE COURT: I think if Mr. Barrett knows the extent of the cemetery and can answer the question it would be material and would be competent. If I remember, without giving the area of the cemetery Mr. Swan testified to the quantity of water that was necessary for the use in the cemetery at a given number of gallons per day. Now, if Mr. Barrett is familiar with the situation he can answer the question whether that amount is excessive, and it would be enlightening to the court to that extent. The objection is overruled. If Mr. Barrett understands the situation he may state whether that quantity is necessary.

A I could not intelligently answer that question without knowing the areaof the ground. I would apply my knowledge of what is necessary per square yard to cemeteries as I know it to this cemetery like others.

Q To this cemetery what?

A Like others.

Q I will ask you what in your judgment then would be the use, necessary use per yard under such conditions as you are familiar with?

A The necessities for lawns and flowers and so forth as they are kept up in cemeteries is very similar to domestic premises. It requires as much as two to two and a half gallons per square yard per day.

Q Are you familiar with the parking system of Provo, Mr. Barrett?

A You mean as to their city parks?

Q City parks in Provo City.

A No, I am not familiar with them.

Q I am advised there are three parks, two of which cover six acres which are sprinkled and in lawn, one of which has not yet been put into lawn.

MR. JACOB EVANS: That is not irrigated.

MR. A. C. HATCHP I understand there is only one under the sprinkling system.

Q What would you say would be the -- let me frame the question in this way-- would you say that the parks of the description and dimensions which I have given, that 135 gallons -- 135,255 gallnns was an excessive use of water for those parks? and such parked streets as there are in Provo City.

A I should have to go into the area and total number of gallons given there in ordr to determine that. However, my opinion is that the same quantity of water per square yard can be applied to parks.

MR. A. C. HATCH: That is what quantity?

A Two to two and a half gallons per square yard per day during the sprinkling season.

Q Are you at all familiar with the uses of water in hospitals?

A Yes.

Q Are you familiar with the ground and uses of water at the State Mental Hospital, Mr. Barrett.

A I am somewhat familiar with the ground, but as to the necessary consumption of water, I am not familiar.

Q You know nothing then as to the consumption that might be necessary in their dairy barns and laundry, in their lawns, and within the hospital for such medical purposes as they might use the water; you have no knowledge as to that?

A I am not familiar with that.

Q Now would you be able to testify as to the use of water within the institution?

A Within the institution itself?

Q Yes.

MR. A. C. HATCH: We object to that question upon the ground that it is shown that the water is furnished at all by Provo City to the State Mental Hospital under a contract; that the grounds of the objection are the same as raised by Mr.

Ray that a city is not authorized to appropriate water for purposes of speculation or sale thereof to parties outside the corporate limits.

THE COURT: Has it been shown this water is furnished to the Mental Hospital, to the State under contract?

MR. A. C. HATCH : Mr. Thomas offered, and it was accepted, a contract between provo City and the State Mental Hospital.

THE COURT: I didn't remember.

MR. A. C. HATCH: Which terminated in twenty years. Now, it was under contract once, speculative purposes, as I understand it, supposition is until the contrary is shown that it is still under contract, and for that reason we object to it as not being a municipal purpose.

THE COURT: Objection is overruled.

MR. A. C. HATCH: Note our exception.

THE COURT: This question can be answered by yes or no, read the question.

(Question read)

A On actual knowledge of conditions within the institution I would not be able to testify.

Q What do you allow, Mr. Barrett, for loss of water in the mains and various services in Salt Lake City?

A We have made no allowance so far, because we are unable to make an intelligent guess.

Q I didn't get that answer, you have made no allowance, I couldn't get the rest.

A Because of the fact we have not been able to make an intelligent guess what that amounted to.

Q There is an appreciable loss, however, isn't there.

A There is a probable loss.

Q Mr. Barrett, are you familiar with the book known as the American Civil Engineers Pocket Book, Mansfield Marriott Editor in chief?

A I have seen the book, I am not very familiar with it.

Q Do you regard it and accept it as a standard authority?

A Yes, I think it is a standard authority.

Q And do you accept it as such?

A Yes, I should say I would.

Q Are you familiar with the 1911 edition?

A I am not.

Q You are not then familiar with page 947 of that edition?

A No sir.

Q Are you familiar with the rule given by that book or in that book, whereby the fire fighting reserve may be estimated in cities?

A Not being familiar with the book, of course, I am not familiar with his figures.

Q Are you familiar with this rule, that you should took the square root of the population in thousands and the quotient being the rate in millions of gallons of water per day at which water should be provided for fire service in cities, are you familiar with that rule?

A I am not familiar enough with it to recall it very readily.

Q Is that rule correct?

A I would not say whether it was or not.

Q Beg pardon.

A I say I couldn't say.

REDIRECT EXAMINATION By Mr. A. C. Hatch.

Q Do you provide any fire fighting reserve in Salt Lake?City?

A Only as we provide a reserve for all purposes. Salt Lake City we don,t need a special fire service.

Q What provision is made for a reserve at Salt Lake?

A We have what we term distribution reservoirs at the edge of the city which are for the purposes of reserve in all cases.

Q And for all purposes?

A Yes.

Q Do that figures that you gave per capita include and cover losses

by seepage and waste and water used for fire fighting purposes?

A It does.

MR. THOMAS: I ask the answer be stricken out. I object to it as improper redirect.

THE COURT: Objection overruled. It may not strictly be redirect, but would obviate the necessity of recalling the witness.

RECROSS EXAMINATION By Mr. Thomas.

Q What did you give as the consumption per capita in the apartment houses?

A I didn't state it.

Q probably I misunderstood?

A I said it was larger than the domestic.

Q Larger than the domestic?

A Yes.

Q That is correct, now can you give the consumption?

A I can give it by referring to my reports which I have here.

Q You gave the consumption as necessary being about forty gallons per capita for culinary purposes?

A Yes sir.

Q Now that would embrace all purposes for which water would be used in residences, does it not, Mr. Barrett?

A No, I don't so consider it.

Q For bathing, flushing of sewers and like in residences?

A Yes, I think that would be all right.

Q So that you could safely say that the use of water, such use of water in apartment houses and residences, no matter to what use it might be put, whether for actual cooking, drinking or bathing or flushing of sewers, would all come under culinary use?

A Yes, with the exception of outside purposes.

Q Entirely apart from ~~sprki~~ sprinkling of lawns, of course?

A Yes.

Q Your use as measured by meters in Salt Lake City for the year

1914, was 72.2 gallons per capita daily, was it not?

A I think on domestic premises, yes.

Q And in one hundred and ninety-seven apartment houses in 1914, you used 95 gallons per capita, did you not?

A I think that is approximately correct, yes sir.

Q How many watering troughs did you have in Salt Lake in 1914, can you give that information now, Mr. Barrett?

A No, I am not able to state that.

MR. A. C. HATCH: Is it in the report?

A I rather think it is given in the report. It doesn,t give the number of watering troughs, it merely gives the consumption.

MR. A. C. HATCH: Is that your 1914 report?

A Yes sir.

MR. THOMAS: I believe that is all.

REDIRECT EXAMINATION By Mr. A. C. Hatch.

Q The amount of water to be provided for watering troughs would be governed somewhat by the number of animals or teams that were watered at the several troughs, would it not?

MR. THOMAS: Object to that as immaterial, it is based upon the size of the trough.

MR. A. C. HATCH: It would certainly go to the necessity.

THE COURT: Objection is overruled.

MR. THOMAS: Exception.

A I presume it would if you were figuring strictly on that basis.

Q To conserve the water?

A Sir?

Q And to conserve the water?

A Yes.

Q Doesn,t practically three fourths of all the water that goes into the watering troughs run to waste?

A I have never made any investigation to determine exactly what does run to waste. I know a lot of it runs to waste.

Q Were you ever at the troughs except when teams were actually

drinking in the troughs that there was about the same quantity spilling out that was running in?

A It might look so.

RECROSS EXAMINATION By Mr. Thomas.

Q In your report of 1914, on page 4 thereof, you have given the domestic per capita use both on the flat rate and meter rate, as 111.8 gallons per capita per day?

A That was combined for flat and meter, I think.

Q That was 1914, one of your short years, wasn't it, rather dry year for you, or was it?

A No, 1914 was an average year.

Q How many reservoirs have you in Salt Lake City?

A Well, we have some places that are called reservoirs that are not. We have what I would term three reservoirs on the edge of the city.

Q Name them please?

A Capital Hill reservoir; Thirteenth East reservoir and Fifth South reservoir.

Q You also have a reservoir at the mouth of Parley's Canyon?

A Yes, that is the intake basin, mere receiving tank.

Q When you included this water in the amount to be reserved for fire fighting purposes, you had in mind, hadn't you, the systema and service means of conveying water to the various buildings, and the pressure that was maintained for the use of these various reservoirs, did you not? A. Yes.

MR. A. C. HATCH: Now, we have a witness, Mr. Johnson, as to the waste of water, and we will finish that matter.

CHARLES G. JOHNSON, called by the plaintiff, being first duly sworn, testifies as follows:

DIRECT EXAMINATION By Mr. A. C. Hatch.

Q What is your full name?

A Charles G. Johnson.

Q Where do you reside?

A On Provo Bench.

Q What is your occupation?

A Farming.

Q I will ask if you were at any time during the past year, made an examination of the ditches and canals below Provo City xx to determine whether or not there was any water flowing to waste?

A Yes sir.

Q From the city system? A. Yes sir.

Q When was it?

A On September second and September fourth.

Q Who was with you, if anyone?

A John H. Stratton and Newt Knight.

Q What did you find as to whether or not water was going to waste from the provo City irrigation system at that time; take the second day of September first?

A We found about 42 second feet.

Q What did you find going to waste, if any, on the fourth day of September?

A About 40 second feet.

Q Sir?

A About forty.

Q About forty second feet; did you make report of that wasting water to any person ? A. Yes sir.

Q To whom?

A To Frank Wentz, water commissioner.

Q In whose behalf was the complaint made?

A In behalf of the Provo Bench canal.

Q Do you hold any official position in that corporation, the Provo Bench Canal Company?

A Board Member.

Q Director?

A One of the directors.

CROSS EXAMINATION By Mr. Thomas.

Q In what stream did you find this water going to waste September second, Mr. Johnson?

A We found Second Ward Pasture five second feet; Second Ward Meadows, seven second feet.

Q How many?

A Seven. First Ward Pasture fifteen second feet, east of Academy three second feet.

Q On East Academy?

A East of Academy Avenue.

Q How many?

A Three second feet. Dry Creek five second feet.

Q Was that all.

A And between Scott's farm and Carter's farm, four second feet; Tanner's race two second feet.

Q That was all?

A That was all.

Q That makes 41 second feet, doesn't it?

A One second feet at Bullock's farm.

Q Now, on the fourth, give me your figures and ditches there?

A On the fourth, Carter's farm, six second feet, Scott farm, five second feet; Second Ward Pasture six second feet; Second Ward Meadows seven second feet; First Ward Pasture 16 second feet.

Q Where did you make this investigation?

A Where did we make the investigation?

Q Yes.

A All along those streams west of the city.

Q Did you go to the head of each stream?

A No sir, we didn,t go to the head of each stream.

MR. THURMAN: I will first ask Mr. Davis, who was appointed commissioner to take the little deposition, to read the testimony of John Carter.

Whereupon the reporter reads to the court the testimony taken by him as commissioner of the witness John Carter, taken at the residence of said witness under appointment of the court, as follows; and pursuant to the following statement made at the time:

MR. THURMAN: Testimony of John Carter taken before Justin R. Davis, Commissioner appointed by the court to take such testimony. Present as attorneys in the case, W. W. Ray, Mathonihah Thomas, S. R. Thurman.

JOHN CARTER, a witness called by the defendant Esthma Tanner, being first duly sworn, by the Commissioner, testifies as follows:

DIRECT EXAMINATION By Mr. Thurman.

Q Mr. Carter, How long have you lived in this vicinity?

A Well, I could not tell you exactly the years.

Q Approximately?

A For about thirty-five years I have made my home here, that is what you refer to.

Q Here? A. Yes sir.

Q Before that where did you live?

A Well, I lived down in Provo good many years since I was a boy.

Q Are you acquainted with the Esthma Tanner land?

A Yes sir.

Q How long have you been acquainted with that?

A Well, about, as near as I can remember, I guess about fifty-five years.

Q You have had familiar acquaintance with the land?

A yes.

Q During that time?

A Off and on, yes.

Q Do you know of any spring of water on that land during that time?

A It is owing to whereabouts.

Q I don't know as I could describe it, between Spring creek and the bench?

A No sir, I don't know of any.

Q Has there ever been any spring?

A Not that I have ever known of until the seepage come out in the last few years.

Q Now, about when did you first notice the seepage coming out?

A Well, I could not tell as to that, first seepage come out there I was not working there.

Q Well, how far back do you remember the seepage?

A Oh, it has been twenty-five years, I guess.

Q Did you work the land yourself?

A Yes sir.

Q How long?

A Five years.

Q Any seepage there then?

A No sir.

CALEB TANNR recalled by the defendant Esthma Tanner, testifies as follows:

DIRECT EXAMINATION By Mr. Thurman.

Q Mr. Tanner, is that an exhibit you have just tacked on the board?

A Yes.

Q What number?

A 129.

Q What does that exhibit represent briefly?

MR. RAY: I think the exhibit has been explained.

MR. THURMAN: All right, I will withdraw that.

Q That is the exhibit which contains the Esthma Tanner lands?

A Yes.

Q And Spring creek?

A Yes. In the original presentation and description there was one element that occurred in the testimony of Myron Newell and in the testimony of John Carter that was not explicitely marked on the map. I have added that element in red on the west margin of the Esthma Tanner land and designated the line as the edge of the bench. The elevation of this bench being about thirty to thirty-five feet in vertical elevation above the level of the Esthma Tanner land which lies to the east.

Q That mark you have put on there intended to illustrated this matter testified to by Newell and John Carter?

A Yes.

Q And the relative situation?

A Yes.

Q You testified in chief on this same question, that is as to the Esthma Tanner land and the drain and seepage?

A Yes.

Q I don't think I asked you at that time if there was any springs on the Esthma Tanner land?

MR. RAY: Object to that as not rebuttal.

MR. THURMAN: It is in rebuttal of Mr. Newall who has since gone on.

MR. RAY: You went in to the whole thing.

MR. THURMAN: No, we didn't go into the whole thing, but water rising on the land since irrigation commenced above, but as to any permanent spring there before irrigation I never touched that.

THE COURT: Objection is overruled.

Q You are familiar with the land and have been for how many years?
A Been familiar with the land since 1878.

Q Has there during that time been any spring on that land other than the seepage water you have testified about heretofore?

A Not at the point or in the position given by Mr. Myron Newall. In other words, there never has been and is not now any spring in the Esthma Tanner land located between Spring creek and the bench at some little distance, as Mr. Newall put it, from the edge of the bench. Approximately his location carried the spring midway between Spring Creek and the bench. The only water on this land is the water that has sprung up in recent years within the last twenty to twenty-five years, along the margin of the bench, and is approximately along the course of the line marked here "drain line".

THE COURT: Anything further except the tabulation asked of Mr. Wentz?

MR. THURMAN: If the court please, before leaving the Tanner matter I have a couple of exhibits Mr. Tanner handed me. To be frank I have not examined them. He stated what they were, certified copies of some records from the office of the Probate Clerk, the title to this property. I don't myself consider them particularly material, but as I have them I would like to offer them.

MR. RAY: Object to them as an incumbrance of the record.

THE COURT: I think the stipulation covers it.

MR. THURMAN: I am inclined to think so myself.

THE COURT: I think it would be better not to incumber the record. No one questions the title or right to possession.

MR. THURMAN: There is just on e feature, however, and that is as to the date of the patent; the date of the patent is June 10th.

MR. RAY: So far as I am personally concerned, the introduction of this exhibit may be waived, and it may be admitted that the exhibit shows the date of patent as stated by Judge Thurman, and the record will be relieved of the exhibit.

THE COURT You have not stated the date.

MR. THURMAN: Tenth day of June, 1873.

MR. THOMAS: I have no objection at all. My judgment was the stipulation covered that and all matters relating to the title.

12:00 Noon, Recess to 2:00 P. M.

****

L. L. DONNAN called by the defendant L. L. Donnan, testified as follows:

DIRECT EXAMINATION By Mr. Thomas.

Q You have been sworn?

A I have.

Q Your name is Lyman L. Donnan?

A Yes sir, it is.

Q You reside in Upper Falls resort?

A At Upper Falls Resort, Provo Canyon.

Q You are the occupant and you are the owner and in possession of that land described in paragraph 2 of your complaint, northwest quarter of the northeast quarter and the northeast quarter of the northwest quarter, and south half of the northwest quarter of Section 34, Township 5 South, Range 5 East, Salt Lake Meridian?

A I am.

Q You have been the owner and occupant of that land since the seventh of November, 1903.

A That was the date the patent was issued.

Q You were in occupancy prior to that time?

A Yes, since August, 1898.

Q You have a resort there?

A I have.

Q Did you appropriate any waters raising in springs upon that land?

A I did.

Q When?

A In August, 1898.

Q Have you continued the appropriation of the waters as described in your complaint?

A I have.

Q And put them to beneficial uses as you have set forth in your complaint?

A I have.

Q You are maintaining a resomrt there?

A I am.

Q Do you have any cultivated land in addition to the resort?

A I have about, altogether about twenty acres of land that I use the water for irrigation.

Q Do you use any water for power purposes?

A I do.

Q About how jmuch water arises upon the land that you use for irrigation purposes? does it vary, Mr. Donnan, in the season?

A It does, the flow of the stream.

Q Well, give approximately; is it as you have set out in your complaint here, varying from one second foot to ten second feet according to the season of the year?

A Yes.

Q Water rises and sinks upon your land and finds its way into the Provo River?

A It raises on land that I have purchased by contract from the Telluride -- the Utah Power & Light Company, and flows on my land, across my land and into provo River on my land.

Q The land which you are using and are about to -- or cultivating, is along the bank of the river, is it not?

A It is along the stream and on the bank of the river.

Q So that all the water which you put to beneficial use for agricultural purposes finds its way directly into the stream?

A Immediately.

Q And you are not using this water on any other land than that described in your complaint, which is along the bed of the stream?

A No sir, I am not.

Q Is it necessary for you to use the amount of water as you have set forth in your complaint?

A It is.

Q You have also alleged that you have, or that you did on the 23rd day of September, make an application in writing in the office of the State Engineer for 20 cubic feet of water for power purposes?

A I did.

Q The water to be appropriated out of the Provo River?

A I did.

Q That application was number 4978?

A It was.

Q This copy which you have here is not a certified copy-- I will ask leave to furnish a certified copy of application No. 4978 for power purposes.

MR. A. C. HATCH: How many feet of water?

MR. THOMAS: Twenty cubic feet of water.

MR. A. C. HATCH: Per second?

MR. THOMAS: Yes.

Q This water is diverted from Provo River on your resort?

A It is.

Q And finds its way immediately back into the Provo River?

A Immediately, just as soon as I run it through my wheel.

Q Are there any points of diversion between your point of diversion and your place of use?

A No.

Q Has this application been approved by the State Engineer?

A It has not as yet, although I have been in use of the water. The application was held up for approval on a protest from the Utah Power & Light, which protest now, has been, I think released.

MR. A. C. HATCH: So far as we are concerned the copy may be admitted, if it is a copy.

MR. THOMAS This is not a copy, I am certain it is not

a complete copy because there evidently is data that is ordinarily attached to a copy that is not on this, so that I would not want to present this.

Q Do you have fish ponds there upon your place as you have set out in your second cause of action and counterclaim?

A I have.

Q Do you use water diverted from those springs for the purpose of maintaining your fish springs .

A I do.

Q Fish ponds?

A I do.

Q Does that water find its way back into Provo River?

A Immediately.

Q Are there any other points of diversion between your points of diversion and the places of use?

A No.

Q So that the water that you are using is not in a sense taken from any other water user on the river?

A It is not.

Q That is to say it does not come between any other point of diversion?

A No.

Q Does not interfere with any other points of diversion on the stream?

A Not that I know of.

Q When did you first begin the appropriation of this water

A In August, 1898.

Q And have you had uninterrupted use of the water since that time?

A Not all of it. Utah Power & Light built a flume and diverted a portion of that water, the overground flow, from about 1902 to 1905, when I tore out their flume.

Q Let me ask this question, Mr. Donnan, have all difficulties between you and the Utah Power & Light Company been adjusted?

A By contract.

Q So that aside from that there has been no interference with your rights to the use of this water.

A None.

Q As you have alleged in your complaint?

A None.

Q You ask the title be quieted to you for the uses of this water for agricultural and power purposes and fish pond purposes as you have set out in your complaint?

A I do.

MR. THOMAS: I think in addition to the stipulation entered into I will ask no further questions.

MR. RAY: All the rights which you claim against the Utah Power & Light Company are fixed and settled in a contract made over a year ago?

A They are.

Q And still existing?

A And still existing.

MR. THOMAS: If necessary I can produce a copy of the contract, I did not think it necessary.

MR. RAY: We don't question it.

CROSS EXAMINATION By Mr. A. C. Hatch.

Q Have you ever raised any crops, Mr. Donnan?

A I have raised vegetables for the place.

Q On about how much?

A Probably an acre of ground altogether.

Q That is all that you have ever cultivated?

A That is all that I have ever cultivated, the other irrigated ground is groves, timber for shade for the resort.

Q And practically the whole of the ground of the resort is shade?

A To a great extent, and the lawns that is on the ground.

Q D° you know how deep it is to the ground water there.

A About two -- two and a half feet.

Q So that the trees would reach the ground water?

A They would reach the ground water, yes sir.

Q And really don't require surface irrigation?

A Oh, the trees might not, but the grass would.

Q And the rest, you simply use it for lawn purposes?

A For lawn purposes, yes.

Q Don't present to raise any crops?

A No.

Q And do you use it -- do you dampen it by sprinkling or by flooding?

A By sprinkling.

Q So that the use -- you have a pipe --

A That is part of it by sprinkling. The grove on the side, the Upper Falls side, on the south side of the hill, is irrigated by sub irrigation from the upper Falls stream, and from the supply from my flume, that is the head of my pipe line.

Q How much of it is covered with the pipe system and sprinkling system?

A I never have measured it, but I would judge there is about eight acres.

Q Could you give us definitely the total area that has been irrigated in any way at all?

A About twenty acres I would judge, sub irrigation, and sprinkling.

Q It is all sub irrigated, all of the flat where your resort is?

A Yes.

Q Is all sub irrigated before you located it?

A Yes.

Q And is still sub irrigated as it was then, isn't it?

A For the trees.

Q And your system then would simply be the sprinkling system to keep the grass green on the resort.

A That is on the bottom lands, that is along the north side of the stream where the main part of the resort is.

Q On the south side of the stream it is generally a precipitous hill side, isn't it?

A On the south side it slopes about one foot in four.

Q And the trees were growing there when you located the same as they are now?

A They were.

Q And always irrigated in the same manner, were they not?

A Not exactly, the supply from the overflow of my trough, at the head of my pipe line irrigates it and the trees are very luxurious where that water drains to .

Q But it just runs down--

A It runs down.

Q A declivity and finds its way into the stream?

A Exactly.

Q You have never diverted the water from the stream for the purpose of irrigation?

A Not for the timber. On that south hill side I have some fruit and raise potatoes to supply my resort there.

Q On about an acre?

A About an acre, yes.

Q Do you have any idea of the quantity of water necessary for the sprinkling and keeping the grass on the resort, the eight acres on the resort?

A I find that my pipe line is taxed to its capacity to furnish the amount of water for sprinkling in the dry portion of the season, and also at times I run a power wheel, I use my pipe line for the power wheel also, furnish power to three freeze ice cream, and turn a washing machine.

Q And the water you use for your power is not at the time used for sprinkling?

A Why, I use it through the faucet. I have a little mix water wheel I attach to the faucet.

Q When you are generating power, the water with which you generate the power does not get into your sprinkling pipes, does it?

A Yes, I have two power plants, one that I use with a small wheel attached to the faucets on my water system. The other power plant is the one that I divert the water from the river through

the old flume, through the old Telluride flume.

Q Was there another outlet between the sprinkling nozzle and the wheel that generates the power?

A It is attached directly on the hose, it is interchangeable with the hose.

Q When you are generating the power are you sprinkling at the same time with the same water?

A Sometimes. I don't get the full force of the water when I do.

Q So that the water when being used for generating power cannot be used, the same water for sprinkling purposes, can it?

A Not right at the same time.

Q That is what I mean. Then it runs, the water used for generating power runs directly into the river?

A Directly.

Q What I am asking you about is the quantity of water that is necessary and that you have used heretofore in the sprinkling of the eight acres where the resort is.

A I could not give you the data on that, because I have at times used the full pressure of the water, or reduced the pressure.

Q Do you think that it would require any more water than is necessary to sprinkle the lawns of Provo City or Salt Lake City?

A I don't think so.

Q Similar quantity would be sufficient?

A Probably, although the land is very porous, sandy, the soil is only about six or eight inches deep.

Q Well, but I understood you to say it is wholly shady?.

A Shady.

Q Shady, yes. A. Yes.

Q That is, the sun doesn't get down to it to dry it out?

A In places.

Q Like it would in the valley?

A I think it requires just as much or more moisture there than it will where the soil is deeper and holds the water better.

Q How large a pipe have you?

A I have an intake and pressure box of--it is a small barrel with

a three inch pipe leading from it. That is reduced to a two inch pipe for about four hundred feet and an inch and a half pipe through the ground.

Q And your pipes, to which your hose is attached.

A Those are connected on to an inch and a half pipe, and later a half inch, reduced to a half inch pipe.

Q Does it require the capacity of the pipe as you have it for the sprinkling of the ground below?

A It does at times, that is to have anything like a full head, full pressure.

Q About how often do you sprinkle.

A Most of the time in the summer time.

Q I mean how often do you get over the entire tract?

A Not any more often than to keep the grass alive.

Q Of course we can form no idea as to that, do you sprinkle it all over once a week?

A Yes, we sprinkle it oftener than that.

Q Now, how often do you sprimkle it?

A Probably we get over that ground twice a week entirely, and sometimes it requires more than that because a portion of that ground gets very dusty, on account of the people tramping over the ground.

Q Now, what portion of the eight acres is covered with grass that you sprinkle?

A There is about three acres, I would judge, or four.

Q Would you be satisfied with a duty of, sprinkling duty such as would be found necessary for Provo City or Salt Lake City?

A I could not say that I would. I will be satisfied with enough water to keep that--

Q Unless you can give us the quantity of water I don't know how we are going to determine whether to contest your right or not to contest it.

A You can figure out the amount of water the pipe will carry.

Q No, I cannot, I might employ an engineer to do it.

MR. THOMAS: How large a pipe have you, Mr. Donnsf

THE COURT: He went into that in detail a moment ago.

MR. RAY: Like to call Mr. Wentz for one question, your honor please. This is in respect to the claim of the Timpanogos Canal Company.

T. F. WENTZ recalled by the defendant Timpanogos Canal Company, testifies as follows:

DIRECT EXAMINATION By Mr. Ray.

Q Mr. Wentz, you heard the testimony, did you, of Mr. Crowther's, relative to the fruit crop on the upper East Union and Timpanogos ground or lands for the year 1916?

A Yes.

Q As I remember Mr. Crowther's testimony he said that the fruit trees under the Timpanogog bloomed in 1916, and on the UpperEast Union they did not, and aptributed it to lack of water under the canal of the Upper East Union. Have you ever had the occasiôn to observe the effect of lack of water upon trees?

A Yes.

Q In respect to blooming? A. Yes.

Q Just state what your observation in that respect has been ?

A Fruit buds are formed the latter part of July, and the leaf buds about two weeks earlier. With a normal supply of water in the month of July and month of August, the blooming the following spring is normal. With a scarcity of water in the month of July and deficiency there is a profuse blooming in the fâllowing spring provided they are not over irrigated in the month of July. Trees and plants when they are in danger of distruction use all their energy and all their forces toward reproduction. If they are dry in July and form a great number of buds and are over-

irrigated in the month of August the fruit buds are changed to leaf buds. If the supply in July is normal, and the supply in August is deficient, there is no change in condifions, and they bloom normally in the following spring.

Q So that from your experience, would you say that the fact that the trees under the Timpanogos bloomed profusely in the spring of '16 would indicate that they had an over supply of water in the summer of '15?

A No, it would not indicate they had an over supply.

Q What would it indicate?

A It would indicate a normal supply or deficient in the months of July and August.

MR. A. C. HATCH: Mr. Wentz is preparing a tabulation of the water actually used by the Provo Pressed Brick Company.

THE COURT: From his report?

MR. A. C. HATCH: That can be introduced in evidence.

MR. CLUFF: Oh yes.

MR. A. C. HATCH: Then it can be introduced by consent of all parties when prepared, particularly with the consent of Mr. Cluff who represents the Provo Pressed Brick Company.

MR. CLUFF: I want to cross examine him a little bit on it probably.

OMISSION.

Discussion as to Heber City stipulation.

THE COURT: Now, is there any other evidence to be introduced.

MR. THOMAS: Your honor, I wish to present the testimony of Mr. Thompson and Mr. Johnson in rebuttal to the rebuttal testimony -- surrebuttal of the plaintiff with reference to the waste of water on September second and September fourth.

MR. RAY: We object to that testimony as being immaterial, not proper surrebuttal, the matter of the use of water has been gone into by Mr. Thomas, and thorough survey-- there was a beneficial use for all the water, that was his main case, during 1916.

MR. THOMAS That is true, and the court permitted us to rebut testimony.

THE COURT: You have your witnesses sworn and I will see what the testimony is. If it is directed to the specific evidence of these witnesses I will hear it.

THOMAS E. THOMPSON recalled by the defendant Provo City, testifies as follows:

DIRECT EXAMINATION By Mr. Thomas.

Q You have been sworn, Mr. Thompson?

A Yes sir.

Q Did you hear the testimony of Messrs, Stratton, Knight and Johnson with relation to the alleged waste of water on September second and September fourth on the ditches known as the Second Ward Pasture, Second Ward Meadow, First Ward Pasture and the Dry creek?

A Yes sir, part of it.

Q And also Bullock's springs, Tanner's rade; what do you say as to the waste of water on the morning of September second, between four thirty and five, or about those hours?

MR. A. C. HATCH: Just a moment, I don't believe any hours were given.

MR. THOMAS: I think the witness Knight said four thirty, about four thirty or five o'clock.

MR. RAY: Yes, he did.

Q With reference to the water amounting to five second feet running to waste below the Second Ward Pasture.

A I was not down there.

Q At that hour?

A At that hour.

Q What do you say as to the waste of water amounting to seven cubic feet, or seven second feet from the Second Ward Meadow on the same date and time?

A I was not down there.

Q What do you say as to the water amounting to fifteen second feet running by the First Wast Pasture?

A We had a tight canvass dam in at the head.

Q Now, the head of that stream--

A Is the Factory race.

Q Is the factory race? A. Yes sir.

Q If there was any water amounting to fifteen second feet or any other lessor amount, in your judgment, from what sources would that water have come?

A Could not come only through seepage and the sewer.

Q Can you state if there was any water running by or from the city through their streams east of Academy Avenue?

A There might have been; it is the morning of the change, every Monday morning it is the change from the north to the south, and it may sometimes get there little ahead of it, and sometimes it is behind time. I wasn,t there that morning.

Q What do you say as to the water running through Dry Creek, amounting to five second feet of water?

A Dry Creek we have nothing to do with.

Q Not within the Provo system?

A No sir.

Q Now, water running past the Carter's farm amounting to five second feet or four second feet at that day, what do you say as to that?

A That is all spring water.

Q Where do the springs rise?

A I can show it if I could see the map.

Q Just erase those other exhibits there. Let me ask, that is water that comes out of Provo River?

A No sir, it raises on the Taylor farm, C. H. Taylor's farm.

Q What do you say as to the water running through Tanner's race amounting to two second feet on that day and time?

A That is the same ditch they claim five second feet. It cannot be any other, the Tanner race and Scott ditch is the same ditch

Q What do you say as to the water running from the Bullock's farm, amounting to about one second foot.

A Might have been, I wasn't out there that morning, such a thing could be from the Upper East Union.

THE COURT: I think it is better to question as to the things Mr. Thompson knows about. He doesn't seem to have knowledge of these matters.

Q Directing your attention to thefourth day of September, were you in the morning at any one of these ditches to ascertain if any water was going to waste on Carter's farm?

A I had nothing to do down there.

Q And the Scott's farm.

A The Scott farm?

Q The Scott and Carter, that is the same ditch?

A The Scott ditch?

Q Yes.

A The Scott ditch is a city ditch, that is the farthest ditch west.

THE COURT: Now, I don't think you heard the question, you were asked the question whether on that morning between four

thirty and five you were down there?

A I was not.

Q did you have a tight dam at the head of the City race on the morning of the fourth?

A Yes sir.

Q And the same answer as to water getting into the lower part of that ditch on this morning would be the same as the answer you gave as to the Saturday preceding?

A Yes sir.

Q Were you present and ascertained whether there was any waste at the foot of the ditches of the Second Ward Meadow?

A No sir.

Q Nor the Second Ward pasture?

A No sir.

CROSS EXAMINATION By Mr. Ray.

Q As to the Factory race, you had a ~~xght~~ tight dam at the head?

A Yes sir.

Q A good many of the town ditches on the east side of Provo City connect directly with the Factory race, do they not?

A No.

Q Some of them do?

A Just one on the east side.

Q Where is that?

A It is right below the ice plant up here, about a mile north.

Q Beginning here for instance, Center street and that block a mile north, or there no east and west ditches which have an inlet into the Factory race?

A Yes, there is another one up here three blocks.

Q Are there any below here?

A Yes sir, there is one again at the -- just south of Center street

Q That makes three in all?

A Yes sir.

Q Do you know whether any or all of those ~~fx~~ ditches might not be

emptying into the Factory race during the night?

A They could not get back in. This one can here, but the balance could not get back in. Those on the east could get back into the Factory race after being taken out, yes, they could get back in.

Q You have no jurisdiction over the west side, have you?

A Just as the east anymore than I keep a deputy mostly down there.

Q You gave no particular attention to what was going on on the west side on any of these dates, did you ?

A Yes sir-- well, no more than common, certainly not.

PETER B. JOHNSON, called by the defendant Provo City, being first duly sworn, testifies as follows:

DIRECT EXAMINATION By Mr. Thomas;

Q State Your full name ?

A Peter B. Johnson.

Q Where do you reside?

A In the southwest of here, in the town southwest.

Q In provo City?

A Yes sir.

Q What is your business?

A Farming.

Q How much land do you farm?

A I farm seventeen acres.

Q From what ditch do you take water for the irrigation of this land?

A One parcel of land is way down where there is no water, away from this other part.

Q How much land do you have water for?

A Six acres.

Q Where is that located?

A Right on the upper part, it is right along the South Pasture road.

Q From what ditch do you get water to irrigate this land?

A Scott ditch.

Q At what time do you receive water?

A Five o'clock Monday morning, until eight.

Q Directing your attention to the morning, Monday Morning, September 4, 1916, state if you were irrigating your land at that time?

A Yes sir.

Q State if youhad all the water that was in the ditch and applied to your land at that time?

MR. RAY: What ditch?

MR. THOMAS: The Scott ditch?

A Yes sir.

Q State if there was any water which went by your dam down past this place at that time?

A Well, there wasn't any without it was just a very few drops.

Q You aimed to get the whole of the water, did you ?

A Yes sir, I did.

Q Is your land at this point on the, or near the brow of the hill which overlooks Dry ditch?

A Yes sir.

Q State if any water percolates through your land and other land and into Dry Ditch, under this bluff on which you are located?

A It does.

Q That is below a point of any use?

A They cannot use it below where it springs up from.

Q Are you the lowest water user on the ditch?

A Yes sir.

Q And you being on the bluff there just above Dry Ditch, are you able to state that water has percolated and does percolate during the irrigation season into that ditch?

A Yes sir.

Q And flows down into the lake?

A Flows into Dry creek.

Q Then from there flows into the lake or the swamps?

A Into the lake.

Q And beyond any point of use? A. Yes sir.

A MR. RAY: What time Monday morning on the second did you begin to irrigate-- on the fourth?

A Five o'clock until eight.

MR. THOMAS: That is all, if the court please.

THE COURT: Now, is there any further evidence to introduce?

MR. THOMAS: Your Honor, Mr. Goddard advises me Mr. Peay who will testify as to September second -- it will take but a moment.

WALTER PEAY recalled by the defendant Provo City, testifies as follows:

DIRECT EXAMINATION By Mr. Thomas.

Q Give your full name?

A Walter Peay.

Q You are deputy water commissioner, Mr. Peay?

A Yes sir.

Q Are you familiar with the streams of which testimony has been given relative to alleged waste of water known as the Scott ditch?

A Yes sir.

Q Can you stateif there was any water going to waste on that ditch on the morning of September second, 1916, about four thirty or five o'clock in the morning?

A Whyat day of the week was that?

Q That would be Saturday?

A No sir, none goes to waste on Saturday.

Q Does any go to waste --

A Friday and Saturday I am particular acquainted with that part of it. It is all used on the same farm I live on.

Q What can you say as to the alleged waste of water through the First Ward pasture on that day?

A Through the First Ward Pasture?

Q Yes.

A I wasn,t there.

Q Were you at or near the end of the ditch from which water runs through the Second Ward Meadows, south meadows.

A I have never seen any water run to waste any time I have been down there during the irrigating season.

Q Were you there this morning?

A No sir.

Q Where were you on the morning of September second, at any other place than that, just describe at that time?

A I don,t remember where I was that time.

Q Were you familiar with the condition of the dam at the head of the City race on the morning of September second, about four thirty or five o,clock A. M.?

A Which dam do you mean, bythe brick yard, or head of the race?

A The Factory race?

A We always have a tight dam in there by the brick yard.

Q Are you familiar with the location of thedam at the head of the Factory race where they turn the water out at night?

A Yes sir, there every night and morning.

Q Were you there on the morning of September second, 1916?

A That is Saturday?

Q Saturday. A. Yes sir.

Q State the condition of that dam at that time?

A Had a canvass in there.

Q Was any water going by down through the race past the dam at that time?

A What time in September?

A Four thirty or five o,clock September 2, 1916?

Q I had a canvass which was twenty feet long and six feet wide put in there, shut the water off dry.

Q There was no water going by?

A No sir.

MR. RAY: What time in the morning do you go to the head of the Factory race?

A Generally get there at six o'clock.

Q What time were you there that morning?

A Six o'clock.

Q And the ditch was dry at that time?

A Yes sir.

MR. THOMAS: That is all.

3:10 P.M., Recess to 10:00 A.M., February 20, 1917.

OMISSION.

Discussions as to Wasatch County stipulation.

THOMAS ASHTON, recalled by the Upper East Union Canal Company, testifies as follows:

DIRECT EXAMINATION By Mr. Robinson.

Q You have been previously sworn, haven't you?

A Yes sir.

Q What is your name?

A Thomas Ashton.

Q What official position do you occupy in the Upper East Union Canal Company?

A I have been watermaster for the Upper East Union Canal Company.

Q You were watermaster during the season of 1916?

A Yes sir.

Q And during the season of 1915? A. Yes sir.

Q How many times during the season of 1915 was the moss cleaned out of the canal, Upper East Union canal?

A At some parts of the canal it was cleaned out four times, and other parts of it was cleaned out once, other parts twice.

Q What parts were cleaned out four times?

A There is a part from Harry Crane's gravel bed just east of Pleasant View meeting house down to Henry Elliott's, that is a distance of two miles, I should judge.

Q What part was cleaned out three times?

A From our lower measuring flume and old flume we had in there down to about Silas Allred's place, distance of half a mile.

Q Now, in regard to 1916, how many times, I will say, was the canal cleaned out during 1916?

A There was part of it cleaned out three times and part of it twice and part of it but once.

Q When was it cleaned out?

A The first cleaning was on the third day of August.

Q And the next?

A On the eleventh of September.

Q What part was cleaned out on the third day of August?

A Part from Harry Crane's gravel bed down to Elliott's.

Q Was that same part cleaned on the eleventh of September?

A No sir, it was cleaned on the 18th of September.

Q On the eighteenth of September?

A Yes sir.

Q Now, what can you say as to the condition of the canal on September first and September third, these are the dates Mr. Tanner testified he visited it in 1916?

A Why, on September first and September third, there was a part of the canal that was in -- it had gone a little over time of being cleaned. It was not in the best of condition, not in the worst I don't think. I had orders to clean the canal whenever it was needed, and I figured I was about a week behind in getting at that particular part of the canal.

Q What orders did you have from the board of directors?

A I had orders to clean the moss and trash out of the canal whenever it was necessary to the flow and advantage of the distribution of the water.

Q You say you were about a week behind cleaning the moss?

A That is what I figured a week before would have been ample time, but it was, I figured in worse condition than it should have been, on account of being that week behind.

Q For what reason were you behind?

A Well, we were in court here and last three days in August, and that throwed me a little behind with other work I had to do on the canal, and before that I had been working on some leaks in the canal, and other reasons.

Q When was this part of the canal you were behind on on September first cleaned?

A It was cleaned on September 11th.

Q Can you give the flow of the canal at your measuring device on September first, 1916?

A I can give it as our recorder-- we have an automatic recorder

there that gives it.

Q What was it on September first, 1915 -- 1916.

A 15.44 second feet.

Q What was it on September third?

A It was 14.76 second feet.

Q What was it on August 31st?

A On August 31st it was 16.20 second feet.

Q What was the highest amount of water that you had there in the canal between the fifteenth of August say and the fifteenth of September?

A It was 19.84 second feet.

Q Was the canal in approximately the same condition when it carries the last amount you have named as it was on September first and September third?

A I had went through that particular part on September 11th, and for that reason it was in a little different condition.

Q Have you visited the Gillespie farm recently?

A It is on the main road, county road, I have been along the road there several times all winter.

Q And the Alred place also?

A Yes sir.

Q Is there at the present time any water in the Upper East Union Canal, company canal?

A No sir, entirely dry.

Q What can you say of the water coming from the Gillespie place to the Allred place at the present time?

A The last time I was along there, the 17th of this month, or last Saturday, I noticed there was water down in Allred's lucern and alfalfa patch, had melted the snow away for three or four rods down into the lucern, down through grain stubbles on the Gillespie place into a peach orchard.

Q Is there any water in the canal on this date?

A Yes sir.

Q Where did this water come from, if you know?

A It is my idea it comes from the wooden pipe laid along the county road and close to the canal.

Q Now, what is the condition of the canal, or was it in September, 1916, as to willows being crowded over the canal making it difficulte to get through?

A I went right through the canal with a team-- that is, I followed the man along, with a team along the bank. Never saw him have any trouble or any willows to pull out of the canal at all.

Q You clean it out with team and scraper?

A Yes sir.

Q You were not bothered at all with willows?

A No sir.

Q In any part of the canal?

A There was one part of the canal in August that the wind had blowed three small trees across the canal, they had not been in there more than a couple of days. All the brush I remember cutting out of the canal.

CROSS EXAMINATION By Mr. A. C. Hatch.

Q The canal was in bad shape then when Tanner visited it?

A It was really not in ordinary shape, not in the average shape that it is kept in.

Q You heard Mr. Tanner testify?

A No sir.

Q It had moss in the canal, hadn't it?

A Yes sir.

Q And so as to back up the water and cause it to overflow in places?

A No, I don't think it caused it to overflow any place.

Q You don't know whether it did or not, do you?

A Well, I was along the canal every day, and I never saw that it overflowed.

CROSS EXAMINATION By Mr. Thurman.

Q Just one question. Where did this pipe water, wooden pipe,

where did that come from, you speak of finding water?

A It comes from Provo river, starts into the pipe at the mouth of the canyon.

Q From the Provo water works?

A Yes sir.

Q Pipe is connected with the mains?

A Yes sir, it is the main pipe from the Provo river to Provo City until they put the new pipe over the bench.

Q Where was the water going after it left the pipe?

A It was going into a lateral from the Upper East Union canal.

Q Goes into a lateral leads from the Upper East Union?

A There is one place about ten feet from the Upper East Union, yes sir.

Q Where is that?

A That is on the Gillespie place and also on the Allred place.

Q These willows you have spoken of, you were asked about willows growing on the bench and dropping over into the ditch, wasn't it?

A No sir.

Q Nothing of that kind?

A No sir.

Q Willows was on the bank, was it.

Q There is willows on the bank, but I never saw any-- I have never taken any out and I have been through the canal this winter. There is none hanging in the canal now.

Q You mean there is none drifting in?

A None hanging down into the portion where the water flows.

Q You had sweet clover there about the first of third of September, didn,t you, begin to seed.

A I suppose it would begin to seed about that time.

Q Wasn't that obstruction more or less?

A None that I know of.

Q How far is the particular place to which your attention has been directed below the diverting point of the Upper East Union?

A Why, in the neighborhood of three miles diverting from the river.

Q Ditch was carrying through this bad place, carrying all the water that was coming in at the head, was it, there was none breaking ov over?

A Well, I never knew of any breaking over.

CROSS EXAMINATION By Mr. John E. Booth.

Q Where in your canal, Mr. Ashton, is thesepage the most, above of below the Gillespie farm?

A It is above the Gillespie farm.

Q Above where you have been testifying to?

A Yes sir.

Q You know the Haddock place?

A Yes sir.

Q Will Baum place? A. Yes.

Q Didn,t you have some very bad leaks there?

A No sir.

Q Didn't you turn the water off on one occasion?

A No sir.

Q Stop it and put lime in there?

A No sir.

Q When was that, year before last.

A Yes sir.

Q Didn,t it leak badly last year? A. No sir.

Q Not at all?

A I could not say as to not at all, but none that was visible or none that could be found.

Q Don,t you know from the east side of the road on the Haddock place right below your canal there was a big stream, half a second foot or so running most all summer?

A Yes sir, but I know it run there while we had the water out of the ditch cleaning it.

Q How long did you have the water out?

A For eight days.

Q Didn,t make any difference when the water was in your canal or

out?

A I could not see it making any difference.

Q So you don't know how much of that water was out of your canal?

A No sir.

CROSS EXAMINATION By Mr. Thomas.

Q Did you say you thought this water might have come from the town pipe of the city?

A Yes sir.

Q What made you say that.

A There is no other source for it to come from unless it comes out of the ground; there is no water in the Upper East Union canal.

Q That is just a guess on your part?

A Yes sir, I never examined it to see, it may be a spring.

Q You have made no personal investigation at all?

A No sir.

Q Don,t know the condition of the pipe?

A No sir.

Q Aren,t there a number of seeps along that place, along the pipe line?

A Not that particular place.

Q Are there above?

A Yes sir.

Q Which might easily find their way down by gravitation?

A Well, I hardly think so, I couldn't tell as to that, I have not investigated that far.

Q You have not make any investigations along that part of the ditch at all, have you?

A Not as to knowing where that water comes from I have not, I just saw the water there.

Q So that it is a pure assumption on your part?

A Yes sir, anymore than I know it doesn,t come out of the canal.

REDIRECT EXAMINATION By Mr. Robinson.

Q You mean the water on both these places, Allred's and Gillespie's?

A Yes sir.

Q Similar conditions obtained as to both of them?

A Yessir.

RECROSS EXAMINATION By Mr. Thurman.

Q You say there might have been a spring there, don't you know whether there is a spring there or not?

A No sir.

Q Did you ever see a spring there before?

A I have seen water there before.

Q Is it a usual thing for water to be there?

A Yes sir.

Q Flowing away like it was there then?

A Yes sir.

Q Running down on the land?

A Well, it has been for the last two years, it is running there now.

Q Is there any difference in the amount now from what you have seen before, or has it increased or decreased?

A I could not say as to that.

Q Why did you conjecture it might be from the pipe, wooden pipe?

A Well, I have saw along on the road outside of these laterals where there has bee leaks in the road. For that reason I thought probably there was a leak under that lateral.

Q Just one further question on that point, you have been acquainted with that place for a great many years, haven't you?

A Yes sir.

Q Is it worse in the last year or two than it was before?

A Yes sir.

Q So, if it is a spring, the spring is increasing?

A Yes sir.

Q If it is a leak in the pipe the leak is increasing ?

A Yes sir.

Q You have seen them repair the pipe along there, haven't you ?

A Yes sir.

Q There is a pipe there?

A I know there is a pipe there, yes.

MR. ROBINSON: I have an exhibit like to have marked. I will state in explanation of this exhibit one reason, or one of the reasons for introducing this, so that the court will understand our position, this canal company is asking among other things that it have a continuous flow. They are alleging for various reasons the flow is not continuous. We are introducing this exhibit to show the exact condition of the flow during the year 1916. It is t aken by the measuring device and it shows that the flow is up and down and very irregular.

THE COURT: Flow of the river?

MR. ROBINSON: Flow of this particular canal, that is one of the purposes.

T. F. WENTZ, recalled by the defendant Upper East Union Canal Company, testifies as follows:

DIRECT EXAMINATION By Mr. Robinson.

Q I handyou that exhibit, Mr. Wentz, it will be defendant's Upper East Union canal company's exhibit 197, ask you to explain what this exhibit is?

A Exhibit 197 is a register of the record of the Upper East Union canal from August 18th to September 7th, inclusive, 1916. The dates are marked along the bottom of the sheet, and the space between the heavy lines as one day and the smaller spaces each one hour. Near the center of the exhibit is marked the gauge height in feet from zero to 2.0. The height of water for a time

is shown in these irregular pencil lines across the sheet from end to end.

Q Where was this measurement taken?

A This was taken at the rating station of the Upper East Union canal, approximately two and a half miles below the mouth of provo Canyon.

Q Can you give any explanation as to why there is such an irregularity occurs in the amount of water in this canal?

A During this period shown on this exhibit the gates near the mouth of the canyon leading to this canal were not changed, ran continuously, the flow ran continuously. Above this point, this station where this record is taken to the head of the canal are the diversions of the Faucett Field ditch company. The irregularity shown on this map is due to the irregularity of the ~~mirs~~ diversion on the Faucett field.

CROSS EXAMINATION By Mr. A. C. Hatch.

Q How would you suggest a change of that irregularity, Mr. Wentz.

A The Faucett field people ought to be put on a schedule and have gates put in so that they could draw the same amount of water continuously, gates and weirs so that they could be measured and rated.

Q Do they have sufficient area to give them a regular stream that would be sufficient for irrigating under that system?

A Possibly not on a continuous stream. They could be, their schedule could be made for say four days out of a week.

Q Then someone would have to be irregular below, would they not?

A No, the other schedule below could be made to conform to the Faucett Field schedule.

Q So that there would be a regular flow to everybody?

A Yes.

CROSS EXAMINATION By Mr. Thurman.

Q Can you give here the maximum and minimum flow on the third and first of September?

A I have a table here, the minimum on September first was 13.36 second feet, the maximum on September first was 16.6 second feet. The minimum on September third was 13.6 second feet, the maximum on September third was 15.88 second feet occuring between eleven and twelve o'clok P. M.

CROSS EXAMINATION By Mr. John E. Booth.

Q Does a part of this fluctuation occur from the fluctuation in the power plant?

A No, very little of it. The Upper East Union canal draws under about a three and a half foot head from city race. The is great deal larger than the creek, and fluctuation existing from that source would be very light, hardly noticeable.

Q The Faucett Field people own small tracts rather than large ones up there, do they not?

A Yes.

Q Would it be possible or profitably or economical at all to give each one of those a constant stream?

A No sir.

Q Couldn't do that? A. No.

Q Would this account for a part of the fluctuation that a man gets through watering at eleven o'clock, turns the water back into the ditch and it is one o'clock before the next one takes it, wouldn't that account for some of thise things?

A Yes, that could.

Q At the same place?

A There is one condition on August 20th where that just goes to a point for a very few minutes, possibly ten minutes, and back.

Q That could be account for --

A But the general line show the variations dropping from the greater discharge to the less discharge for a number of hours and

then back to the greater discharge again.

Q So that if a man did not take his water when it was allotted to him, then an hour or two afterwards did take it, that would account for it, wouldn't it?

A That would account for some.

Q How would you account for the rest?

A The low drop I would say either were two streams taken out or greater quantity, or probably the same man had taken a greater quantity during his same period of irrigation or less quantity.

Q Nearly every one of them ~~tk~~ take his water out at a different place on the canal, doesn't he?

A Yes.

REDIRECT EXAMINATION By Mr. Robinson.

Q Would it be feasible to separate the Faucett fitch people from the upper East Union Canal Company and have a separate decree as to their rights?

A Yes.

MR JOHN E. BOOTH: They have that in the Morse decree. Just one other question. As you understand it from your experience and observation and testimony, the Faucett Field was occupied and cultivated long before the waters of the East Union Canal were taken out?

A I understand that is the case.

RECROSS EXAMINATION By Mr. Thurman.

Q Is this fluctuation existing in part or at all in different hours of the day as to the regularity?

A No, it is irregular.

Q When is the least quantity, morning, evening, noon, or what?

A Generally the least quantity is between seven o'clock in the morning and about eight o'clock in the evening, the daylight.

REDIRECT EXAMINATION By Mr. Robinson.

Q Isn't it a fact these Faucett -- these people that take under the Faucett ditch are practically unrestricted, one of them can take it, or two, or they can take as much water --

A Yes, the trouble with the Faucett field is they have no gates or measuring devices of any kind. It is merely a take and guess at what they take.

Q They just go and help themselves?

A Yes.

Q What is your idea should be done as to that matter?

A There should be gates in there, both in the canal and gates in the laterals from the canal, that could be rated so that the same quantity of water, the proper quantity of water could be diverted at all times.

RECROSS EXAMINATION By Mr. Thomas.

Q Are there any fluctuations in the City creek due to the Telluride Power Company, just at the point where the Upper East Union takes its water out of City creek?

A Yes.

Q Then those fluctuations, if any there are, are borne entirely by City creek?

A Practically, yes.

Q Your judgment, shouldn't those fluctuations be equalized so that the Upper East Union should bear its proportion of the fluctuation as well as the other users out of City creek?

A Yes, that would be better if it could be arranged.

Q Isn't that a mere matter of mechanical construction to install such devices as will equalize those fluctuations?

A Yes, that could be done.

Q And in your judgment it should be done?

A Yes, the shock, whatever shock there is, should be distributed over as large an area as possible in order to reduce the effect.

Q Would it be possible to have those fluctuations-- withdraw that

question -- in what way in your judgment would it be possible to minimize those fluctuations?

A I have answered that before. Of course a change of load at the plant as long as the governors are on, why, the governors will take up that load and discharge different quantities of water from hour to hour.

Q That is right, you did go into that question before, I overlooked that, have you any suggestions to make by way of installation of a mechanical device in the intake of the upper East Union out of the City creek?

A yes, that could be arranged, in order to make those draw -- rather draw on a proportion basis than on constant head to the Upper East Union.

Q That in your judgment would be more fair?

A Yes.

Q To all the water users?

A Yes.

RECROSS EXAMINATION By Mr. John E. Booth.

Q You, as water commissioner, did you ever find a time when the Faucett field people were using more than was awarded to them by the Morse decree?

A I don't recall just at this time any particular date. I have found a number of times when we had a supply in for the Faucett field and the Upper East Union, at the upper East Union station we were shorty and I found, I think, on two or three occasions where there was more than one stream being used by the Faucett field, when they were only supposed to be using just one.

Q That was a matter of mere regulation then?

A Yes.

MR. ROBINSON: This Exhibit may be admitted?

THE COURT: Yes.

T. H. CLUFF, called by the defendant Upper East Union Canal Company, being first duly sworn, testifies as follows:

DIRECT EXAMINATION By Mr. Robinson.

Q What is your name?

A T. H. Cluff.

Q What official position do you hold in the Upper East Union Canal Company?

A President of the Board.

Q What are yourinstructions as a board to your water master relative to the moss which accumulates in the canal during the summer?

A Two of the members of the board are called and appointed by the balance of the board to be an advisory committee for the watermaster and aid him, for him to apply to.

MR. THOMAS Just a moment, what is the purpose of this examination.

MR. ROBINSON: It is rebuttal to show the condition of the canal in regard to moss.

MR. THOMAS: Has there any question arisen whether you have not cleaned the canal?

MR. ROBINSON: Yes, there is, just as against the plaintiff.

Q This advisory committee is for the purpose of aiding the watermaster, and he, through them, is advised at all times to go on and clean the canal whenever it should be needed, or to do anything else that in his observation is for the best interests of the canal, but if he gets in a condition he is unable to look after that alone, he falls back on to this committee to come to his aid, so that if there were any head gates or moss or any other thing of any nature that is a detriment to the canal, and he is unable to look after that, then he applies to this advisory committee to help him out. At our last stockholders' meeting the board was authorized to make repairs or renew any gate or gates, entire length of the nine miles of the canal, and

if they could not be made satisfactory otherwise to put in steel gates with cement abutments so that it would be in a first class condition.

MR. ROBINSON: That is all the evidence.

OMISSION.

Discussion as to Wasatch County stipulation and as to further order of procedure.

12:00 Noon, Recess to 10:00 A.M., April 12, 1917.

MR. STORY; There is one matter, your honor that I should like to bring up before any other proceedings. That is, that I have been requested by the attorneys for the plaintiff to furnish certain additional evidence in the way of charts and so forth, showing power consumption which the plaintiff desire to introduce in their case in connection with the Utah power & Light Company. I have not produced the evidence and I wish to state briefly my reasons for not doing so. The plaintiffs closed their case in rebuttal at the time we had the hearing, and practically all the testimony was introduced. I introduced certain evidence in surrebuttal. That evidence consisted of the report of the State Engineer, or rather, certain information that was included in that report, and inasmuch as the plaintiff objected to the introduction of the report itself, put Mr. Tanner on the stand and brought the evidence out in that manner. As I say, that was after they had closed their case in rebuttal. I had understood when we closed that evening that the plaintiffs had also closed so far as examination of Mr. Tanner was concerned, but later I learned that they took the view they still had the right to cross examine him with reference to that report, inasmuch as I had made him my witness for that purpose. The next time that I had a hearing here and I was present the plaintiffs advised that they expected to introduce further evidence on the part of Mr. Tanner, saying they had not closed their examination of him in connection with this report. I was obliged to leave before they got to that examination, but instead of examining Mr. Tanner on that report, as I understood they were going to, and they claimed they had a right to do, they introduced a lot of entirely different extraneous testimony. I felt that was very unfair. I want to say to both the court and counsel I

thought that was very unfair to put that testimony in in my absence or attempt to do it. Nevertheless it went in and we were obliged to arrange for other parties to cross examine the witness at a latter date; and then again closed their case. Now, I think there should be an end, we should know where we stand, and I have therefore taken the position that having closed their case if they get im any further testimony they must make an application to reopen and get permission of the court so to do, and get this testimony they want in the regular manner . I think that my action throughout the trial of this case has indicated-- I hope it has at least-- my willingness to be entirely courteous to counsel at all times, and to furnish testimony without necessity of suppoena duces tecum, but under the circumstances in view of the manner that the testimony has gone in here after the case has been closed without any notice to me it is going to be done, I think it is time to call a halt from my point of view, and that is the explanation I wish to make this morning as to my refusal to produce further testimony. If they are going to get any further testimony in, so far as the Utah power & Light Company is concerned, I shall insist the case be reopened and they get it in in the regular manner.

MR. A. C. HATCH: If the court please, my recollection of the matter is when they put the witness on the stand, Mr. Swendsen, the introduced certain -- some five different records of peak loads at their plant. We, at that time asked for a record of all the peak loads, and particularly the peak load covering the date of our measurements to which we had testified, and that is what we are now asking for, and we have been asking for it since long before we closed, and we were promised on different occasions, If I remember right, that search would be made and they would be furnished to us if it could be done, but that it would require a searching through large volumes of files in their offices, and would take time. The notice served

upon Mr. Story was to furnish us with this data, data showing the leak loads of their plant on the dates when the measurements were made of the water flowing in the flume by Wentz, by Tanner, and by one or two others. Now, I think we are entitled to it. We asked for it at the time Mr. Swendson testified. We asked for it, if I remember rightly, at the time the testimony was given as to peak loads in the first instance, and the excuse has been from the beginning that they could not put their hands upon them, but thatit would require search. Now at the last adjournment of this court we made a second or third written demand that they furnish us with this particular data, and we are entitled to it. We think we have been entitled to it from the time they introduced the testimony as to peak loads at all, and that it should go into the record in this case as part of the cross examination of their witnesses, showing the power they produced on the days that their flume carried a certain quantity of water, and then we have shown the amount of water necessary to produce certain power in that flume, and we think we are entitled to the testimony, and we asked for it before we closed our case, and we have been asking for it ever since, with the understanding that we would eventually get it, I may be mistaken.

MR. STORY: I said we would look the matter up. As a matter of fact, the request now is for a good deal of more testimony than they have asked for before.

MR. A. C. HATCH: Just five days.

MR. STORY: This letter is a good deal broader than that. The point is this. They did close their case, and I think we should have an understanding right now how many times this case is going to be reopened. When the case is closed and counsel go home, they have reason to expect the case will not be opened up in their absence and further testimony introduced, and I am simply taking advantage of this opportunity to say frank-

ly to counsel I think their former action was entirely unfair in introducing testimony under those conditions, and in the second place to have a definite understanding now whether this case is going to be reopened up, and to what extent it is going to be reopened up.

MR. A. C. HATCH: If the court will permit, during the trial of the case a counsel whose client is interested should be present at the trial of the case, unless a statement is made stating nothing would be introduced touching his client's interest during his absence. It is not our fault Mr. Story absented himself from the trial of the case at different times, and when we closed our case we closed it with the understanding we would have the right to introduce this when we got it. The court will remember that that has been the reservation all the time. We have been expecting it, and we think that it will show conclusively that they never did need the water that they claimed, even their highest peak loads on the dates when we measured, didn't require all the water that was then flowing in the flume, that the water was spilling over the spillway at the time, and we believe that, and that is the reason we want the data, and with the data we can conclusively, as we expect the right to show, and have reserved it, as I understand it when this evidence was introduced. If it is not produced-- we have assumed up to the present time it was because they could not find it, or could not produce it. Mr. Story now seems to admit --

MR. STORY: I don't admit.

MR. A. C. HATCH: That he hasit in his possession, but does not produce it because he don't think we have the right.

MR. STORY: No, I have not admitted anything of the kind, and don't want the court to get such an inference. As I told you before, it will take quite a long while to get that record together. I will say to you frankly, after the treatment you accorded us in that matter I didn't feel under any obligation

to go ahead and make that search. Now, Judge Hatch speaks of their not being responsible for my absenting myself from this court. That is true, so long as the hearing on the matter in which I was involved was open, but after they have closed their case I have reason to believe they are not going to introduce further testimony in my absence without notifying me of their intention so to do.

MR. THURMAN: When do you claim we closed our case?

MR. STORY: I claim the record will show you closed your case in rebuttal before I introduced the state record, and the only thing you claimed to go further after I closed my surrebuttal was after my examination of Mr. Tanner.

MR. THURMAN: I think after what you call closing our case I served notice on you sitting right there, and you said it would take some time, you would have to go through some fourteen or fifteen hundred cards, and it would take time, after what you now say was the closing of our case, so you did not seem to understand at that time that we had closed our case, and for that reason you would not furnish it.

MR. STORY: Judge Thurman, I had no different understanding then from what I have now as to whether you had closed your case. The only thing you said you expected to introduce at that time was the testimony with reference to the State Engineer's report, and I went away with that understanding. You had asked me to produce this other testimony, and I am frank to say I had expected to do it as a matter of courtesy, but when the other testimony was introduced without any notice to me I felt I was absolved from all obligation in that respect. If the court wants to reopen the case and let this testimony in and go further into the details of this case, I will do the best I can, of course, under the court's order.

MR. A. C. HATCH: If the court will permit me, we don't like to go into all the details of this case, or any matter ex-

cept that which we have preserved, as I understand, the right to go into. So far as any unfair treatment of Mr. Story is concerned, there was some thirty or forty attorneys here and certain matters come up every day in which his client is liable to be interested; if he cares to absent himself from the court and take those chances, I don,t feel personally I have done anything wrong, and I haven't any apology to make. When I do I am always very humble. I understood during all the time he was absent Mr. Ray was representing him.

MR. STORY: Mr. Ray was not all the time. Afterwards he very ably represented him.

MR. A. C. HATCH: To cross examine some witnesses.

MR. STORY: Yes.

MR. A. C. HATCH: I understood Mr. Story had to be absent, and I don,t understand we have in any way been discourteous, or disrespectly, or anything that would tend to injure Mr. Story or his client. If we have and he wants to remedy it, we are willing to consent now that he has that opportunity.

MR. STORY: I don't think we have suffered any damage. Mr. Ray cross examined the witnesses, and probably very much better than I could have done, as far as that is concerned, but I felt it is the time to know where we are at.

MR. A. C. HATCH: I will tell you where I feel that we are at, that they have been trying to avads giving us the facts that were necessary to establish what their rights were, and the water that they actually necessarily used in that plant. We have been trying from the beginning to obtain that evidence, and I think they have it and could produce it with a little effort on their part, but they did not seem inclined to do it, and now he stands on what he claims is a technical right. We insist he produce those five or six dates of leak loads, and if necessary that we serve them with a subpoena, but in open court

we demanded it, seemed to be willing to do it and didn't think that was necessary.

THE COURT: Now, is there some application to be made to the court in relation to this matter. I don't understand there has been any application made as yet. I understood Mr. Story was merely putting in the record his reasons for declining to comply with the requests that you had made.

MR. A. C. HATCH: We wish to make an application that Mr. Story be required to produce the data that we have requested of him from almost the beginning of the trial of the matters pertaining to the right of the Telluride Power Company.

MR. STORY: Pardon me, Utah Power & Light Company.

MR. A. C. HATCH: Utah Power & Light Company, and in a few moments I will have a copy of the letter requesting him. I have sent to the office for it.

MR. STORY: I think I have the original here now. I insist if it is going to be produced at all it should be upon application to reopen and application to be limited to specific testimony desired, so that we will have an end of this controversy, if the court allows any further testimony at all. In other words, want to know just how far we are going.

THE COURT: Mr. Story, the court is here today for the purpose of hearing testimony, the case has not been closed, I understand at all, it is open, does not need to be reopened.

MR. STORY: I mean so far as the controversy between the plaintiff and Utah power & Light Company.

THE COURT: My method of trying these water cases that I have tried has been not to adhere to the strict rule with reference to the introduction of evidence and the order in which it should be introduced, and usually we permitted parties to introduce evidence as long as they had any and as long as they could discover any, in order that the court might have the benefit of all the evidence that was available, and these cases usually

are conducted more in the nature of an inquisition than in the nature of a trial of an ordinary action at law or suit in equity, and if it is necessary there be any order for the reopening the court will make the order reopening, if there is any evidence that is material and will assist the court in ariving at a just conclusion in the case. I don't understand, however, there is any application to the court based upon anything the court can recognize at this time to make an order. Is there, Judge Hatch?

MR. STORY: Your Honor, I don't wish to give the impression I want to stand upon technicalities to the extent of requiring duces tecum or anything of that kind, but I would like to know, and am taking advantage of this opportunity to learn if possible, just how far we are going in the matter, how much more testimony the plaintiffs are going to introduce in this case, so that we may be able to govern ourselves accordingly. If the court desires to let them reopen their case insofar as the Utah Power & Light Company is concerned to introduce this specific testimony, I don't insist upon a duces tecum. If I can obtain the testimony of course I will obtain it, but I would like to have it definitely understood what testimony is going to be introduced if the case is reopened.

THE COURT: Mr. Hatch, can you give Mr. Story the information he asks for in that respect?

MR. A. C. HATCH: Yes sir, we intended upon showing the peaks loads they had on these days to introduce testimony showing the quantity of water necessary to produce under the testimony or in the case, at least, the greatest load they had on the particular day, and that the measurement of the water in the flume as testified to by the several witnesses was more than sufficient for their use on those days, and that water was some fifty to one hundred feet less than they claimed they measured flowing in their flume at the time the measurement was

made by Mr. Swendsen and some of their engineers. They are here claiming the capacity of their flume with the side boards on in order to get it full at a particular point. We are claiming they are entitled only to the water necessary to produce the heaviest loads they have produced during they time they have run at least, sufficient to produce that under their present system, and anything in excess of that, regardless of whether they run it in their flume or not, has not been appropriated.

MR. STORY: We furnished the evidence, your Honor, at their request of the maximum load it would carry from 1913 up to 1916, and reason for not carrying a heavier load at that time, has all been gone into in the evidence. Now, they have asked for the amount of power that was consumed as shown by the chart on the days that Mr. Wentz and Mr. Tanner happened to make their specific measurement of the amount of water running in the flume. Personally I don't see what bearing that has on the question of the maximum load. We have given them the evidence of the maximum load.

THE COURT: The effect of the evidence and weight the court should give to it would be a matter of argument, but the only question now, I suppose, to be considered, was what evidence now they want to introduce. Is this evidence you have asked Mr. Story to furnish all you want to introduce?

MR. A. C. HATCH: We want to introduce that and when we have it to introduce by competant engineers testimony to show the quantity of water necessary to produce those loads.

THE COURT: I understood you to say that was in the record now.

MR. A. C. HATCH: We cannot get it until we know what their peak load was. We have given the testimony in regard to the flow of water in their flume at all the time we have and record of its being measured.

MR. STORY: Yes, but the point is this, mere fact we

were using a certain amount of power at any particular day does not necessarily limit our power for the three years to this particular measurement. We have given you the maximum amount of power produced during that period and I think you gave testimony as to the amount of water necessary to produce that maximum amount of power. Now, I suppose we could go indefinitely and bring in the chart for every day of the three years and give testimony how much water it took to produce that particular amount of power any particular hour, or any particular day. That does not limit the right, and it seems to me wholly irrelevant and immaterial certainly. From what I understand now from Judge Hatch, they want to go into vastly more evidence than what they had originally talked about, conceding you said you had the right to introduce these particular power loads.

MR. A. C. HATCH: As I understand the evidence we have not a measurement of the flume at any time when they claim to have given us the maximum peak load. What we want is a measurement of the water flowing in the flume at some time when they had a maximum peak load. All the maximum peak loads they have given us were on dates when we have no measurement of the water in the flume, and if we can't combine those two, we think it would give some little light at least it would to me, and I think it would to the court, as to whether or not, if they had these maximum peak loads, whether their flume would carry sufficient water to give the peak loads ~~that~~ that they claim.

MR. STORY: Am I not correct, your Honor, in saying that was gone into very fully in the evidence of both the parties as to what the power consumption of the plant was and what amount of water it took to produce the power in that plant, the efficiency of the plant, the efficiency of the wheel and everything of that kind was gone into by both the plaintiff and defendant, Utah Power & Light Company very fully; what was the proper efficiency to be given to those wheels and amount of water

it took to produce energy of horse power in that plant. Now then, they have their maximum amount of power produced, and, according to their own statement they want to put on further evidence to show how much water it takes to produce a lessor amount of power. The testimony is already in how much water it took to produce the maximum amount of power we say we used during those three years. What is the object going into that testimony?

MR. A. C. HATCH: Our letter is dated Provo, Utah, March 12, 1917. Messrs. Story & Steigmeyer. Gentlemen: On January 8th we demanded that you furnish us the data as to the power output on the following days, namely: 1911, July 26th; 1913, June 14, July 5, August 7, October 20 and October 22; 1914, November 27, May 9, July 20, July 27, August 25, October 19 and October 22, November 6, November 9, November 10; 1915, February 16, April 9, May 8, May 14, June 3, July 9, July 22, September 25; 1916, January 8, January 17, January 21, April 27, May 16, May 22, May 25, June 13, June 14, September 9, October 9, October 13 and October 21.

These are the dates when measurements were made by Mr. Wentz and Tanner and engineers of the Utah Power & Light Company of the volume of flow of water in the flume of the Utah Power & Light Company. Up to the present time we have not received this data, and we now therefore request that you give us this information at the earliest date possible, so that we may present such matter as we have in rebuttal to the court at its next session, beginning the 12th. Respectfully yours, Signed by myself as one of the counsel.

MR. STORY: Will you pardon a question.

MR. A. C. HATCH: Just a moment. This data, as I understand, is asked as to the days when measurements were made and when there was ample water to fill their flume to capacity, and to have furnished all that was necessary for all of the users

below, particularly during the months of June, and the latter part of May, and we asked for that before as to certain measurements, but on the 8th in open court we asked for it, and we had not then closed our case as against the Utah Power & Light Company and I don't understand that we ever have closed it.

Now, we ask at this time that the court make an order requiring the attorneys for the defendant to furnish us this data if they have it.

MR. STORY: Judge Hatch, in the first place, as a matter of fact, your original request covered only the days Mr. Wentz and Mr. Tanner had made their measurements, it did not contemplate these others, and when you got up that letter you simply went through all the testimony and measurements that had been made, or assumed to be made by everybody, and asked for the charts of those days. At the present time it is vastly wider than it ever was before.

MR. A. C. HATCH: Will you now say you have given us the peak loads in your testimony for any date when a measurement was made by any engineer of the volume of water in the flume?

MR. STORY: I don't know I can answer that in the affirmative.

MR. A. C. HATCH: That is why we want this.

MR. STORY: I can say to you we have given you the maximum load carried through those three years, and also the reason why we did not carry a larger.

MR. A. C. HATCH: Not for every day during the three years?

MR. STORY: No, we gave you the maximum.

MR. A. C. HATCH: As I understand it, we haven't the maximum load for any date when a measurement was made of the water flowing in the flume. That is, we haven't it in the record, and we would like to have the maximum load for all the days when measurements of the flow of water in the flume were made.

I don,t understand that we ever closed our case as against the Utah power & Light Company except with the understanding that we would have this data or certain portions of it later.

THE COURT: Mr. Story, when could you get this information.

MR. STORY: I don't know, your Honor, I will endeavor to get it as quickly as possible, if the court reopens the case for that purpose.

THE COURT: The case may be reopened.

MR. STORY: And may I know now what testimony we are going to have further in the case.

THE COURT: AsI understood the statement of Judge Hatch, and I will give my understanding so that I may be corrected if I haven't the correct understanding, is they expect to introduce, or offer rather, the evidence with relation to the peak loads upon the days mentioned in this letter and then introduce evidence of a competent engineer to show the quantity of water necessary to produce that amount of power.

MR. STORY: Is that going to be the limit of the testimony?

MR. A. C. HATCH: Yes, with such evidence as is required of the irrigators.

THE COURT: With what?

MR. A. C. HATCH: With such use as is required of the irrigators throughout this state in their use of the water, proper dams, preservation to prevent leakage, and proper wheels for producing the power. Now, we are going to insist and warn Mr. Story now that people who run a 65 per cent wheel, that is a wheel with 65 per cent efficiency cannot continue to do so and waste water as they appear to have been doing in the State of Utah and allow the state to be developed. We insist upon the irrigator putting in concrete pipes tight dams and preserving every drop of the water that can be preserved, and are going to

insist upon the power companies using at least the same effort to conserve the use of the water that we require of the farmers.

THE COURT: I might ask, Judge Hatch, so that I may know, what evid-ence do you expect to introduce on that subject?

MR. A. C. HATCH: Nothing at all.

THE COURT: The court did not ask for an argument what you will insist upon or contend, but merely to know what evidence you expect to offer. Did I correctly state the evidence you expected to offer, Judge Hatch?

MR. A. C. HATCH: If the court please, when we know these peak loads, we expect to put on a competent engineer to show the quantity of water necessary to have produced these peak loads with proper machinery for producing the power.

THE COURT: That is as I stated it, that will be included in it. When could this be produced, Mr. Story?

MR. STORY: I dnn't know your Honor, I am sorry I cannot give a definite answer, I will give instructions immediately to those in charge of the records to make a search for them. As I told Judge Hatch, I think as I said to the court, there are some fourteen or fifteen hundred records that have not been carefully preserved, great many of them there, I think good many have been lost. We may be able to get those records for every day, on the other hand we may not. It will require some time to search them out. They have never been filed in their regular order. We will get it as soon as we can. When does the court desire to take this up?

THE COURT: I desire to take it up at the earliest date you can furnish it.

MR. STORY: I am sorry I cannot give your Honor that information. I should be glad to do it if I could. Now I understand that there has been a suggestion that the argument in this case would be held at Salt Lake next week.

THE COURT: No, it would not be nextWeek if this

evidence is going to come in.

MR. STORY: How long will it take you to introduce this evidence?

MR. A. C. HATCH: I think we can do our part in a day very nicely, only a question of when we can-- if we can put the engineer on to testify to an exhibit, I think it will take half a day.

MR. STORY: As a matter of fact, the court could hear that testimony in Salt Lake. I could furnish what records we have prior to that time, or just as soon as possible, and they would then have the advantage of having them before them, and working them up with their engineers, what the amount of water.

MR. THURMAN: Prior to what time?

MR. STORY: I will get them just as soon as I can. I will have men start today.

THE COURT: I can hear the argument any time, so far as I know, except week after next. Of course, we don't know about that until we see about these other matters.

MR. STORY: Could we have it understood this testimony, will it be introduced at that time?

MR. THURMAN: What time?

MR. STORY: Whenever the argument is had, and I will get this to you within the next few days, as fast as we can.

OMISSION.

Discussion as to time of argument.

Discussion as to Wasatch county stipulation.

Testimony as to claim of Wasatch Irrigation Company.

MR. MCDONALD: I would like to inquire of counsel for the plaintiff in the way of saving time, if it would be agreeable to them to have the decree in this case provide that the commissioner should investigate the losses and charge the respective losses to the respective parties, the reservoir water?

MR. A. C. HATCH: No, it would not. We have two or three years now to investigate this matter, and we have put in our proof as to the matter and we would like a decree. We don't want the thing to extend over another period and we have had all these years to determine this and we put in our proof as to the matter.

MR. MCDONALD: There is no use of further talk, we simply ask if you consent to it.

JOHN H. CLEGG called by the defendant Wasatch Irrigation Company, being duly sworn, testifies as follows:

DIRECT EXAMINATION By Mr. McDonald.

Q Mr. Clegg, are you acquainted with the Provo River system, that is, from the Wasatch dam up?

MR. JACOB EVANS: Before you ask that question, I move to strike out all the evidence given by this witness up to this point, as being immaterial, irrelevant and incompetent under the stipulations in this case as to the capacity of the canal.

MR. MCDONALD: We don't object.

THE COURT: It may go out then.

A Why, partly, not very good.

Q Do you know about how far it is from the reservoir to what is called Stewart's ranch?

A I think it would be about twenty-five miles the way the river runs.

Q Is there anybody uses water for irrigation purposes from the

river or its tributaries between the reservoir spoken of and the Stewart Ranch?

A There is one place where Stewart takes a little high water.

Q I am speaking down to Stewart's.

A This is up on Boulder , at the upper end of Stewart's, about three miles, I should judge, or more from Stewart's ranch, where it goes into the South Fork.

Q Then we will confine this inquiry to that point, that is the upper point of the Stewart ranch. Now, is there anybody else that uses water between the reservoirs and the point you have spoken of ?

A Not that I know of.

Q Could a weir be placed at this point that you designate on the upper part of the Stewart ranch for the purpose of measuring the water from the reservoirs?

A Yes, there could be one put there all right.

Q And there would be no interference with the water so far as you know by persons diverting any water between the two points designated? A. No.

Q And in that way could the amount of loss be determined?

A I think so.

Q Now, you say that you are acquainted with the system to some extent, have you been watermaster for some years?

A Yes sir.

Q For what company?

A The Wasatch.

Q Wasatch Irrigation Company? A Yes sir.

Q How long?

A For the last three years.

Q Were you acquainted with the distribution of water to the canal prior to that? A. Yes sir.

Q How long?

A Oh, off and on for the last twenty years, not permanently.

Q Now, Mr. Clegg, have you made any investigation as to the quantity

of loss or amount of water which goes down from the reservoirs to the Wasatch dam after the reservoir water is turned out?

A Yes sir.

Q What has been the result of your investigation?

MR. JACOB EVANS: Object to that, the witness has not shown himself competent to testify. This seems to be a question directed to an expert witness. He may testify what he has done, but as to the result, I think it calls for the opinion of the witness.

THE COURT: I don't think it calls for the opinion of the witness, it calls for a statement of some fact what results he has seen.

MR. JACOB EVANS: The question was asking him what was the result.

MR. RAY: No, what investigation have you made.

MR. JACOB EVANS: And what was the result of that investigation?

THE COURT: He may state that.

MR. JACOB EVANS: We take an exception.

A The result has been, I have been watermaster and there has been so much water turned from the reservoir. I generally go up the night before and mark the flume. I used to mark it with a nail to see how much the increase was when this water come down, and when the reservoir is supposed to be down. I find by investigating and comparison there ain't over a foot reaches our dam, they say is turned out. I believe they have turned it out before anything reaches our dam.

Q You may state whether or not the Wasatch Irrigation Company has a tight dam across the river.

A Yes sir, have a tight dam with the exception of some we have to let go to Midway of the tunnel water.

Q Have you any means of measuring that?

A No, not exactly, it is measured every year, but we don't have no weir there.

Q Is that turned down the river bed proper?

A Yes, that goes down the river bed proper.

Q With the exception of that water that goes to Midway during the normal flow of the river, who uses the water of the Provo river?

A The Wasatch and North Field uses the normal flow.

Q All of it? A. Yes.

Q And--

A All that goes to our dam.

Q What has been the custom of the plaintiff relative to taking the water after they reported to you they had turned some in?

A Sometimes they have taken the full amount, and sometimes when I objected they have not, they have turned it loose.

Q Have you made more than one investigation to determine how much water came down?

A Yes, I have made observations every time it has come down.

Q For how many years back?

A Last three years.

Q And what, from your investigation, did you find?

A I found that in my best judgment there would be from twenty-five to fifty per cent of the water never get to our dam at all.

Q Have you made any investigation as to when the water was turned off from the reservoir? A. Yes.

Q And from your investigation what did you learn as to the condition of the water down at your dam.

A Well, it didn't make as much difference as what they turned off. That is, if there was twenty feet turned off up there I would not notice that much difference down there. There would not be ten feet short to our place.

Q How far is it from the Stewart point you speak of down to your Wasatch dam?

A I don't know exactly, I would judge it is about twenty-five miles maybe a little more.

Q What is the condition of the channel from the reservoirs down to the Stewart point?

A Why, it is a rough, rocky channel, some places it spreads out and circles, other places it is narrow, but it is rocky all the way, very rocky.

Q What is the condition of the channel from the Stewart point down?

A After you strike the South Fork, I think it is better, it is very fine, better channel.

Q More soil in it than above?

A Well, it is rocky all the way. There is more soil on the sides though.

Q You may state whether or not the Wasatch Irrigation Company is interested in these reservoirs?

A Yes sir.

Q And you may state from the investigations you have made whether this water comes down?

A I don't think it does, more than half.

Q How much do you say, how much loss is there?

A Our dam?

Q Yes.

A I think there is from 25 to 50 per cent that never gets to our dam. That is the way I have estimated right along when it has been turned down.

Q How much period of time does that require?

A It covers all the time the reservoir water is coming, all the time ours is running, Provo Reservoir has the reservoir water longer than we do.

Q Now, you may state whether or not when the plaintiff takes out ~~the~~ their water at the Wasatch dam, whether your quantity is immediately diminished?

A It is diminished all the time, every time.

Q Now, you are acquainted in Wasatch and Summit counties with the distribution of water from the Provo river, are you?

A Why, some little, not thoroughly.

Q Well, you have known the river system, haven't you, for thirty

or forty years?

A Yes, I have been up and down it many times.

Q And know the water and the way it has been distributed?

A Yes.

Q Now up to the time this suit was commenced you may state what cost you had in the distribution of water?

A From our dam, do you mean?

Q Yes, from the Wasatch dam?

A We had about-- for the three companies we had about, I think, about fifty or sixty dollars a year.

Q That is all of you together.

A All together.

Q That covered all expense of the distribution?

A Yes, that is for the commissioners, we have watermasters on the side.

Q What has been your cost since that time, since the filing of this suit for the commissioner who has served?

A For all the companies, I think it is about six hundred dollars. a year.

Q Now, from your knowledge of the distribution of water of the river system, would the interests of the people in Wasatch and Summit Counties be subserved by a division of the district?

A How do you mean?

Q Well, have a dividing line somewhere between Utah county and Wasatch and Summit counties, have a commissioner for one end and commissioner for the other?

A Making two districts?

Q I will get at it in a different way, about what is the length of the irrigation season in Wasatch county?

A About four months.

Q About four months? A. Yes.

Q About when does it start?

A Generally start about the first of May.

Q When do you conclude?

A About the last of September.

MR. THURMAN: Five months.

A I guess it would be five months, we don't always water all our tract to the last of September. About the tenth and use water for pasture and beets and fall plowing.

Q What part of that time do you need a commissioner in Wasatch and Summit counties?

A If it is like it has been in the past, about three months we would need one.

Q Three months? A Yes.

Q Would it be better in your judgment to have a commissioner appointed by the court or one apointed by the people of those two counties?

A I don't hardly know, I believe it would be better by the people after we get it settled once.

Q What do you mean by settled?

A After a decree is given so that we will understand what we are entitled to. I believe then the people could handle it all right.

Q And select a commissioner for such period as they saw fit?

A Yes.

CROSS EXAMINATION BY Mr. A. C. Hatch.

Q At the time when they first turned the water from the reservoirs into the river, the river is usually receding very rapidly?

A Yes sir.

Q Normally only? A. Yes.

Q And have you ever made any attempt to determine the amount or quantity that the river would recede per day during that period?

A Yes.

Q What was the quantity?

A I haven't made it out in feet, I have made it out in divisions, I have had nails drove along to see about.

Q Can you give us any idea of the cubic feet per second it would recede per day during the period when the reservoir was first

turned in?

A I have seen it fall, right at first, I have seenit fall at a rate for two or three days, twenty to fifty feet a day, but after the reservoir it goes right on. As quick as they are turned in, it don't fall, I don't think, over five feet.

Q Do you have any knowlege whatever as to the fall of the river, the normal river during the period of time at which the reservoir water is first turned in, in feet per day?

A No, I could not tell you exactly in feet.

Q Would you say it would not amount to as much as ten or fifteen feet?

A I say it would when first turned in, more probably.

Q Would you say it would be as much as fifty feet?

A Just before it is turned in, I guess.

Q In making your calacultion have you allowed for a mrem normal fall of the river? A. Yes sir.

Q What did you allow?

A I allowed it, as I tell you, in measurements on that nail measure- there ain't much fall-- if the reservoir water, for instamce, comes down three or four o'clock in the morning, we measure it at night, and in the year through ain't much fall between that time. The water is lower at night, always little lower at night than it is in the morning.

Q What did you allow for the normal fall of the river;you say when you reported twenty feet turned down you only had ten feet additional at your dam?

A Yes.

Q Did you allow anything for a decrease in the normal flow of the river?

A Normal flow?

Q Yes.

A Well, we allowed somewheres about from three to five feet when it goes down to normal, there ain't but very little fall then.

Q You don't know but it might have been ten feet per day for that

period of time, do you ?

A Yes, I do.

Q How do you know it?

A By the comparison of the days.

Q Do you know whether or not the river losses as much in coming down as the reservoirs do?

A No, I don't know anything about that.

Q Don't know whether there is any loss in the natural flow of the river in its flow down or not?

A No.

Q But at the time the reservoirs are first, water is first turned out from them, who turns it out first?

A The Timpanogos has been turning it out.

Q Then you company follows?

A Our company then sometimes.

Q About how long afterwards?

A Generally about two days in the past, just as quick as the Timpanogos takes the water we are right down, take it out of our canal and we have to follow within two days.

Q So that the loss is between you and the Timpanogos Company in the first fall?

A In the first, yes.

Q How do you divide that loss up, or don't you divide? it?

A We don't divide it, they just take the loss and water too, that is where we are losing out.

Q You do without?

A Yes, it takes it out of our canal when they take it.

Q How do you tell how much of the natural flow of the river is taken by either you or the Timpanogos Canal Company when they have turned the first water in from the reservoir?

A I ain't got no record of that.

Q The river is receding and rededing very rapidly, isn't it?

A I just have a comparison of what is taken the day before and that is all.

Q Now take last year, how much did the river fall in second feet, if you know, the day before the water from the reservoirs reached your dam?

A I don't know exactly, I think it is on record here though, I don't remember.

Q Do you know whether or not a part of the reservoir water reached your dam the day before or the day following, or whether the whole flow reached you at one and the same time?

A We always have the biggest flush at the same time, within usually six hours after the first reservoir comes, reservoir water gt gets there. It is the biggest flush, then it dies out again.

Q The river is a constantly receding stream from the high water until September, isn't it?

A No, sometimes it begins to increase in August, depends on the rain and showers.

Q That is only temporary when it increases?

A It ain't temporary, it fills up the earth and it stays, sometimes it is the lowest in July.

Q You say you think that is losses twenty-five to fifty feet frmm the time it is turned out of the reservoir?

A Until it gets to our dam, yes, ain,t over that mugh gets there.

Q Tell us why you think that,

A Because, as I have told you, the water don,t get there.

Q Do you know whether it is diverted above?

A No.

Q By any of the many users?

A No, that is something I don't know.

Q Do you know whether or not the quantity is turned that is reported?

A No, I don't, but I believe it is because I am acquainted with the parties and am satisfied it is.

Q That they told you the truth? A. Yes.

Q And you have no knowledge whatever of the fall in cubic feet per day of the normal flow of the river during that period, have you?

A I can not, it is on record, I cannot remember it now.

Q You haven't any knowledgeof it of your own?

A Not this present time.

Q You never made any measurement of it?

A Yes, I have made measurements.

Q At any time? A. Yes.

Q How did you make the measurements?

A We have a weir and keep track of the daily river. Every time that goes up we have a record what the river drops.

Q What the normal flow was? A. Yes.

Q Have you any record of the fall of the flow in the normal river prior to the time the reservoir water was ever turned into it?

A No.

Q During this period of time?

A No, I don't think we have.

Q But you know it is a very rapid fall, don't you ?

A After the 20th of June, I will say to the first of July it drops right down, then it is pretty normal.

Q And it continues to drop from that on until the middle of August?

A Yes, sometimes.

Q Except there is a heavy rainstorm should come in the meantime?

A Drops a little.

Q But you don't have any idea at this time in cubic feet of the fall, do you?

A No.

Q Per day/? A. No.

Q Twenty-four hours? A. No.

Q Do you know how long it takes the water to run down from the reservoir to your dam when it is turned in?

A Takes about thirty-six hours.

Q Don't you know exactly the time?

A No, I don't think anyone knows to the minute, but that is what we figure on, thirty-six hours, maybe thirty-eight, maybe thirty-five.

Q You never have made any investigation to see whether the people

above continued their regular streams after the water was turned in from the reservoirs? A. No.

Q or whether they cut down to their natural flow?

A No, I have not.

Q So that you don't as a matter of fact know whether there is any loss?

A I know there is a loss.

Q In the flow of water from the reservoirs down to your dam, do you?

A I know it don't get to our dam.

Q But you don't know whether it is being diverted and used by people above?

A No, I don't.

Q Now how long after you and the Timpanogos Company turned your reservoir water down the river before the plaintiff turned its water down?

A I don't know, the last year they didn't turn down, I don't think, until about the 22nd of August or 30th, but other years they have turned down I don't know but what the last of June.

Q Last year your company and the Timpanogos Company used all of your reservoir water, didn't you, during the entire year?

A No, we used a good deal of it. I would like to explain on that.

Q I wish you would.

A Well, about the 25th, I think, of August, somewheres along in there, Mr. Wentz -- the Provo Reservoir, I think, had turned out 55 second feet, and had about ten feet independent of the Midway water, that made about 65 passed our dam, and as I remember on record there was running 42 feet and we had ten feet of reservoir, that was 32 feet it left us of the normal river to water five thousand acres, and two days after it was down to twenty-five. I telephoned down to Mr. Wentz, I told him I couldn't stand that, with the normal river it ought to be more than that, and we were entited to more water. He said "How much

are you entitled to, John." I said "Fifty feet at least." He said "Make it up to fifty feet", which I did, and kept it there.

Q From the reservoir water of the plaintiff?

A Yes.

Q Plaintiff never made any complaint of it, did it, to you?

A No.

Q You say there was 55 feet of reservoir water turned out?

A Yes sir.

Q Receded in a few days to 25 feet at your dam?

A No, we only had that left. Ours went down from 32 to 25, he left us 32.

Q Your portion of the water?

A No. all told, North Field and the Wasatch combined. Last year was a normal year or a little more for us for good water. It went from 32 to 25, the normal river for use for five thousand acres.

Q And you had the reservoir in common also?

A We had ten feet in addition to this twenty-five feet.

Q How do you know what the normal river was?

A Just judging by the past, I didn,t go up the river, I have been acquainted. I know that we were entitled to more than twenty-five feet of the normal river by comparison with the past.

Q Now, you say it cost the ~~xt~~ three companies about sixty dollars a year before this suit was commenced for diverting the water from the river into your several canals?

A Commissioner's services, yes sir .

Q The county paid the commissioner, did it not?

A Sometimes the county paid for some of it, not always, sometimes we paid for it.

Q So some years it didn't cost you anything?

A Some years it didn't cost us anything.

Q You say it has cost the three companies about six hundred dollars a year?

A -

A Five companies what goes through that same system I have put into that, the Sage Brush have used some high water, and Spring creek.

Q And Midway?

A No, it is the North Field, Wasatch, Spring creek, Sage Brush and Upper Charleston goes through the same gate, that is what water they used.

Q And it has cost you something in addition to putting in dams, proper dams, has it not?

A Oh yes.

Q That is included in the six hundred dollars?

A No sir, Oh no.

Q How do you account for the water not receding when the reservoirs are shut off, you say there is twenty feet coming from the reserwoirs and they shut them off and your water does not recede more than ten feet; how do you account for that?

A I don,t know xx without the waters spread out in there, and as the water recedes it goes on down, unless in some cases it might be rain. I have never demonstrated that, but it is a fact at the present time. I cannot account for it, but that xx is the way I find the condition.

Q The shutting of it off doesn,t decrease your quantity more than half?

A Over half.

Q And the turning in doesn't increase your quantity more than half?

A No.

Q Can you account for either one?

A I can account for the first one, don't get to us, I don't know where it goes, but the last one, I don't hardly know how to account for it, without, as I say, it spreads out and comes back in again.

CROSS EXAMINATION By Mr. Thurman.

Q There is one thing I don't understand exactly; I want to ask a question or two. I would like you to explain again just how

you determined this loss in transmission. You measure the river at the time the reservoir water is turned in above?

A We measure the river just before we expect the reservoir water down.

Q And then after the reservoir water comes?

A After they take the reservoir out again.

Q Well now, you find when they say twenty feet turned in, only ten feet or a little more of it gets down to you?

A That is the way, yes. There has been exception of that, sometimes none gets down.

Q At what time?

MR. MCDONALD: What was that last answer?

A Sometimes, I say, we don't feel the effect any getting down. We are the last dam on that system.

Q Now, I take it that there is loss in the river water that comes down flowing in the same channel as well as the reservoir water, isn't there?

A I suppose so.

Q It is all commingled?

A Yes.

Q The truth is, you charge all of the loss that comes down to the reservoir, don't you?

A No.

Q Do you mean to say that the river between the point where the water is turned reservoir water is turned in and your dam, that the whole stream losses from twenty-five to fifty per cent that is turned in extra?

A I say it don't get to our dam, yes.

Q There is that much loss in that distance?

A Yes.

Q 25 to 50 per cent in the whole stream in the channel?

A Yes, the reservoir water.

Q No, no, I am talking about the whole stream, you cannot single out the reservoir water from the river water when it is all mingled

together.

MR. RAY: Your Honor please, I insist he can if he wants to . The reservoir, the loss in the normal river is the normal and without consideration here, the question is what is the loss in the added water.

MR. THURMAN: That is just what I am trying to get at, is his normal loss of the river. He has not given us that yet. I want to see how much of that loss may be charged up against the reservoir.

Q You are charging 25 to 50 per cent of loss to reservoir water, how much do you charge for river water?

A I don't know exactly, we are expecting so much so much water down, if they have told us they have turned twenty feet down we expect somewheres about that, and for that portion we don't get that I am charging up to the Provo Reservoir system.

Q Suppose now there is fifty feet in the river of natural flow?

A Yes.

Q At the time they turned it in?

A Yes sir.

Q And they turned in twenty feet.

A Yes.

Q Of the reservoir? A. Yes.

Q You have measured it out, or about the time you expect the reservoir water down then you measure it after, how much of that seventy feet do you find loss?

A I will explain that, if we had fifty feet there and if the river was dropping at the rate of one foot a day, that would be forty-nine feet. If they turned lose twenty feet up there instead of having forty-nine we have fifty nine feet. I think there is fifty per cent of that reservoir water didn't get to us.

Q Then there is all of the difference ten feet you charge up against the reservoir? A. Yes.

Q In that case? A. Yes sir.

Q One foot against the normal flow of the river?

A Yes, if that is the condition. Sometimes there ain't none, the normal flow is increasing a little, depends on the weather and conditions. If it is a rainy time the river may be raising when that water is put in, and have to take that into consideration.

Q Did you ever measure the natural flow of the river at a time when the reservoir water was not in?

A Yes.

Q To see what the loss would be during thirtysix hours?

A I have just answered that. We have kept a daily record of it. I go up sometimes every day, sometimes miss a couple days, being watermaster.

RECROSS EXAMINATION By Mr. A. C. Hatch;

Q There was a question in regard to the distribution of water with regard to the commissioners, how ould you have them elected if they were elected for Wasatch and Summit counties?

A How would we have them elected?

Q Yes.

A Well, I don't know, I have never --

Q At a general election or by thestockholders?

A Possbly the stockholders from the different companies.

Q You have tried that experiment heretofore, haven't you?

A No, I don,t know as we have.

Q When the commissioners was appointed, required to appoint commissioner for each county, you remember the time of that, don,t you ?

A When the county appointed them?

Q Yes. A. Yes.

Q And when one county would not appoint because of the expense?

A Yes.

Q And you had trouble all the time about the water and distribution of it during those periods, didn't you?

A I don,t know, I have never had no trouble myself.

Q Don,t you think the same trouble would arise with the appointment of two or three commissioners that formerly existed?

MR. MCDONALD: I object to that question on the ground it assumes they have had an experience, the witness has not so testified

MR. A. C. HATCH: Well, it is a matter of common knowledge in the community in which he lives. I don't know whether under the rule-- the court will understand the rule-- I don't know that the court should take judicial notice of those things that ought to be known in a community.

THE COURT: I understood Mr. Clegg to say in response to your question whether they have had any trouble, he said they had not had any trouble, and your next question was whether the same trouble would occur?

MR. A. C. HATCH: He said he never had any personal trouble.

Q Don,t you time and again the Wasatch Canal company having to send men up to Summit county to ask them to turn down water that the Wasatch people claimed belonged to them of right?

A Yes.

Q And that was during the period of time when these commissioners should have been acting under the county appointments, wasn't it?

A I don,t know whether that was always or not. I think we just sent the commissioners up when we had commissioners, I don't think we sent the citizens up.

Q Ed Clyde was never a commissioner, was he?

A I don,t think he was, only temporary.

Q Do you know of him going up?

MR. RAY: Your honor please, I object to that as incompetent, immaterial and irrelevant.

MR. A. C. HATCH: I think likely the whole subject matter was immaterial. If they are willing to strike out their questions--

THE COURT: I think it is proper cross examination of the evidence. My recollection now is Mr. Clegg declined to

exirpres his view upon what would be the best mehhod.

MR. JACOB EVANS: He suggested they ought to be appointed by the people.

THE COURT: I think he did say that, yes. This is proper cross examination, I think, of that statement.

Q Ed Clyde was never a commissioner, was he?

A I said I don't know.

Q Was Joseph R. Murdock ever a commissioner?

A Not that I know of.

Q You know of them having gone up in behalf of your company, Wasatch Irrigation Company, don't you? A. Yes

Q On different occasions?

A Yes.

Q And while this system of commissioners prevailed up there, don't you know that?

A No, I don't. As I said, I don't know those individuals that went up were the commissioners.

Q And because of Summit county refusing to act in the premises don't you know that was the reason?

A No, I don't. Summit county commissioner refused once ~~of~~ before, I think our commissioner dealt with it outside of the citizens.

Q Now, you said that when the plaintiff takes out its water at your dam your water is immediately diminished in quantity, what do you mean by that?

A I mean just what I say, just as quick as they take it out we lose a certain per cent.

Q What they take out?

A Biggest part of it , yes.

Q Prior to their taking it out you are losing it all?

A If we had twenty-five feet there when they take their's out, maybe cut us down to fifteen when the natrual drop of the river wouldn't be over a foot.

Q How do you know the river in its natural drop would only be a second foot in twenty four hours?

A I just know by observation.

Q Do you know it by observation?

A Yes.

Q Can you tell any one day in any year since you have been water-master when the natural drop of Provo river has not exceeded one foot in twenty-four hours other than when there was a raise by reason of a storm?

A When it ain't dropped more than a foot?

Q When it has not dropped more than a foot in twenty-four hours?

A Yes, I can tell, I can pick you out individual days.

Q What days?

A I would have to go to the record.

Q In what year?

A Every year, some mornings it would be higher and next night be down a foot.

CROSS EXAMINATION By Mr. Ray.

Q Mr. Clegg, I understand you figure it takes thirty-six hours for the water turned out of the reservoir to reach the Wasatch dam? A Yes sir.

Q You are notified when it is going to be turned out of the reservoirs? A. Yes sir.

Q And then before you expect it down you measure the river?

A Yes.

Q How many hours before you expect it there?

A If it comes in two or three o'clock in the morning we measure it in the evening, six or seven o'clock.

Q If it is to come in the afternoon when do you measure it?

A We would measure it when it come and in the morning.

Q So that it would be just a short interval between the time of your measurement and observation of the increase?

A Yes, very short, there practically isn't much loss in that time.

RECROSS EXAMINATION by Mr. A. C. Hatch.

Q There is another question, in this deduction for loss from the reservoirs how do you divide it between yourself, Timpanogos and provo Reservoir Company.

MR. MCDONALD: Object to that as irrelevant and immaterial, not cross examination.

THE COURT: What is the object of it.

MR. A. C. HATCH: He has said that in turning the water down from the Reservoir Company from the reservoirs, there was a certain loss, 25 to 50 per cent. Each company is an owner, as shown by the evidence , and his testimony of the interest in these reservoirs, and his company and the Timpanogos Company turn the water into the river several days to two or three weeks before the plaintiff turns any water from the reservoir in for its use. The three of them, together with the Sego Company own the reservoirs.

THE COURT: I understand, objection is overruled.

MR. A. C. HATCH: I am asking him what proportion would he charge to each.

THE COURT: I see.

A I don't understand the question.

Q Each of the owners?

A The Timpanogos and Wasatch?

Q Yes.

A We just take the whole thing, don't belong to the Wasaton, I say we take just we turn out. That is what I am trying to get at, to adjust it, we don't want only what we are entitled to.

Q You take all?

A All we turn out.

Q And Timpanogos takes all they turn out?

A Just the same, we take it from the old users, I claim.

Q Then you are not testifying in behalf of yourself and your company, but in the interest of the other parties?

A I am interested in all the other parties, we are all the old

users. When we take it out from them we take it out of one pocket and put it into the other. The Wasatch and North Field own about 74 per cent of the natural flow of the river at the low season.

Q And it has been your custom since you commenced turning the water in from the reservoir to turn out for your use as reservoir water at the Wasatch dam the only quantity that you turn in from the reservoir?

A Since it has been in the hands of the court, not before, we did not.

Q How did you do it before?

A I think there was about 7 per cent something allowed, deducted a little.

Q Do you know how much it was?

A No, I don't; I think it was 7 per cent, what I think Jarvis told me, once figured out about 7 per cent.

Q You took seven?

A It was divided out that way, I think, but I am not sure.

T. F. WENTZ recalled by the defendant Provo Bench Canal and Irrigation Company, testifies as follows:

DIRECT EXAMINATION By Mr. Ray.

Q Have you made any observations as to losses in transit between the reservoirs of the plaintiff company and Wasatch dam?

A No, not detailed observations .

Q I don,t mean measurements, I mean any observations?

A Yes.

Q Have you observed the time which it takes for water leaving the reservoirs of the plaintiff to reach the Wasatch dam?

A Yes.

Q About how long?

A Thirty-six hours.

Q And from the Wasatch dam to the mouth of the Provo Canyon?

A Twenty-four hours.

Q What is the nature of the channel above the Wasatch dam.

A It is a -- some places it is wide, more or less irregular and rocky, the upper stretches are rather steep.

Q Above the level of the normal flow of the river, at the period when reservoir water is turned in, is there an area there which absorbs water or takes up water beyond the channel of the river in this rocky formation?

A Yes, if the river water plane was raised, why it raises the adjacent g round water plane adjacent to the river.

Q If the reservoir water is turned in and raisesthe water plane of the river, at first the reservoir water would percolate out or run directly out into this rocky film?

A Yes, part of it.

Q Have you made any observation as to whether or not in the early season when the reservoir water is turned in, it goes in its full quantity down to the dam, or ittakes a percentage to fill this channel?

A I haven't a detail measurement of that; we don't receive the full amount of water at the Wasatch dam we turn in at the reservoir, but above the Wasatch dam we have fifty diversions, not more than two or three, possibly four that have good gates in, and may lose some of it out that way. The increase would part of it go in these diversions.

Q Might go, you mean?

A Yes, might go, and undoubtedly a great quantity of it goes into the ground water plane at the sides of the river.

Q Have you made any observations as to the shutting off of the reservoirs which justify you in that conclusion?

A Oh certainly, many of them.

Q State what they are?

A We may be running is August 40 second feet out of the reservoir and cut ten second feet at the reservoirs, and not feet it at the Wasatch dam, not get any diminution at the Wasatch dam at all.

Q And that is because of the return water which has gone into this rocky stratum at the time of the early turning in of the reservoir water, isn't it? A. Yes.

Q So that there would be a period during the time the reservoir gates were opened in the early part of it when the water was considerable less than that turned out and during the latter part of it there would be an inflow of these waters after the reservoir gates were closed?

A Yes.

Q The only loss which would be properly chargeable then to the reservoir water would be those waters which left the system during the entire period, would it not?

A Yes, above the Stewart randh where there is a ground water plane well defined.

Q That comes into the system?

A Yes.

Q Have you ever made any determination showing what the loss to the system of those waters if from the time of the turning in of the waters until they are finally returned through seepage in the later season? A. No.

Q Do you know of any having been made which are available?

A No.

Q Are those determinations which with proper gates in the diversions above the Wasatch dam could be made?

A Yes.

Q With some accuracy? A. Yes.

Q And keep records of it. The commissioner should determine reasonably what loss should be charged to those waters during the period, could he not?

A Yes.

Q You say that the water plane begins near the Stewart ranch?

A Yes, just below the Stewart ranch.

Q If a weir then were placed just at that point or above that point and the measuring device of the plaintiff company at its reservoirs, those two weirs could become in the main the determining factor in that, could they not?

A Yes.

CROSS EXAMINATION By Mr. A. C. Hatch.

Q Now, do you mean to say that the reservoir water still continues to flow down the Provo river for a considerable period of time after it is shut off at the reservoirs?

A Yes, eventually the quantity is delivered, it may not be delivered beginning thirty-six hours after.

Q So that what they loss in the forepart of the season they get by return in a later part of the season when the water is at a lower stage.

A Yes.

Q So that eventually would you say there is no loss whatever to the users by reason of the turning of the reservoir water?

A Very little loss, if any, after you strike where there is a ground water plane, just below Stewart's.

Q What has been the custom as to the reservoir's use, to shut them off immediately upon the closing of their gates or within thirty-six hours after they close their gates at the reservoirs, or were they allowed to continue the use of this reservoir water until it had all run out?

A It has been the practice to cut them off about the time after-- that we cut the water off at the res-ervoirs. That has been the practice, but that has been an erroneous practice by me.

Q The practice has been one which deprives the reservoir company of a right to the use of water in the lowest stage for a period of ten or twelve days, has it not?

MR. RAY: I object to that as an erroneous assumption, because it appears here they were given the reservoir water immediately when they were not entitled to it, the period has been improperly fixed, they have not been deprived of any water, they have been their quantity, but given it at a wrong time.

MR. A. C. HATCH: Then I understand counsel to say or to mean that our period, use for reservoir water should extend a considerable length of time after we close our reservoirs in order to make up if they take any from us when we first turn it in.

MR. RAY: I admit you should have all the water you turn in less the natural loss to the system, of course.

MR. MCDONALD: After the irrigation season is over.

MR. RAY: Much of it comes back after the irrigation season is over, I think the evidence will show.

Q The Timpanogos and Wasatch companies turn their water out first?

A Yes.

Q Fill up all these vracks and areas with their water, do they not?

A Yes, some of them.

Q So that the loss or gain by the Provo reservoir turning its quantity would be practically nothing, wouldn't it, the Timpanogos already having filled up the cracks and pores, there would be no loss occasioned by the Provo Reservoir Company, isn't that true?

A Well, that is partly true in a way. I don't consider any loss after we strike Stewart ranch. What we put into this system we eventually get out and if properly manipulated you will get it out during the irrigation season.

Q And not, as suggested by Mr. McDonald, long after the irrigation season has ended?

A No, if properly manipulated we can bring it through during the irrigation season.

REDIRECT EXAMINATION By Mr. Ray.

Q But in the past it has returned after the irrigation season was

over, some of it, hasn't it?

A Probably some of it that came after the irrigation season was over.

Q To the extent that the later water turned in by the Provo Reservoir Company heightened the water plane they would have a loss that would equal the other people, would they not, or comparatively so?

A Yes, they would be storing in that ground water plane.

RECROSS EXAMINATION BY Mr. A. C. Hatch

Q Do you have any idea about how long it would take to fill this ground water plane that is spoken of, so that the full flow as turned in from the reservoirs would reach the Wasatch dam?

A Well no, I suggest this to that answer. Suppose the Provo Reservoir wanted to draw 20 second feet of water at Provo. If I had the thing to do over again I would draw 40 second feet out of the reservoir to begin with or greater quantity than I wanted to divert here at Provo, and then after the first of August when I begin cutting off at the reservoirs so I had 20 second feet drawing at the reservoirs I would give them 50 here. That is merely a transfer of acrefeet from one point of time to another point of time. It has been an error in manipulation more than anything else.

Q And there is eventually during the season practically no loss by transmission from the reservoirs to the points of use?

MR. RAY: I object to that question as having been asked and answered. He says above the Stewart ranch-- below the Stewart ranch no, above the ranch yes, there are losses. He has answered that two or three times.

MR. A. C. HATCH: I didn't understand it.

A Below the Stewart ranch no, and above the Stewart ranch, I don't know what those losses are, but they could be determined by proper appliances.

Q Do you know whether there was any?

A No, I don't know anything about it.

MR. RAY: That is all.

THE COURT: Have you some other matters?

MR. RAY: No, your Honor.

THE COURT: Has any party anything further to offer at this time?

MR. A. C. HATCH: Here is a tabulation of the Factory race, Provo Pressed Brick that Mr. Cluff is representing. Have you a copy of this, Mr. Cluff?

MR. CLUFF: I have a copy of the one Mr. Tanner handed me.

MR. A. C. HATCH: We will call Mr. Wentz.

T. F. WENTZ, recalled by the plaintiff, testifies as follows:

DIRECT EXAMINATION By Mr. A. C. Hatch.

Q Mr. Wentz, have you the original records of the flow of water that could pass through the Provo Pressed Brick Company's plant for the years 1902 to '16, inclusive?

A Yes.

Q I wish you would refer to them and read into the record the flow for the period mentioned-- of what do those records consist?

A Three books, marked as the water commissioner's records, taken by Mr. Hyrum F. Smith and Mr. Farrer.

Q What do they contain as to the flow of water into channels leading to Provo City?

A They give the measurements of water in the channels of Provo river, and particularly the flow through the Factory race and through City creek channel, or City race channel.

Q And those two races are all the water, contain all of the water that has reached the Provo Pressed Brick Company's plant, do they not?

A Yes, in the normal flow of the river.

Q By that you mean--

A In the low water flow, sometimes in the high water flow there is a part of the water that can go through the plant that goes over the waste gate at the head, near the head of the City race, and there is also a quantity in these races during the low water flow that is not available to the Provo Pressed Brick plant that goes into the -- just above the head of the Factory race and City race and along near the bottom of the penstock of the Pressed Brick plant. This amount during the low water flow is about four to five second feet.

Q The measurements are not given daily, are they?

A No.

Q But all of the records that are made are shown in the books which you have?

A Up to the year 1913, from 1913 to 1916 inclusive, I have made the measurements and submitted them in the reports here to the court.

Q Filed in this case?

A Yes.

Q Now, if you will begin with the first date, 6/23/02, I think is the first. I present to you Exhibit 198, and ask you, Mr. Wentz, if you prepared it?

A Yes.

Q And does it contain a tabulation of the measurements of the flow of water in what stream?

A This tabulation, Exhibit 198 contains the discharge of the Factory race from 1902 to 1910, inclusive, and is a copy of the original record, and is all the data regarding this Factory race in those records. It also gives the Factory race from 1910 to 1916, and the City race from 1910 to 1916, inclusive, and total of these

two diversions in second feet. It is a copy of the original record prepared, this tabulation prepared by me, and gives all the data regarding these two channels and their discharge.

MR. A. C. HATCH: We now offer this in evidence.

MR. CLUFF: I want to ask Mr. Wentz a question or two.

CROSS EXAMINATION By Mr. Cluff.

Q Does this tabulation, Mr. Wentz, indicate the amount of water that actually passed through the Pressed Brick plant or wheel?

A No, there is a stream of four to five second feet that comes from the river that is in this tabulation that does not go through the Pressed Brick Company wheel, but sometimes in the high water season there is an amount that goes over the spillway at the head of City race.

Q Is there anything to indicate what that amount is?

A No, not during the high water season.

Q So as a matter of fact, this tabulation simply indicates a portion of the water that may be passed, or does pass through the Pressed Brick Wheels during the low water season?

A No, this tabulation is greater than the amount that passes through the pressed Brick wheels by four or five second feet.

Q By four or five second feet?

A Yes.

Q At certain periods? A. Yes.

Q At the time this was taken, that is, as to the dates that are given here, on those dates, would you say there was four or five second feet of water more mentioned here than was actually going through the pressed Brick wheels?

A No, I wouldn't say on those dates, I say that is the condition. Now there is about four or five second feet that doesn't go through the wheels.

Q This condition doesn't give us any definite information at all as to the amount of water that has passed through, or did pass throug the pressed Brick wheels at the time these measurements were taken?

A Up to 1910 the Factory race was available to the Pressed Brick Company, and possibly 19-- may have been 1910 or '11, and after that the City race and Factory race were both available to the Pressed Brick Company.

Q And aside from that the whole river is practically available to the pressed Brick Company at the point where they divert it to their canal into City creek if there is more than these two races need, it goes over the spillway into Tanner's race and back into the river .

A Not in the low water flow, very little goes over there.

Q It can ~~xxx~~ do and does it when there is water there sufficient?

A Yes, in the high water season there should be some turned over there.

MR. CLUFF: We object to this so far as the Pressed Brick Company is concerned, as being irrelevant, incompetent, immaterial, it does not go to show any evidence that would tend to enlighten the court as to the amount of water they use or have used or capable of using that is necessary to run their plant.

MR. A. C. HATCH: Our contention for it is it shows all they have used and more than they are now using or have been for sometime past. Is that right, Mr. Wentz?

A Yes, at the present time.

MR. A. C. HATCH: At the date mentioned.

THE COURT: Objection is overruled. With the modification given on cross examination I think the court understands.

MR. CLUFF: Let me ask one question further.

Q Isn't it a fact at the time these measurements were made, the dates given here was when the commissioner was called out and asked to measure when the people down here were short of water?

A No, not all of them. Some of those measurements are taken for maximum carrying capacity. Some of them for high water purposes and measurements since 1913 have been taken each time that I could get around to it to take them without regard to any

shortage or surplus or any other condition?

Q Prior to that time you don't know anything about that ?

A Only what the original records contain. Some of them of course are low water measurements and some of them are taken especially for high water measurements.

MR. A. C. HATCH: I have nothing further.

THE COURT: Has anyone anything further to offer now?

MR. A. C. HATCH: I have some questions to this witness, but not in regard to admission of this document. I understand it is admitted.

THE COURT: Yes.

DIRECT EXAMINATION By Mr. A. C. Hatch continued

Q Mr. Wentz, you may turn to the record there and show, beginning with 2/23/02 and following on certain data as you have there, and read it into the record. Identify the book from which you read first. Just a moment first, we won't ask for that, I think the tabulation covers the whole matter. Have you anything anywhere in those records, discovered anything as to the volume of flow of water im the Provo City pipes?

A That flow is in the original record that I have.

Q Haven't you it in those records?

A Yes.

Q I wish you would turn to it, first identifying the record and then read such data as is there showing the flow of water in the Provo pipe system, give us the date.

A I will have to look through all these. If I may be excused for a minute, I will go to the office and get the dates.

Q Very well.

A In book No. 1, page 130 of the water commissioner record of date July 28, 1903, is a current meter measurement in details of the work water-works system, water-works of Provo city. Discharge as shown is 3.92 second feet.

In the same book on page 114, under date of June 9, 1904,

is the measurement of the city water-works supply over a weir in Provo canyon, discharge of 3.9 second feet.

In all of the records of the water commissioner these are the only two actual measurements of water in the water-works system.

Q The system has been enlarged somewhat since then, hasn't it?

A Yes, been reconstructed, it was reconstructed in 1904 and '05, beginning at that time. This last measurement is under the new construction.

Q The 3.9? A. Yes.

Q 3.09?

A 3.9.

Q That is under the new system? A. Yes.

Q That was in June, 1904? A. Yes.

Q And there has been no measurements that have been recorded since?

A No.

CROSS EXAMINATION By Mr. Tucker.

Q What time of day were those measurements taken?

A No, the time of day is not shown.

Q That would be very material in the measurement of a water-works system, would it not?

A No, this measurement is over a weir in provo Canyon, collecting all the springs, and the overflow of the water-works supply is out about three miles south of the mouth of Provo Canyon.

Q That first measurement was a measurement of a water meter, I understood it?

A Made by a water meter.

Q Was that on the pipe line of the city?

A That was at the head of the pipe line.

Q And the time of day at which that measurement was made would be very material because the discharge of those pipe lines varies, doesn't it?

A There may be some variation in the discharge during the day on the first measurement.

Q Now if the second measurement of the water which flows in the Provo City pipe line, how is it material here? As I understood you the second measurement, measurement in 1904, was a measurement over the weir and below that weir there is an overflow, so you don't know how much water is flowing from Provo City pipe line from that measurement?

A No, only know it should be less than that, could not be more than that, it may be even less than that that they are actually using.

MR. CLUFF: There was a matter in connection with the Provo Pressed Brick Company. Mr. Belmont testified to the time they began using water and took the application from Mrs. Dixon. She had formerly appropriated water and they had succeeded to their rights. We neglected at that time to offer the application Mrs. Dixon had made and I have here the notice of appropriation of water made by Mrs. Dixon that I would like to offer as part of the record.

MR. A. C. HATCH: If you are going to show you complied with the law so as to make the application of any valid use, we don't object, but the application itself without proof that you commenced work of construction within thirty days after it was made is burdening the record for nothing.

MR. CLUFF: As I understood Mr. Belmont at the time he testified application was made by Mrs. Dixon, and they succeeded, took from her application, they commenced work and followed this up. Of course, they later made another application and got a patent and the patent was introduced, merely starting of their rights.

MR. A. C. HATCH: I don't remember such testimony. There is no objection to his testifying as to the application and if he did so testify it is already in the record without any objection.

MR. CLUFF: I think it is in all right.

MR. A. C. HATVH: If it is to go into the record without proof construction was commenced within the time required by statute, it is valueless.

THE COURT: My recollection is his evidence was they proceeded under this application and proceeded with the diversion of the water within a certain time. I don't know whether it was within the thirty days required they commenced their construction or not.

MR A. C. HATCH: Now, of course we will have to go through the record to determine whether or not there is any testimony to support that. My recollection is there is not. In order to make that application of any validity whatever, they would have to commence the construction within thirty days after the filing of the notice, notice of appropriation of water under the old law.

THE COURT: So that it would be useless and encumbrance of the record unless it was shown it was followed up. Objection will be overruled and it may be received. Of course, if the record doesn't show they commenced the prosecution of the work within the law required by that time it is of no validity.

MR. A. C. HATCH: And diligently continued it.

THE COURT: Yes, and continued it, but we will not take the time now to go through the record to see whether the evidence does show that. It may be received. Now, are there any other matters.

3:35 P. M., Recess to 10:00 A.M., April 20, 1917.

OMISSION.

Testimony as to Midway Irrigation Company and Sunrise Irrigation Company.

IN THE DISTRICT COURT OF UTAH COUNTY ~~OF~~ UTAH.

PROVO RESERVOIR COMPANY, - -Plaintiff, :
vs :
PROVO CITY, et al, - - - - Defendants. :

April 20, 1917.

MR. A. C. HATCH: Mr. Story, we have here some thirty-nine--thirty-eight or thirty-nine sheets furnished us by you, and they may be admitted, may they not?

MR. STORY: Certainly. There are some of those sheets, Judge, we did not have the original. The situation was we had to take the record as shown from the terminal, so that we brought---those particular papers show other power output than that of the Provo plant.

MR. A. C. HATCH: We will only offer such parts as are relevant to the Provo plant.

MR. STORY: We have no objection.

MR. A. C. HATCH: We willoffer them, if the court please; first, power output sheet of Utah Power & Light Company, for June 14, 1913. Next offer power output sheet of the Utah Power & Light Company for October 20th.

MR. STORY: Do you not want to take those in their order?

MR. A. C. HATCH: We have them in their order as they come here, following the dates.

MR. STORY: I think you are mistaken, because we furnished you with a sheet June 13th, then July 5th, August 7th, and then October 20th.

MR. A. C. HATCH: July 5th, August 7th, and October 20th, we have not received.

MR. STORY: I think you must be mistaken.

MR. A. C. HATCH: I want to offer them in their order.

MR. STORY: I can give you the dates you have there.

MR. A. C. HATCH: I will offer July 5th, 1913. (Exhibit 202).

August 7, 1913, in two sheets (Exhibit 203)

October 20, 1913, (Exhibit 204.)

I understand they may be compared and admitted.

MR. STORY: Yes; October 22nd is the next.

MR. A. C. HATCH: October 22, 1913 (205)

February 27, 1914, (206)

May 9, 1914, (207)

July 20, 1914 (208)

July 27, 1914 (209)

August 25, 1914 (210)

October 19, 1914 (211)

October 22, 1914 (212)

November 6, 1914 (213)

November 9, 1914 (214)

November 10, 1914 (215)

February 16, 1915 (216)

April 9, 1915 (217)

May 8, 1915 (218)

May 14, 1915 (219)

June 3, 1915 (220)

July 9, 1915, (221)

July 22, 1915 (222)

September 25, 1915 (223)

January 8, 1916 (224)

January 17, 1916, (225)

January 21, 1916, (226)

April 27, 1916, (227)

May 16, 1916, (228)

May 22, 1916, (229)

May 13, 1916, (230)

June 30, 1916, (231)

June 14, 1916, (232)

September 9, 1916, (233)

October 9, 1916, (234)

October 13, 1916, (235)

Odtober 21, 1916, (235)

T. F. WENTZ, recalled.

DIRECT EXAMINATION by Mr. A. C. Hatch.

Q You are the T. F. Wentz who has heretofore testified in this case, Mr. Wentz?

A Yes.

Q Can you state to the court the quantity of water necessary at the plant of the Utah Power & Light Company to produce, with the fall it has, to produce a horse power, quantity in second feet?

A To produce one horse power?

Q One horse power.

A On eighty per cent of efficiency or one hundred per cent?

Q Hundred per cent efficiency and eighty per cent and sixty-five can be determined, whatever efficiency the court may find is proper to be determined, theoretical horse power.

A Horse power on one hundred per cent efficiency equals the second feet times the head divided by 8.8. The head, as I remember it, of the Olmsted plant is three hundred and forty feet. That may be substituted for "H" in the formula. I don't know as I understand your question, Judge, you want to know the number of second feet that is required to produce one horse power?

Q Yes, at that plant.

A One second foot will produce 38.6 horse power. Water required to produce one horse power would be one divided by 38.6.

Q Give us the formula that it may go into the record, Mr. Wentz, by which this is determined.

A Horse power equals second feet times three hundred and forty divided by 8.8 at one hundred per cent efficiency.

Q How do you determine the horse power?

A Horse power is equal to five hundred and fifty foot pounds per second.

Q In determining the quantity of water necessary to produce one or more horse power at that plant or any plant, what do you use as a basis upon which to make the determination?

A I use the weight of water as sixty-two and a half pounds.

Q To a cubic foot?

A To a cubic foot. The cubic foot of water falling 8.8 feet is equally to five hundred and fifty foot pounds per second or one horse power.

Q That is the theoretical horse power?

A Yes.

Q Assuming that there is one hundred per cent efficiency?

A Yes.

Q Do you have any knowledge of the efficiency, proper efficiency of the pipe linss and wheels through which the water goes in this particular plant?

MR. STORY: I object on the ground it is incompetent, irrelevant and immaterial, witness has not qualified to give expert testimony on that question.

THE COURT: I don't just remember what the qualification of Mr. Wentz has been.

MR. STORY: Mr. Wentz has not shown at all he has had any experience in power operation.

THE COURT: I am inclined to think he has; I am inclined to hink that it was gone into.

MR. STORY: Besides, it is a question of opinion, the testimony before this court as to the efficiency of wheels, it has varied a great deal.

THE COURT: Yes. It seems to the court it is a matter that the court should have expert testimony as to the usual and ordinary efficiency of such machinery, and especially the efficiency of such machinery. It is a question of fact and not a matter of opinion. Now, read the question. I understand it applies to this particular machinery.

MR. STORY: He used the word "proper". He said for proper machinery of this kind.

(Question read)

THE COURT: That seems to be the question.

Q Do you have any knowledge of the efficiency of the wheels and pipe lines at this particular plant?

MR. STORY: I wish to object to the testimony on the ground that it is irrelevant and immaterial.

THE COURT: Objection is overruled.

A No.

Q Do you know what is the ordinary efficiency of the wheels and pipe lines in a plant in good condition similar to that?

MR. STORY: Object on the ground that it is incompetent and irrelevant, and immaterial.

THE COURT: Objection is overruled.

MR. STORY: Note exception.

A Only by publications by the government and manufacturers of power output machinery, power plant machinery.

Q You have studied that subject ?

A Yes.

Q And from what text book, if any, other than government reports?

A Well, there are a number of text books, but the main tests that have been made that are published are published by the government and by the manufacturers of power plant machinery.

Q What is the efficiency?

MR. STORY: I object, Your Honor, on the ground it is irrelevant, incompetent and immaterial.

Q Working efficiency?

MR. STORY: And not the best evidence, the works themselves are the best evidence, if they are going to get the evidence in that manner.

THE COURT: Objection overruled.

MR. STORY: Note exception.

A The general efficiency is about eighty per cent. Sometimes it is a little less and sometimes a little more.

Q Can you say how many in the sheets introduced in evidence here, as showing the power output of the plant for 1913, '14, '15 and '16, on different dates we have--say for October 21, 1916, assuming that the plants of the Utah Power & Light Company were working under an efficiency of eighty per cent, can you tell from the sheet the quantity of water necessary to produce the power output of that date, assuming that the fall is three hundred and thirty-two feet--you used three hundred and forty in your computation on the board. The testimony shows it is three hundred and thirty-two feet, does it not?

MR. STORY: It shows that is the effective head, yes, three hundred and thirty-two.

MR. A. C. HATCH: Or actually three hundred and forty, is it?

MR. STORY: I think that is right.

A Using a three hundred and thirty-two.

Q Using three hundred and thirty-two, which the testimony, I understand, shows is the effective head at that plant.

A On exhibit given me, No. 237, as I read it, the average load for the day was forty-five hundred, thirty-three kilowatts.

Q Before beginning how many kilowatts will one horse power produce at one hundred per cent efficiency?

A It would require two hundred second feet to produce this power

output of forty-five hundred and thirty-three kilowatts.

Q With one hundred per cent efficiency?

A With eighty per cent efficiency on three hundred and thirty-two foot head.

Q Now, can you give us the formula into the record or make it on a sheet, so that it may be introduced that any of these dates may be computed?

A Horse power at eighty per cent efficiency equals second feet times the head divided by eleven. One horse power equals .746 kilowatts. One kilowatt equals 1.3405 horse power. Kilowatts equals second feet times the head divided by 14.75 at eighty per cent efficiency. Do you desire that at one hundred efficiency, too, in kilowatts?

Q If it is one hundred, I will state this, if it is one hundred per cent efficiency, whatever then the court may determine is the proper efficiency would be more readily reducible.

A At one hundred per cent efficiency, kilowatts equals second feet times the head divided by 11.8.

Q At one hundred per cent efficiency, to have produced the power shown to have been produced by the exhibit to which you are testifying, would be one hundred and sixty second feet, eighty per cent, two hundred feet?

A Eighty per cent, two hundred feet, yes.

Q And one hundred per cent would be what?

A That would be one hundred and sixty second feet.

CROSS EXAMINATION by Mr. Story.

Q Mr. Wentz, what personal experience have you had in the operation of power plants?

A None.

Q What personal experience have you had in the way of testing efficiency of power plants?

A I haven't had any.

Q Then the formula that you have given are merely those which you

have learned as the proper theoretical formula for determining horse powers and so forth, are they not?

A Yes, they are the formulae for determining power.

Q But you have never done testing at all in matters of this kind?

A No, I have not tested the efficiency of any plant.

Q Inso far as your knowledge of efficiency of water wheels is concerned, it is merely that which you have learned from books and reports you have mentioned?

A Yes, from government reports and manufacturers' reports.

Q When did you make this investigation of this manufacturer's reports from which you have testified?

A Well, it has been sometime, two or three years since I looked them up.

Q Have you got them now?

A Yes, I have them in the office.

Q That is manufacturers' reports purported to be efficiencies of their machines, do they not?

A Yes.

Q And do you or do you not know whether or not the manufacturers' reports of efficiencies of the machines are usually over or under the actual efficiency in operation?

A Well, I don't know.

Q You wouldn't think they would be under, would you?

A No, I wouldn't think so. They usually give some tests in there that probably are authentic.

Q These government reports that you mention are merely lists of efficiencies of various kinds of water wheels, are they not?

A Yes.

Q They are various makes of wheels, are they not?

A Yes.

Q And efficiencies of the various makes vary, do they not?

A Well, not so much. There is some variation.

Q Some variation between efficiency of different machines?

A Yes, but it is not very great.

Q What particular machine has an efficiency to-day of eighty per cent in actual operation, that you know of?

A Well, I have not looked those up for sometime. The tests the Government gives on practically all the standard makes of wheels, as I remember it.

Q And there has been a very great change in types of water wheels since 1902, has there not?

A Yes, there are some improvements.

Q And the machines today are a great deal more efficient than the machines of years ago, are they not?

A I would think so.

Q Were you here at the time of the installation of the present Olmsted plant?

A No, I wasn't here in the year 1902.

Q You don't know anything about the original efficiency, then?

A No.

Q I take it you also don't know anything about the loss of efficiency after operation for a while, do you?

A No.

Q You cannot give me now, however, the type of machine which you say the Government says has an eighty per cent efficiency?

A No, it has been two or three years since I paid any attention to this.

Q And you cannot give me the name of any machine that has an eighty per cent efficiency in actual operation?

A No, sir.

MR. A. C. HATCH: If the court please, the witness has not been testifying as to wheels and pipe lines.

MR. STORY: Simply a question of loss of effective head. Where you get your efficiency is on your wheel.

MR. A. C. HATCH: That is what he was testifying not to machinery, of course, we have not gone into

that.

MR. STORY: I think I am not mistaken when I say the witness testified as to the efficiency of water wheels, as given by the government reports. Was tha t not your evidence?

A Yes.

Q As a matter of fact, many of the older types of machines have a great deal less than eighty per cent efficiency, did they not?

A I could not say so. It has been some time since I looked up those publications.

MR A. C. HATCH: We object to that, if the court please, as being irrelevant, immaterial and incompetent for any purpose except to test the knowledge of the witness.

THE COURT: It is proper cross examination for that purpose.

Q You have merely given us the general efficiency of water wheels at the time these reports were published, concerning which you have testified?

A Yes.

Q And you don't remember the date of those reports?

A No, sir.

Q You don't know whether they were a year old or three years old?

A No, it has been some time since I looked them up.

Q And do you know what the general efficiency of water wheels in plants such as this is at the present time?

A No.

Q Do you know what the general efficiency of wheels in plants similar to this was at the time this plant was installed?

A No.

REDIRECT EXAMINATION by Mr. Hatch.

Q About how long ago was it that you examined this matter?

A It has been two or three years since I have looked up the publications on the efficiency of wheels.

Q I understood you to say that the Government reports gave practically all of the standard wheels an eighty per cent efficiency?

A Yes, they a re around eighty per cent. Some of them are a little higher, and some are lower.

Q About what was the greatest variation?

MR. STORY: Your Honor, I don't wish to keep objecting, but it seems to me testimony of this kind is not the best evidence. If they are going to testify about these government reports, I think we are entitled to have the reports brought in themselves.

THE COURT: Do I understand you are asking for the contents of the reports. I have overruled the objections heretofore on the theory and because of the fact I understood Mr. Wentz to be testifying from his knowledge, acquired from a study of the question and he gave the source of his information as being gov ernment reports and reports---

MR. STORY: And principally these government reports.

MR. A. C. HATCH: Text books.

THE COURT: That would not make his evidence incompetent, because the principal source of his information was the reports, but if you are asking for the contents of the reports---

MR. A. C. HATCH: From his study at the time he made it, as to the different kinds of wheels, what was the variation as to the different standards of wheels.

THE COURT: He may answer that.

MR. STORY: I save an exception, and like--this is a new question--the stenographer to please

read the old question.

(Question read)

MR. STORY. That was the question I objected to.

MR. A. C. HATCH: I withdraw the question. That is all, Mr. Wentz.

CALEB TANNER--- Recalled.

DIRECT EXAMINATION by Mr. Hatch.

Q You are Caleb Tanner. the witness who has heretofore testified in the case?

A Yes.

Q Now, Mr Tanner, what is the--I will hand you plaintiff's Exhibit 237 and ask you to determine the quantity of water necessary to produce the power as shown by that power output sheet on October 21, 1916, assuming that there is a fall of three hundred and forty feet, assuming an efficiency of one hundred per cent. I call your attention, Mr. Tanner, to the sheet itself which fixes the average head in feet at three thirty-three feet?

A Yes.

Q According to the sheet, now I asked you to fix it at three hundred and forty feet, I wish now to withdraw that three hundred and forty feet and ask you to compute it on the basis as given by the exhibit itself, three hundred and thirty-three, isn't that?

MR. STORY: The effective head, I think is three hundred and thirty-two.

MR. A. C. HATCH: I am taking the sheet, the exhibit itself, that is thirty-three, isn't it?

MR. STORY: I don't know what it is intended for. It should be the same on all the sheets.

MR. A. C. HATCH: It is not; they change from three hundred and thirty and one half to three hundred

and thirty, something else.

MR. STORY: Of course, that is due to fluctuation in the canal.

MR. A. C. HATCH: What is the least effective head you have? Do you know?

MR. STORY: No, I don't, best information I can give you would be the average effective head would be three hundred and thirty-two.

A Assuming one hundred per cent efficiency, one hundred and ninety-two second feet, approximately. Assuming eighty per cent efficiency, two hundred and fifty-fiv e second feet, approximately.

Q With a three hundred and thirty-three foot head?

A Three hundred and thirty-three.

Q Now, what would be the efficiency, what should be the efficiency of the wheels of the plant at any power plant under present conditions?

MR. STORY: I object on the ground that it is irrelevant, incompetent and immaterial, witness is not qualified to answer the question.

THE COURT: Objection is overruled.

MR. STORY: For the further reason that the practice at the present time is not controlling at all, of what the practice was at the time of the installation of this plant.

MR. A. C. HATCH: True, if the court please, and the use of water along all lines to-day is not what it was forty years ago. We are requiring now--

THE COURT: I think that would go more to the weight of the evidence than its admissibility.

MR. STORY: I don't believe the witness is qualified to answer that question.

THE COURT: Objection is overruled. He may answer.

MR. STORY: Save an exception.

A My judgment it ought to be eighty per cent, the load factor shown upon the card.

Q What is your judgment as to whether or not, allowing your efficiency to go below eighty per cent, would be a waste of energy, or waste of the water?

MR. STORY: I object on the ground it is irrelevant and immaterial.

THE COURT: Objection is sustained. I think that is a matter the court must determine.

Q What is the efficiency, if you can give it, of the modern make of water wheels?

A Water wheels are--

Q Standard wheels?

A Of the type that we have here, reaction turbines, are pretty much all of the makes built on the same standard, empirical formula that have been worked out with great care and experience. They are constructed for the service under the particular conditions that the plant is built for, and if a wheel is not operated under the conditions that were given for its construction and operation, if it runs above or runs below, the efficiency falls off. In the actual operation of a plant where you have a variable load to deliver, your ordinary methods of controlling the variable load and maintaining the speed of your machines is to check the entrance of the water to the wheel, close the gates,and the closing of those gates results in the falling off of efficiency, so that if a wheel is built for such a head as three hundred and thirty feet and to carry, we will say, one hundred second feet of water, to drive a machine of a dertain number of revolutions per minute, then it ought to have its gate opening something like three-quarters, to get the highest efficiency. If the load falls off---and that load means so much in that assumption, we will say, it means fifteen hundred kilowatts. In this particular card there are three wheels involved, and one we assume would deliver fifteen hundred

kilowatts. If the load falls off so that you only have to have one thousand, then you have to choke the delivery of water into the wheel, and efficiency falls off. If the load suddenly raises above fifteen hundred kilowatts and you have to open the gates more than to say three-quarters, in order to supply that water, the wheel then is not operating under its maximum efficiency, and while you get more power output it is not in proportion to the amount of water delivered, and therefore the efficiency falls off. Falls off in delivering excess of power and falls off with the delivering of less than the standard power. The wheels are built to operate in an output of a standard quantity, due to the head that the water supply with the particular installa tion would determine, and when the wheel is working with the standard load under standard conditions, for its operation, you ought to realize eighty per cent efficiency from the standard modern turbine. It ought to b e more than that when it is first installed, but under conditions of use, in my judgment, you ought to realize after a period of years under those standard conditions, eighty per cent efficiency; and that has been the case with turbines for the last ten or fifteen or twenty years.

Q What is the variation in efficiency, present efficiency under the conditions of increased or decreased load from the standard?

A Why it sould run down pretty low. If you closed the gate so that only a little trickle is going through, your wheel practically stops, but if you open it so wide that the water makes serious interference in the operation of the runner, itself, your efficiency drops down, but does not drop down as much as it does by having a small quantity of water; so if you plat it down to the base line, you can run your efficiency down to nothing, having a small supply of water, but within the range of operation we will say, ranging from the eighty per cent shown.

Q As shown by this card?

A Not as shown by this card, because the variation here is not very great, and my judgment the output there you ought to realize eighty per cent of everything shown on that card, and if the load was only forty per cent part of the time, then the efficiency might range down in the neighborhood of seventy per cent or a little below seventy, and if you carry an overload the excess of water through the wheel temporarily makes the gate opening larger than standard, the efficiency might drop off fiv e per cent or six per cent, so as to range down to seventy-four per cent.

Q Now, I will ask you to examine Exhibit 235 and say under the conditions as there shown as to load, what the efficiency should be.

A My judgment it ought to b e eighty per cent for that card.

Q And 234?

A Eighty per cent.

Q You might take all of these exhibits, Mr. Tanner, that have been offered this morning and examine them, and then I will ask you in regard to them whether there are any--just taking them all, other than the three you have examined?

A At some other time?

Q Now, and before leaving the court room. I will call you, I will put on another witness in the meantime.

THE C OURT: You may cross examine then.

I. H. JACOBS, recalled.

DIRECT EXAMINATION by Mr. A. C. Hatch.

Q You have heretofore testified as an engineer in this c ase, have you not?

A Yes.

Q I present to you plaintiff's Exhibit 237 and ask you if you prepared the exhibit?

A Yes.

Q The tables shown thereon and what does it show?

A It shows the second feet necessary to produce given number of kilowatts at a given wheel efficiency under three hundred and thirty-two foot head.

MR. A. C. HATCH: We now offer this, if the court please.

MR. STORY: We willhave to check this, Your Honor. I don't object to it at this time, but reserve the right to object if on checking it we find it to be incorrect.

Q It purports to show the second feet of water necessary to produce given numbef of kilowatts under a three hundred and thirty-two foot head at the efficiencies of wheel from sixty to ninety per cent?

A Yes.

Q It is sixty, sixty-five, seventy, seventy-five, eighty, eighty-five, and ninety per cent efficiency?

A Yes.

Q It doesn't show second feet on its face, doesn't indicate second feet, you had better mark that.

MR. STORY: I see very plainly we will have to introduce some further testimony ourselves and I want to introduce the testimony of Mr. Swendson. Mr. Swendson was obliged to b e in Boise to-day and he could not be here, so therefore I shall have to ask we be given an opportunity at a later date to introduce his testimony and if these gentlemen are not ready to introduce other testimony at the present time, I have no objection to introducing it at that t time.

MR A. C. HATCH: We will be ready and will not delay the court at all in this matter. I will put Mr. Tanner on now.

CALEB TANNER recalled.

DIRECT EXAMINATION by Mr. Hatch continued.

Q Have you gone through those exhibits, No. 201 to 236, generally, Mr. Tanner?

A Yes, the ones I have looked up since stepping out of the court room are cards that don't show a great deal of variation between the average load and the peaks, and therefore, a high efficiency should be obtained. Low efficiencies would probably be shown on some of the cars where the output was from two hundred to a thousand kilowatts below the general standard line of the cards I have just examined of forty-five hundred kilowatts, and where the output ranged below this standard line a thousand kilowatts or more, the efficiency, in my judgment, would fall off some per cent from what would be realized with the wheels operating on this standard line, or delivering on this standard line, rather.

Q To what extent, what per cent, approximately?

A In my judgment it should not, for a thousand kilowatts, it should not fall below three per cent below eighty.

Q That would make it seventy-seven per cent efficiency?

A That would make it seventy-seven per cent efficiency, for the water used on the wheels in developing about thirty-five hundred horse power for the interval that thirty-five hundred was being developed, which might, as the cards show, only be for a few minutes, and then the standard load would come on again and the efficiency would again mount to the standard efficiency.

CROSS EXAMINATION by Mr. Story.

Q Mr. Tanner, I believe you say that you have arrived at the conclusion it should be eighty per cent based upon the variation of the load from the peak load shown on those cards each day, am I right? I will state it again. In arriving at your conclusion that it should be eighty per cent efficiency, I understand you have arrived at your conclusion by comparing the gen-

eral load with the peak load for each day?

A We have done it on the assumption the plant was installed for the delivery of forty-five hundred kilowatts.

Q Do you know what it was installed for?

A No.

Q Do you know what its maximum capacity is?

A No.

Q Why did you assume that figure?

A Assumed that for the purpose of making the answer.

Q That is the best answer you can give to my question?

A Yes; the installation, as I remarked in the beginning of my statement, is always made with reference to the physical conditions that obtain where the installation is to be operated, and on the assumption that the installation was made at Olmsted to be operated under three hundred and thirty-three feet head, with a certain class of machinery, turbines and generators, and having a certain output of power. Now, for the purpose of getting at where the place of operation should be in its power output to serve the purpose of its installation, I have assumed it was built for forty-five hundred kilowatts, output, operating under three hundred and thirty-three foot head.

Q As a matter of fact, you don't know what it was actually installed for?

A I just know in a general way. I think there has been some evidence with reference to the character of the wheels themselves.

Q I am talking about your own knowledge.

A No.

Q Of what the installed capacity is.

A No, I have never seen the wheels or the other installation to arrive at a personal certainty as to what the installation was for.

Q Why didn't you assume a six thousand kilowatts output, as the

installed capacity?

A I can answer your question on a six thousand kilowatt output.

Q Answer my question, why did you not assume a six thousand ?

A Because the general curve here on these cards was making an output at about forty-five, ranging about forty-five and all the cards I have examined in the interval I have been on the witness stand.

Q Does it necessarily follow that because the plant was operating at that capacity at the time these readings were taken that that is the maximum installed capacity of the plant?

A No, I should say not, that would not necessarily follow.

Q You heard the testimony of Mr. Brundige, in this case, did you not?

A I think I heard part of it.

Q Do you not remember that he testified that during the years 1913, '14 and '15, and also during the year 1916, that the plant was not operated at anywhere near its full capacity?

A I don't remember.

Q You don't remember whether he so testified or not?

A No.

Q You did testify, however, that a variation of load from that which the plant was designed to produce made a variation in efficiency didn't you, or caused a variation in efficiency?

A Yes.

Q And that if the plant was not operating at the maximum load for which it is designed, that its efficiency falls off?

A Yes.

Q And you have merely in your calculation then assumed that the capacity for which the plant was designed was forty-five hundred and based your conslusion on that, is that the case?

A That is the answer of eighty per cent efficiency for these cards, yes.

Q That is on what you based your answer of eighty per cent?

A Yes, on these cards, yes.

Q Now, Mr. Tanner, what power plant have you operated?

A Oh, I have operated a mill.

Q Where?

A In Provo.

Q The Provo Mill here?

A No, Tanner's mill.

Q What is the character of the power installation there?

A There is a turbine installation.

Q Under what head are you operating?

A About thirteen or fourteen feet.

Q Some difference between that and the head down here at the Provo plant, isn't there?

A Yes.

Q Is that the only power plant you ever operated?

A That is the only one I ever operated.

Q What tests did youpersonally make on other power plants?

A Well, I have conducted, assisted in conducting a number of tests on hydraulic machinery.

Q I would like to know what plants, high head plants you have tested or assisted in testing for efficiency?

A No, I have never tested a high head plant, except a pumping installation at fairly high head; I have never tested an electrical generating plant with high head.

Q Have you ever installed or assisted in installing any high head power plant such as this?

A No.

Q Then where do you gain your knowledge about the efficiency at which these plants should operate?

A It is a matter of general information. The turbine is built with a certainty, the same certainty with reference to its use if it is properly installed as the Cutter formula is with reference to the flow of water.

Q I didn't ask you that. Please answer my question. Will you please read it to him?

(Question read)

Q Where do you gain your knowledge as to the efficiency with which these plants should operate?

A Well, I don't think it makes a great deal of difference whether you operate it under a fifty foot head or a hundred foot head. My knowledge is limited to heads less than the heads up there, but my study and books extend to practically many high head tests that are contained in the literature, and from that information I have come to the judgment what a fair efficiency should be, if care is used in the installation and proper devices are installed so that a reasonable use is made of the mechanical contrivances for the development of the power and water.

Q Then, the only knowledge you have as to the efficiancy of a high head plant of this character comes from the learning you get from books, is it?

A Yes.

Q And what books are those?

A Well, there are a great number of books published on hydraulic turbines. I don't recall very many of them just now. I have several over in the library.

Q Has your learning on this subject, or your reading on this subject shown you that the efficiency in plants of this character has varied in the last eight or ten or fifteen years?

A Yes.

Q Has it shown you there has been a gradual increase in the efficiency of plants during that period and methods of construction?

A Some increase in efficiency.

Q You don't know how much increase that has been?

A Well, we use to look upon, twenty years ago, to an eighty-eight per cent efficiency in turbines to be about the high mark--ninety--now we realize as high as ninety-four and ninety-five.

Q Under high head, do you?

A Yes.

Q Will you please tell me any plant within your knowledge which is to day operating at ninety per cent efficiency, a turbine plant?

A I didn't answer that; I said with reference to standard turbines, tested in the shops of the makers, or at the original installation of the makers, or at the government testing plants, because as a matter of fact it is only now and then that even in the literature you obtain the tests that are given out by the operators themselves. That material is comparatively meager.

Q Answer my question. Do you know of your own knowledge, of a single plant where a turbine is used under a high head where they are actually operating at a ninety per cent efficiency?

A Well, I know where there was one about 1903.

Q Did you test it out yourself?

A No, the literature tells me.

Q Then, all you have is on the literature on that?

A Yes.

Q You know nothing a bout the accuracy of the test, do you?

A I have every confidence in the accuracy of it.

Q I am asking you of your own knowledge?

A I just know the literature with reference to the matter.

Q Do you know any plant in this western country to-day that is operating with a turbine at an eighty-five per cent efficiency?

A No, but there are many I am confident that are.

Q You think there are, I am asking you if you know of a single one; if you do, please tell us; please name it.

A I don't have any certain knowledge that to-day the plants or any plant in the state of Utah, of my own knowledge, is operating at eighty-five per cent efficiency or any other efficiency.

Q Do you know of a single one that is operated in the state of Utah that is to-day operating at eighty per cent?

A No, but I am confident there are many.

Q I am asking you if you know of one, and can name it?

A I am not at the plant to-day and have not tested them to-day.

Q Do you know of a single plant in the state of Utah that is operating at eighty per cent efficiency in the last year, where a head is used to above two hundred feet in height?

A I have not tested such, but am confident there are many.

Q That is the best answer?

A Yes, because I have not tested any within the last year.

Q Do you claim to know anything about the condition of the art of which we are speaking at the time this Provo plant was installed in 1902?

A The wheels?

Q Yes, condition of the art that existed at that time.

A My knowledge of the matter, of course, is confined to what the intention was, and I understood the installation of the wheels was made in 1909, and they were Allis-Chalmers turbines.

Q I am talking about the original installation. Do you know anything about it?

MR. A. C. HATCH: Just a moment. I want to understand this, that was up at the old Nunn's station?

MR. STORY: Yes, that was up at the Nunn's station.

MR. HATCH: That, if the court please, I don't see the relevancy of.

MR. STORY: It is relevant in this way. This witness has testified there has been no change in the practice in regard to turbine, and practically very little change in efficiency of turbines in the last fifteen or twenty years. Now, I want to test this witness's knowledge on which he based that statement, would like to know what he knows about the condition of the art in 1902, that is within the twenty ~~period~~ year period that he mentions.

MR. A. C. HATCH: What I was objecting to as to the relevancy, was when this installation was

first made in 1902. It is that part of it. We are testifying now to the plant at Olmsted, that is your claim and all the claim you make to water is at that plant.

MR. STORY: There is testimony we use water at the other plant, and it all goes to show the diligence we have used putting water to a beneficial use under our appropriation, but that is not the point I am getting at with this witness. I am testing his knowledge upon which he based his statement there has been no change in the art of constructing turbines practically for the last twenty years.

MR. A. C. HATCH: I didn't understand him to so testify.

THE COURT: Objection is overruled. He may answer.

(Question read)

A No, I don't know anything about it.

Q Do you know whether it was customary or whether--strike that out. Do you know whether turbines were generally in use in 1902 under heads of one hundred and twenty-eight feet?

A There were a great many in use, one hundred and twenty-eight feet.

12:00 NOON RECESS TO 1:15 P.M.

CALEB TANNER--

CROSS EXAMINATION by Mr. Story, continued.

A I desire, if the court please, to correct the computation that I made in answer to a question from Judge Hatch. I had carried an erroneous division factor in my mind and was using a sixty-five per cent efficiency instead of an eighty per cent efficiency. The computation is good for sixty-five per cent efficiency.

MR. A. C. HATCH: What question are you answering?

A The correct answer on an eighty per cent efficiency of the development of forty-five hundred and thirty-three kilowatts under a three hundred and thirty-three foot head is two hundred second feet, and for one hundred per cent efficiency, one hundred and sixty second feet. That is within the nearest second foot.

Q Mr. Tanner, you stated, I believe, that as the power factor dropped below the planned capacity of the plant the efficiency drops, decreases?

A Yes.

Q And for you say a thousand--drop of a thousand horse power, that the efficiency would probably decrease three per cent or thereabouts?

A That was my judgment; I think that would be the outside limit.

Q What is your judgment as to what would be the decrease in efficiency where a plant was operating between forty-five and fifty-five per cent of the planned capacity?

A To answer that so as to get at it better this way: the supply of water to the wheel is regulated by gates, and the gate opening regulates the supply, and ordinarily for a plant like that a standard speed is maintained. Now, my judgment is that from a two-thirds gate opening up to we will say three-quarters that you ought to have quite a high efficiency. If you fall down to a gate opening of one-third, my judgment is that the efficiency would fall off about three per cent.

Q I take it, then, that the loss of efficiency would increase more rapidly as the power factor was lowered.

A Yes, if you draw a curve, just assume for arguments's sake that the dotted line is the efficiency; as you overload the wheel, that is about the character of the efficiency curve; a certain maximum which is developed by stating the conditions best.

Q Getting down to the question I asked you about, the loss in efficiency increases more rapidly as the power factor is lowered, doesn't it?

A That is the way the curve shows, yes.

Q That is the way the curves show. Now, you say that depends upon the character of the gates and so forth, admitting water to the wheel, whether two-thirds open or one-third open?

A Yes.

Q Do you know anything about the gates in the Olmsted power plant?

A No.

Q You don't know whether that curve applies to them or not, do you?

A I am satisfied it does.

Q But do you know?

A No, I wouldn't know. It would be a curve something like that.

Q Now, then, get back to the other question I asked you and please give me a direct answer on it, what, in your opinion would be the loss in efficiency where a plant was operating at forty-five to fifty-five per cent of its installed capacity, or planned capacity?

A Well, neighborhood of three per cent falling off.

Q Per thousand?

A No, three per cent of the planned; that is forty per cent of what it is rated for, output of forty per cent of what it is rated for.

Q You are assuming in that computation, are you not, a plant operating, planned for forty-five hundred kilowatts output?

A Answering it, as I understood the question to be general and I was answering it as I understood generally.

Q You said a loss of one thousand, deduction in the power factor or load of one thousand kilowatts would be forty-five hundred, kilowatts planned would mean a loss of efficiency of about three per cent, didn't you?

A Yes, as I remember.

Q Now, what would be the loss in a plant operating at fifty per

cent of that installed capacity? Would that still be three per cent?

A About three per cent.

Q In other words, it doesn't make any difference whether fifty per cent of the installed capacity is used or three thousand, the loss of efficiency would be the same, would it?

A When I said about three per cent, it might fall off about three per cent, now to be as specific as I can, the curve above forty per cent is not a steep curve, it is relatively flat and the depression of power output down to forty per cent of the capacity is not a very great depression. Now, it may run as high as four per cent, but I wouldn't say that it would exceed, operating forty per cent of capacity, four per cent, and I think I gave the quantities when I said about three excessive in the other answer.

Q Do you know, or are you talking now from experience, or are you talking---are you now speaking from experience, or purely theoretical sides?

A From both sides.

Q Where have you made any tests of loss of efficiency in plants of this character?

A I have made tests of what the curve output was, and as I say, when you are operating under half a load, in my judgment the depression, in my experience, depression has been very material. I have tested an installation two or three years ago.

Q What installation was that?

A Over here at the Utah Lake pumping station.

Q I am not talking about a pumping station. I am talking about a generating station.

A Well, a pump in its hydraulic element is practically identical.

Q You mean to say that a hydraulic pump is in fact the same as a turbine?

A Well, the same principles of flow and same character of curve developed for both.

Q Nevertheless, have you ever made any tests to determine that fact yourself?

A Yes, I have made tests but that has been some years ago.

Q Where did you make them?

A Down in Massachusetts.

Q What plants were they?

A They were plants located at Fall River.

Q That is when you were at Harvard?

A Yes.

Q How long were you at Harvard?

A Four years and a half.

Q How long were you taking this course?

A This course was only one period.

Q Did you make any tests of high head turbine plants there?

A No, they were all relatively low.

Q Now, you said, however, that in your opinion, a plant that had an installed capacity of forty-five hundred kilowatts and loss-- a reduction in the power output of one thousand kilowatts would mean a loss in efficiency of approximately three per cent.

A That is what I said, I think I was a little high in giving that.

Q Now then, if a thousand would--loss of reduction of a thousand kilowatts would produce a loss of efficiency of three per cent what would the reduction in the power output of two thousand kilowatts cause?

A Answer about three or four per cent.

Q Did you not testify that as the loss increased that the rate of efficiency--rate of loss of efficiency increased?

A Yes, that is true.

Q Then, why do you say the loss of one thousand in power output would mean three per cent, and yet a loss of two thousand would only mean between three and four per cent?

A I have already said I gave three, I am satisfied distinctly high. I wish to correct that and put it nearer two.

Q What has caused you to correct your testimony, Mr. Tanner?

A I said about one thousand kilowatts output.

Q What information have you had since you gave that first testimoney to cause you to change your testimony in regard to the loss of efficiency?

A Thinking of it. The question came without my having a chance to think it over carefully and the same reasons led to my modification of that as led to my modification of my calculation.

Q What would be the loss, comparative loss of efficiency if you took off another thousand of the power output?

A Take off three thousand?

Q Yes.

A In all probability when you get below one thousand the curve steepens very rapidly, more rapidly than it does above. Operating at half the capacity probably fall off, that other thousand would cause a falling off equal, equivalent to falling off in the other two thousand. That would be about eight per cent.

Q You mean--

A Eight or nine per cent.

Q Do you mean to say the falling off of the second thousand would be just about the same as the falling off of the first thousand?

A No.

Q What do you mean in that connection? You said the loss of one would be little more than two and that the loss of two thousand would be little more or about four; do you mean the second one would cause a less loss of efficiency than the first?

A No.

Q What do you mean by that, please explain.

A The first thousand, as I modified my statement, would be between two and three per cent, the second I raised it up to four per cent, and the third I raised it up to eight per cent.

Q Mr. Tanner, were you familiar with the turbines and their use in 1909, and '08?

A Yes. I kept familiar with the literature in a general way.

Q Had your reading taken you into the realms of plants which had been installed under high head where turbines were used?

A Yes.

Q And you were pretty familiar with the condition of the art at that time, were you?

A No, just fairly familiar.

Q Do you know whether or not at the time that the Olmsted plant, the present Olmstead plant, was installed in the year 1908 or '09, whether or not that was an unusually high head for the use of turbines?

A Yes, it is a high head to-day.

Q Wasn't that a pioneer plant for installation of that kind,- that high head?

A Not in 1909.

Q It was originally installed, of course, first part in 1904, that was a pioneer plant for a head of that height, was it not?

A I rather think it was one of the earlier plants.

Q Do you know of any other plant that as operated under that head at that time, or a head commensurate with that?

A I am satisfied there was, but I cannot call any to mind now.

Q You don't know of any, do you?

A No, I cannot say I do.

Q Do you know of any other plant where a turbine was used which was operating under a head of three hundred and thirty-two feet, effective head, in 1908?

A No, only I know there were a number of them. I cannot call them off.

Q Name one of them, can you?

A I cannot do that.

REDIRECT EXAMINATION by Mr. A. C. Hatch.

Q The gates to which you refer as admitting water to the wheels, are attached to the casing surrounding the wheel, are they not?

A Yes, that is generally the situation.

Q And constituting a part of the one piece of which the wheel is the center?

A Yes, it is attached to the--connected with the mechanism that reaches up into the power house.

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OWEN H. GRAY, being called by the plaintiff, having been first duly sworn, testifies as follows:

DIRECT EXAMINATION by Mr. A. C. Hatch.

Q Mr. Gray, state your full name to the reporter.

A Owen H. Gray.

Q Where do you reside?

A Salt Lake City?

Q What is your occupation or business?

A Consulting engineer and contractor.

Q Where did you study engineering?

A At the Massachussetts Institute of Technology in Boston.

Q Are you a graduate of that institution?

A I am.

Q When did you graduate?

A 1897.

Q Have you been practicing engineering since that time?

A Almost continuously.

Q What kind of engineering?

A Hydraulic and electric, principally.

Q Where have you practiced?

A Almost altogether in Utah and Idaho, for the last fifteen years.

Q Have you been connected with or have you installed any electrical

plants, power plants?

A Yes.

Q Where?

A Well, a little plant in Springville, Hobble Creek canyon.

Q What is the capacity of that plant?

A That was only -I think that was a hundred kilowatts.

Q And where else?

A Where is it?

Q Where else have you---

A Oh, the plant tha t is now known as the Wheelon plant on the Bear river, now part of the Utah Power & Light Company's system.

Q When was that established?

A When was it?

Q Yes.

A That was about twelve years ago, I take it.

Q What is the--

A I was not the engineer, pardon me; I just want to say I was not the engineer originally except in an association with Mr. R. F. Hayward, and afterwards, after he left the employ of the company, I was retained to enlarge the plant.

Q And you did supervise the enlarging of the plant?

A Yes, and I had most of the work to do with the original designing and construction of it also.

Q What is the capacity of that plant?

A I don't remember exactly, but I think it is in the neighborhood of-3--original installation, I think, was in the neighborhood of three thousand horse power. In that neighborhood, I don't remember the exact size of the units.

Q What was the fall of the water?

A One hundred and fourteen feet between the head and tail water.

Q Have you installed any other plants?

A Yes, quite a number.

Q Just state where they are.

A Well, I had charge of the enlargement of the American Fork plant of the Utah--what was at that time the Utah County Light & Power Company.

Q That is at the mouth of the American Fork canyon?

A That is at the mouth of American Fork canyon; that is the older of the two plants that are now there. I had charge of enlarging that for the Utah County Company.

Q When was that?

A That is about ten years ago, I should judge, at least that long. Then there were two plants in Mill Creek that are now connected with the Utah Power & Light Company's system, which I had entire charge of the designing and construction of. Then there is a three thousand kilowatt plant on the Thousand Springs near the Snake river in Idaho. I had entire charge of the design and construction of that plant. That is all I think of right this moment.

Q When was that constructed?

A This last one I mentioned?

Q Yes.

A I think that was about three or four years ago.

Q And when was the first plant constructed by you, the Springville plant, about when?

A About fourteen years ago.

Q Have you knowledge of the efficiency of turbine wheels in their use in the development of power?

A I have from the standpoint of the purchaser in relation to the manufacturer. Yes, I might say I have.

Q You have practical--have youmade practical tests of the efficiency of those wheels?

A Why, yes, I have.

Q Now, what is the efficiency of the standard turbine water wheel in good condition under different conditions as to load and as to the fall of water upon them?

A Well, I can only answer that by saying what the manufacturers

are willing to guarantee. That is to say--

Q Can't you state from your own examinations, and installations, as to whether or not the efficiency was actually shown in the use of the wheels?

A Yes, I made some tests, but of course it is well known among engineers and power companies that an accurate reliable test on which you could testify in court for example, is a very difficult thing to take, but I have made such tests as is possible to make under practical working conditions, and I have found efficiencies in that way.

Q Now, what is the efficiency of a turbine wheel under different conditions of load?

A Well, they vary, some manufacturers are ready to guarantee--

MR. STORY: Object to that, Your Honor.

A Ranging from seventy-eight per cent up to---

MR. STORY: Just a moment. Let me object to that testimony, what they guarantee on the ground it is irrelevant, immaterial and incompetent.

MR. A. C. BATCH: It may go out.

Q Mr. Gray, just testify as to what you know, of the efficiency either from your technical training in the schools or from actual experience in testing of the efficiency of the wheels.

A Not having tested any of the latest models of machines, I cannot testify just what the best turbine, such as one I would buy, would do at present.

Q Such as those you have bought and installed, can you testify as to them?

A Well, it is my belief, based on my experience, with water power plants--if that is a satisfactory way to put it--that efficiencies range from about seventy-eight per cent up to eighty-two or three per cent. That is from half load up to full load and beyond.

Q And if it is below half load, what difference in efficiency would

there be?

A Below half load the efficiency drops off pretty rapidly.

Q About what per cent would it be at, say, a one fourth load what percent loss of efficiency?

A Possibly, of course, depends on just what--did you ask me turbine wheels?

Q Yes, standard.

A Or impulse wheels?

Q Sir?

A I wondered what it was you were asking.

Q Standard turbine wheels.

A Well, I don't remember just what would be as low as one-quarter load. My recollection is somewhere around sixty-five or seventy per cent.

Q Would be the efficiency?

A Yes.

Q At a one quarter load?

A I am much more sure of my statement of it above that amount of load, however, because it is seldom of very much interest of what it is at such an extremely small fraction of the total load.

Q Now, what is the maximum loss of efficiency, would you say, on the increase above the load for which the plant is installed?

MR. STORY: I object, Your Honor, on the ground that it is an improper question.

A About eighty per cent, that is to say that its highest efficiency ought to go considerably above eighty per cent, and would be above eighty per cent all the way from three-quarter load to twenty-five per cent overload.

Q You spoke of some other kind of wheel than turbine wheel; what kind of wheel was that?

A I referred to impulse wheel, the bucket on the rim of the wheel, stream coming through a nozzle, form of a jet.

MR. STORY: Move to strike the testimony of the witness because he is testifying about an entirely different wheel from the evidence shown in this case.

THE COURT: I don't so understand.

MR. STORY: He is talking about an impulse wheel.

MR. A. C. HATCH: Oh, no, the testimony has all been about the turbine wheel, but he mentioned some other kind of a wheel.

MR. STORY: I misunderstood him, then.

Q Have you ever visited what is known as the Olmsted plant at the mouth of Provo canyon?

A Yes.

Q Have you made an examination of the installation there?

A No, I have not, Ihave visited it only as an excursionist going by.

Q You made no examination whatever ?

A None whatever.

Q Would there be any differ nce in the efficiency of a wheel under what is called a very high head and what is called a low head, that is a turbine wheel?

A At present they are developing very high efficiency in high head turbines, but that is comparatively recent.

Q About how recent?

A Well, in the last six or eight years.

Q And has the efficiency been increased?

A Very much.

Q And what would be the efficiency of the present day wheel?

A What I was telling you before applies to the present day wheel.

Q As to the wheel, say in 1902, or 1908, rather?

A I cannot tell you just what would be the average efficiency of wheels of that particular date, but I would say about

eight or ten years ago when they began making marked improvements in the high head turbines. Prior to that time it was only the low head turbines that were high in efficiency.

Q About ten years ago?

MR. STORY: He didn't say that.

MR. A. C. HATCH: Eight or ten years.

MR. STORY: Six or eight.

MR. A. C. HATCH: What was the testimony?

(Answer read)

Q I now hand you plaintiff's Exhibit 235, daily station log of the Utah Power & Light Company, and ask you to say what the efficiency of the wheel ought to be under the conditions as shown by that exhibit as to load? You will note there is some variation as to the load as shown by the exhibit, and what the efficiency or variation in efficiency, if there would be any?

A I notice here it says, "load factor 96.5." Now, if that means--that, I suppose means the ratio of the maximum to the average load of the entire plant. Now, if the units of the plant bear such a relation to the total load that they should bear, why that must mean that they are operating very nearly full load. Such of them as are operating should be operating very nearly full load. No reason why they should not. If so, I should think they would expect to get the efficiencies I have mentioned.

Q And they should get, should they not, the efficiencies you have mentioned with proper wheels?

MR. STORY: I object to the testimony as incompetent.

THE COURT: Objection is overruled.

MR. STORY: Save an exception.

A Yes, they should.

Q You have examined the sheet and seen the different data shown thereon, have you?

A I beg pardon?

Q You examined the sheet and saw the different data shown thereon?

A It might take some time to know just what that all meant. Great many figures onhere. I have just mentioned that one thing I noticed there. That would seem to indicate that the machines are operating, or should be operating somewhere nearly full load. That is to say if the plant is running at a very steady load, if the machines are running at one-half capacity and low efficiency, they could cut out half of them and run the rest at high efficiency, so that there is another reason for their steady load conditions, and not much fluctuation here. I see no reason why they should not operate at a-- at or near full load, in which case they would be operating under the best conditions for high efficiency.

Q And I show you now plaintiff's Exhibit 135 and ask youwhether or not under the conditions shown on that exhibit---

A What I just said with regard to the other one applies equally to this. This says ninety-six per cent load factor, I haven't gone beyond that. I don't know what else this may say.

Q Well, examine it, if there is anything else upon it there that would give you information upon which you could base the determination of the efficiency of the wheel, you may state it.

A I see a great mass of figures and abbreviations. I wouldn't pretend to give any general statement about what that sheet says without spending sometime examining it.

Q Running at fifty per cent of the load, what did you say, or what would you say would be the loss in efficiency of the wheel?

A I should think they ought to get seventy-eight per cent or better.

Q And you stated that running twenty-five per cent overload, the loss would be what?

A Well---

Q If anything, loss in efficiency, I mean.

A Probably they should be able to run from three-quarter load on a generator to twenty-five per cent overload on a generator with better than seventy-eight per cent efficiency on the

water wheel.That is to say it should rise considerably above that; at the gate opening on the turbine corresponding to full load of the generator.

Q I will ask you if you have any knowledge as to the effect upon a wheel as to decreasing its efficiency by the use of water carrying sediment, such as our streams, Utah streams, do in the spring of the year?

A Why, little or none, excepting as it causes wear in the machinery.

Q And if wear is caused, is there any way to overcome or remedy?

A Only by replacing.

Q Sir?

A By replacing worn parts.

Q Are the wheels so constructed that the several parts may be replaced as they become worn?

A Usually, yes.

Q And are they not constructed so that they may be tightened up, as they wear?

A I don't know of any that a re constructed that way.

Q Can you say how long a wheel ought to be run, that is economically to the user before it should be replaced with a new wheel?

A Might vary from one to ten years, one to fifteen years.

Q Well, in the ordinary Utah streams, your experience has been largely in Utah, has it not,Utah mountain streams?

A The efficiency would begin to fall off, probably four or five years, if there was much sediment in the water,

Q And about what would be the time, what time would yousay should it be replaced with a new wheel?

A It is too variable a time for me to give a specific answer.

Q Can you give us a maximum as being the life of the usefulness of a wheel, economically?

A I would not expect one to---I can give a specific illustration, if that would do any good.

Q Do that.

A The turbines in the Bear river plant, which I testified having

installed were very badly cut to pieces and had to be renewed about eight years after they were installed.

Q And what occasioned that cutting?

A I only know from hearsay. There was considerable sand and gravel carried down the flume.

Q Now, is there a mode by which this carrying of the sand and gravel through the wheels may be avoided?

A Is there a way?

Q Yes.

A There usually is a way to get rid of most of it. I think undoubtedly there would have been a way in this case I mention.

Q You may state what it is.

MR. STORY: I object to it, Your Honor, unless it is a method available here.

MR. A. C. HATCH: Until we know what it is we could not say whether it would be available here or not. Of course, I could give my version and all that.

THE COURT: The objection will be overruled; unless it is shown it is available here the court will not consider it, but if it should be shown it may be a matter to be considered. You may answer, Mr. Gray.

Q Did you hear the question?

A No, I did not.

Q Read the question to him. The question is as to the method of preventing the sand and gravel from flowing through the wheel.

A In the particular case I had in mind I think the gravel that was causing most of the trouble could undoubtedly have been trapped by putting in a settling basin immediately above the point of intake of the pipe line, so as to bring the water pretty near to rest before it passed into the flume.

Q I will ask you whether or not sand box or settling basin could not be installed along any flume or pipe line?

A If the material were very fine, probably might be prohibitive to building a large enough settling plant to get rid of it. There might not be room enough in the canyon but the case I mentioned the trouble was principally caused by large particles which could have been settled out very easily.

CROSS EXAMINATION by Mr. Story.

Q Erosion increases in proportion to the head you are operating under, does it not?

A I don't hear you.

Q Erosion from sediment increases in proportion to the head under which you are operating, does it not?

A Yes.

Q In other words, velocity of the water?

A Would increase as the head increased.

Q And the life of the plant depends upon these variable conditions, doesn't it?

A Certainly does.

Q So you could not give an estimate what would be the fair life of a particular plant unless you know the particular conditions under which that plant is operating?

MR. A. C. HATCH: We object to the question. Counsel includes the whole of the plant. We are only asking this witness as to water wheels and it is all right for this court, but the question itself may be confusing and misleading.

MR. STORY: I refer only to water wheels, for that is all we have been talking about.

MR. A. C. HATCH: I know, but it is just as easy to say "wheel" as it is "plant".

MR. STORY: Please substitute the word "wheel" for "plant" and read the question.

(Question read).

A Am I to answer that?

THE COURT: Yes.

A I could not.

Q When you say it varies, life of a plant varies from ten to fifteen years, you mean it varies according to the conditions under which the---all right, I will strike it out. When you say the life of a wheel varies from ten to fifteen years, you mean it varies according to the conditions under which that wheel is operated, do you?

A Yes.

Q Where does the wear on a wheel begin first, as a rule?

A Beg pardon?

Q Where does the wear on a wheel begin first?

A Usually on the runners, or around the--between the runner and case.

Q Is it not a fact that the first wear on a wheel causes a greater proportionate loss of efficiency than the wear after a later period, at a later period?

A I don't think I can answer that.

Q Have you ever made any tests to determine?

A No, not to determine that particular point. In other words, it would require a test once a month for the whole life of the wheel to be able to make any general statements in regard to that.

Q To make any statement as to the relative loss in efficiency by the first or the later wear?

A Yes.

Q And you don't know what that is?

A No, not so that I could say positive.

Q You say that the efficiency begins to fall off in four or five years, is that always true?

A No.

Q What do you mean by your answer then?

A I mean if the conditions were perfect, that is water perfectly free from sediment, perfectly clear, machine kept in perfect

alignment, inspected frequently, and kept oiled, probably wouldn't be any wear at all for ten years.

Q In other words, you are speaking of operations under ideal conditions, were you?

A No.

Q Or substantially ideal conditions?

A No, I simply attempted to give a rough average.

Q As a matter of fact the loss of efficiency may under operating conditions begin very much earlier, may they not?

A I merely meant in about five years there would be a noticeable loss in efficiency. It would theoretically, of course, begin immediately and continue gradually up until final dissolution.

Q And the delay in loss in efficiency, or the loss in efficiency, postponed loss in efficiency, dependent upon conditions under which the wheel is operating, isn't it?

A Most assuredly it would be.

Q And if you are operating under conditions where there is more or less sediment in the water, the loss of efficiency will commence immediately, and will increase more rapidly than it would if you were operating under some ideal conditions, would you not?

A Turbine would wear out more rapidly operating under improper conditions than it would under proper ones, of course.

Q You say that replacement obviates the loss of efficiency?

A Certainly, replace everything.

Q If you can replace it all, but in operating practically there is always a loss of efficiency because the parts are not replaced, so as to keep them up to hundred per cent efficiency, isn't there?

A No, but the parts were renewed every once a year, for example, why you would have almost full efficiency all the time.

Q Do you know any plant where they renew their parts every year?

A No, it is usually cheaper to let it go on running down.

Q To what point?

A At what point, it would depend entirely upon the value of

power and relative values of power and water. If both were--if the water was very scarce and power very expensive, very high, it might actually pay to renew the machinery every year. Certainly would pay to renew it frequently.

Q But you don't know any operating plants in your experience where that is done, do you?

A No, that would be unusual.

Q Do you know of any operating plant where it is replaced every two years?

A No, I don't.

Q Or every three years?

A No, I don't know that.

Q In other words, the operating practice is to replace them when, from the standpoint of efficiency, and all things considered, all demands considered, it is found reasonably necessary to do so.

A Usually replaced when it is very noticeably less in efficiency.

Q And in the end, the plant itself wears out and have to be renewed, the plant or the wheel itself?

A I didn't understand.

Q I say, in the end the wheel itself wears out, and have to replace the wheel?

A Exactly.

Q What did you say was the general average number of years which it is the practice to renew wheels of this character?

A I cannot answer that question definitely any more than I could some of the others. All depends on conditions.

Q In your operating experience, or from your observation you wouldn't say that plants of this character are renewed more than once in ten to fifteen years, would you?

A No I think that would be about what is usual, ten, eight or ten, may be some cases.

Q Now, you spoke of operating efficiencies of turbines being from seventy-eight to eighty-two per cent, did you refer to present

day practice?

A Yes.

Q You refer, speaking of those efficiencies, to wheels which are manufactured at the present time, do you not?

A Have been manufactured in the last few years, yes, recently.

Q So, that when you spoke of a--what a plant--what efficiency there should have been on a plant operating under the conditions shown in Exhibits 235 and 236, you had reference to wheels, turbines, such as might be manufactured under present day process, didn't you?

A Yes.

Q You didn't have any reference to the efficiency which you would expect of a wheel manufactured ten years ago, did you?

A I would say ten years came within that period, eight or ten years, I wouldn't go back twenty years. I could not say just exactly when the machines began to be efficient. I don't happen to remember, I suppose it would be a matter that could be determined, but I don't have it in memory, exactly.

Q You say, however, that there has been a very marked increase in efficiency of wheels during the last eight or ten years, do you not?

A Yes.

Q In other words, they are making the wheels of very much greater efficiency to-day than they were four years ago as a matter of fact, aren't they?

A No, I don't know about that; I hardly would say that, four years ago.

Q Aren't they making more efficient wheels to-day than they did six years ago?

A Probably on an average they would be.

Q Aren't they making more efficient wheels to-day than they did eight years ago?

A That is undoubtedly true.

Q Did this marked increase in efficiency come in one fell swoop

instead of a graudal thing?

A No, it was gradual, first one manufacturer then another would make a more efficient wheel, but--

Q So that the wheels of eight years ago were not as efficient as the wheels of to-day are they?

A No, that is true.

Q By a good deal, were they?

A I would say that a considerable increase in that time.

Q Would you not say there was at least net ten per cent increase in actual efficiency?

A No, I wouldn't say that much.

Q What would you say was the difference?

A I would think during that time probably five or six per cent, I should think probably that time. If you go back longer than five years, why there was much greater increase than that.

Q If you go back another year or two years, is there not a great increase?

A Trouble is I cannot place the exact date. I just know in a general way that there has been this marked increase in efficiency.

Q Do you know that the operation of turbines under a comparatively high head, such as three hundred and thirty odd feet was rather a rare thing in 1908?

A At how high a head?

Q Three hundred and thirty feet?

A Yes, it was.

Q And practically all of the experience in the construction of turbines operating under that head has been since that day, has it not?

A Since 1908?

Q Yes.

A Just about coming on then.

Q They were just commencing to get into those heads?

A Yes.

Q And there has been a great deal learned in the art since that time, hasn't there?

A Yes, undoubtedly.

Q And the efficiencies have been very rapidly increased from what it was when they commenced to operate under those heads, has it not?

A That is true.

Q So, if the plant in question in which that chart was taken, referring now to Exhibit 235, or 236, were manufactured in 1908, you would not expect to find an eighty per cent efficiency on those, would you?

A Be rather an accident.

Q Be rather an accident, even if they were operating under--- without loss of efficiency due to wear, wouldn't it?

MR. A. C. HATCH: Just a minute; pardon me. I understand your witness testified those wheels were guaranteed and they they really had eighty per cent efficiency.

MR. STORY: My dear man, you are speaking of Brundige, he testified that the wheel at Grace, which was the newest and latest up-to-date wheel to-day, under ideal conditions produced about little over eighty per cent efficiency.

THE WITNESS: Pardon me, I didn't say they would not go above that. I said they go far above that. I said it ought not to fall below that.

Q You are speaking of present--

A Present day wheels.

Q My question to you was about a wheel which was manufactured in 1908 and which had an ordinary efficiency of wheels at that time. You said, as I understood you, you would not expect anything like an eighty per cent efficiency on that.

A No, I said that, but I said all along I could not fix the date exactly, whether it was 1908 or '05 or '06 or '07, along in

there. I don't know just when it would--

Q You testified also, did you not, this great improvement in efficiency did not come all of a sudden?

A Yes, I did.

Q Now, assuming that the wheel manufactured in 1908 had been in operation some five or six or seven years, would you expect to find a wheel of that kind in ordinary operation keeping up an efficiency of eighty per cent, or even seventy per cent?

A Not for fifteen years, no, certainly not.

Q Would you, even seventy per cent?

A Would I what?

Q Even seventy per cent, would you expect to find it operating seventy per cent?

A I would not attempt to say anything about the efficiency of a wheel that old and it had not been renewed, it had not had a new runner or anything.

Q Assuming the ordinary replacements had been made, such as are ordinarily made in common practice, plants of this character, would you expect it--

A I would think a wheel gotten down to such low efficiency as that ought to have something done to it. I wouldn't know what, but ought to have something done to it.

Q As a matter of fact, I am speaking of what your experience has been, but the point I am getting at, Mr. Gray, is whether or not, in your experience plants which were constructed about that time, high heads, have ordinarily in common practice suffered a loss in efficiency through such operations.

A There has been only a very few high head turbine plants in this part of the country.

Q How many have you been acquainted with?

A What?

Q How many have you been acquainted with?

A Well, I have five or six.

Q What ones are they?

A One of them pioneer plant at Ogden. Did you ask for high head

plants, or high head turbines?

Q I added, turbines. I am not speaking of over-shot wheels.

A I have known in a general way what has been going on in all these plants around here.

Q I am speaking of your personal experience, what high head turbine plants have you personally had experience with?

A Thousand Springs.

Q What is the head there?

A That is a hundred and eighty-five feet, nearly two hundred feet.

Q What capacity?

A Three thousand kilowatts.

Q Who is the owner of that plant?

A Well, group of Salt Lake men, including Lafayette Hanchett, W. W. Armstrong.

Q I don't care to go into this generally. What other plant?

A Who runs it?

Q What is the efficiency of that plant, average efficiency?

A I made a test on it which showed an efficiency of very close to eighty per cent.

Q When was it installed?

A About four years ago.

Q You made your test when, with reference to the installation?

A Almost immediately.

Q Before there was any loss due to the causes which you have mentioned?

A Represented practically new construction.

Q So that is supposed to be an up-to-date and ideal plant that time?

A Was it supposed to be?

Q Yes.

A Capacity of the wheel that time.

Q That was its capacity as a new plant, was it?

A Yes.

Q What other plant, high head turbine plants, have you had to do

with?

A Well, Bear River.

Q That is the Wheelon plant?

A That is the Wheelon plant.

Q How long were you there?

A I don't know you would call that a high head, however. I had something to do with that off and on from the time we first made the survey, plant was first thought of, until the Utah Power & Light Company took hold of it.

Q Over a period of seven years?

A My connection with it was very slight toward the end, however.

Q Did you make any tests to determine efficiencies?

A I made tests on it.

Q To determine the efficiency of the plant?

A I could not make any real efficiency tests on that plant.

Q Why not?

A Because no way of measuring the water that was accurate.

Q Do you know what the efficiency of the plant--have you any way of knowing or telling what the efficiency of that plant was as it was operated?

A I said there was no way of making an accurate test on that plant.

Q Then, you don't know what the operating efficiency of that plant is?

A No.

Q Nor was when you were there?

A It was what?

Q You don't know what it was when you were there?

A No, nor anybody else unless--that is, didn't know what it was in an early day.

Q What other plants have you had to do with where you determined efficiency of the wheels?

A Most of the other plants I have been connected with used impulse wheels and not turbines.

Q You say most of them, what others did you---

A All that I can name right at this moment, then.

Q Then, the only one you can name on which you made an efficiency test was the Armstrong & Hanchett plant?

A Exactly.

Q Which you tested immediately after construction?

A Yes.

Q Can you tell me any other plant, high turbine plant, high head, you ever tested?

A Not that I have made tests on personally. Of course, I have talked to a great many engineers who have been working on that, but personal experience, I cannot give any others.

Q So you have never made any tests on any plant, operating plant, sometime after construction from which you, youself, would learn what the loss in efficiency had been through operation, have you?

A I think this is the only other, I think there is no other high head plant in the state, as a matter of fact, using turbines for any length of time.

Q No other high head using turbines, no other company using turbines under high head, did you say?

A I said around here, I could not say with the exception of the Pioneer plant I mentioned and this plant here in Provo canyon, I don't know of any other ones around that were operating with those high head turbines.

Q When you speak of high head, what height do you refer to?

A Three hundred feet or more.

Q Well, what plants have you tested for loss in efficiency consequence of operation?

A Beg pardon?

Q What plants have you tested for loss of efficiency operating under a head of even two hundred feet?

A You mean make a test steadily over a long period of time, I haven't done it at all.

Q For a short time?

A I mentioned.

Q Just that one?

A Yes. I meant to make that very specific. That is the only high head turbine plant I have had anything to do with directly.

Q Have you had anything to do with any turbine plant operating under a head of two hundred feet?

A The Bear river I told you operated under one hundred and fourteen feet head, but it was not practical to make a careful efficiency test, Before I give any wrong impression, I want to say this, that we always made all the tests we could make, but it is almost--it is very difficult and very expensive to make a complete careful efficiency test, especially to make it over a long period of time in most of these plants.

Q Have you ever made a test of efficiency of any turbine wheel operating under a head of more than one hundred feet except the one instance you mention?

A No, that is all.

Q Then, you cannot tellus of your own knowledge as to what is the general operating efficiency of plants as they are operated throughout this western country, can you?

A If you mean actually had experience, one after another, different plants and collected it, no, I cannot.

Q I didn't mean that, that would be an unfair question to you, and I don't mean to be unfair. I mean, have you any general knowledge about the average efficiency of plants of this character, as they are operated throughout this western country?

A Only as a matter of hearsay.

MR. A. C. HATCH: Just a moment, we object, if the court please, to the question, as not being cross examination.

THE COURT: I understand he says he has not such a knowledge. I think it is proper cross ex-

amination.

MR. A. C. HATCH: Efficiency of plants, we don't know anything about.

THE COURT: I think to avoid any misunderstanding from the record made, Mr. Story may be understood as referring entirely to the parts of the plant that you examined about.

MR. STORY: Yes, purely and simply, absolutely.

THE COURT: Because it seems it is difficult for him to refer to it as wheels, and I understand all the time that he means that part of the plant that you examined about, which was limited to the wheels and appliances for putting the water on the wheels.

Q Are you generally familiar with the operating practice in this western country of plants, I now refer to turbine wheels in such plants of this character?

A Why, yes, I think so.

Q Do you know from reading or from general investigation on the subject as to what is the general average efficiency of plants of this character that are operated in this western country?

A I have not made that particular phase of engineering a speciality. I have made a speciality of hydro-electric work, and that is usually--after the plant goes into operation I lose sight of it and only know of it in a general way from what I hear from the operators.

Q In other words, you know what you would expect in the way of efficiency of a new plant installed to-day?

A Yes, and know about how often they put in new parts.

Q Have you made any investigation at all as to the general efficiency of plants of this character throughout this western country under operating conditions?

A No.

Q You would be very much surprised to find they operated at eighty per cent efficiency, wouldn't you? That is, taking all the plants in the country as a whole?

MR. A. C. HATCH: Now, there is the question comes in again.

A There is a lot of old plants that had not been renewed.

MR. A. C. HATCH: Just a moment, if the court please, it is going clear outside of the record, and I don't like the manner in which he asked the question. He is covering something we have not touched at all, and putting it into the record where the Supreme Court, if the case shall possibly go to it, will be misled.

THE COURT: You may confine yourself to the wheels, then.

MR. STORY: I thought I had confined it to wheels, stated exactly that was what I meant.

MR. A. C. HATCH: Very easy matter to say "wheel" instead of "plants".

MR. STORY: As a matter of fact, your other witnesses have been talking about efficiency, you were talking about plant efficiency and not about wheel efficiency.

MR. A. C. HATCH: No, we were not; we were talking about wheel efficiency, pardon me.

MR. STORY: Pardon me. I just like to ask Mr. Tanner some questions then, if I may on that very point. May I cross examine him a moment?

MR. A. C. HATCH: Yes.

CALEB TANNER, recalled.

CROSS EXAMINATION by Mr. Story.

Q Mr. Tanner, when you spoke about the amount of water which it would be necessary to produce a certain amount of power at a certain efficiency, say eighty per cent, you referred to the efficiency of the water wheel alone, did you?

A No, that involves not only the efficiency of the water wheel, but the efficiency of the generator.

Q In other words, if involved the efficiency of the units as a whole, did it not?

A Yes, as to the point of output from the generator.

Q Point of output?

A From the generator.

Q And that necessarily included the efficiency of the water wheel and efficiency of the generator, did it not?

A Yes.

MR. A. C. HATCH: Then, I will withdraw my objection.

THE WITNESS: No, I would like to explain that only covered that one particular point. Good many of the answers with reference to your cross examination was confined to the wheel.

Q I grant you that, but am speaking about the amount.

A That one calculation was based upon that. My answers to your inquiry was answers directed exclusively to the wheel.

OWEN H. GRAY, recalled.

CROSS EXAMINATION by Mr. Story, continued.

Q So you cannot give us any information as to what is the general experience in plants of this character, referring particularly to the wheels or the turbine wheels in such plants with reference to efficiency, can you?

A Only ones I can tell you about, is the result of personal experience is the Bear river plant, Wheelon plant and Thousand Springs plant.

Q Do you know anything about the average efficiency of generators?

A Life of generators?

Q Yes.

A Yes.

Q What is it?

A Depends on the size of them. Give me some idea of the size, I should say--

Q On a thirty-six hundred kilowatt,

A Thirty-six hundred?

Q Thirty-six hundred horse power.

A Ranging from ninety-three to ninety-four or five per cent, that is my recollection; I cannot tell you just exactly.

Q Then, if you have a wheel which has an eighty per cent efficiency and generator which has ninety-five per cent efficiency, what efficiency do you get in your plant, as a whole?

A Multiply the two together, eight tenths times ninety-five.

Q That would be about seventy-six to your plant, wouldn't it?

A Something like that.

REDIRECT EXAMINATION by Mr. A. C. Hatch.

Q You said if a wheel didn't show eighty per cent efficiency, that there was something wrong with it, ought to be something done with it, you didn't know what.

MR. STORY: I didn't think the witness gave---

A Yes, with the present stage of the art manufacturing water wheels, I think something ought to be done, if you don't get a high efficiency under somewhere near full load.

Q Now, what is the highest efficiency of the wheels, present day wheels?

A The highest they ever reached, you mean?

Q Yes.

A Well, they claim as high as eighty-eight per cent.

MR. STORY: I object to it, Your Honor, on the ground that is incompetent, irrelevant, and move

to strike out the answer. The witness says they claim as high as eighty-eight per cent.

THE COURT: I think that should go out.

MR. A. C. HATCH: If the court please, as to that, the witness in testifying here in cross examination, has testified and answered Mr. Story as to what the general improvement in wheels has been. That is all hearsay, practically.

THE COURT: I didn't so understand it, I understood that was from his knowledge.

MR. A. C. HATCH: Then, I will withdraw that question.

THE COURT: There is no objection sustained to your question. The answer was stricken out, it is not responsive to your question, and is incompetent

Q What personal knowledge, have you, if any, as to the increased efficiency in wheels manufactured since on or about 1907 from the efficiency of those manufactured prior to that time?

A All I can say is, there are more people, more manufacturers making high efficiency wheels now than there were then or prior to that time. There has been a gradual--there has been a rapid improvement since last eight or ten years.

Q Were there any manufacturers who were making these high efficiency wheels prior to 1907?

A I don't know, I cannot give as to efficiency for exact times.

Q What do you mean by saying that there are more manufacturers now making the high efficiency wheels than there were prior to 1908?

A I mean about along about that time they were just beginning to use turbines for high heads, Prior to that time been using a different type of wheel.

Q Has there been any change in the form of the turbines manufactured since 1908?

A Yes.

Q What has been the change?

A The general design is very much the same, but the changes in--they are making changes all the time using higher velocities approaching the runners, for instance.

Q Now, do you have knowledge of the efficiency of the wheels manufactured prior to 1908, turbines?

A Yes. Low head turbines, you mean?

Q Any turbines that were manufactured?

A They have been getting up to eighty per cent efficiency. That was about--it used to be a struggle to get them up to eighty per cent, seemed to expect to get them to that point, but was rather a struggle to do it. Matter of twelve or fifteen years ago it was hard to get that efficiency at that time. Since that time it has been gradually easier and easier, a nd the heads for which they built turbines have been gradually higher and higher, so that now it is possible to get turbines for heads up three hundred feet or more, and get guarantees of efficiencies better than eighty per cent. That is about all I can say covering that point.

RECROSS EXAMINATION by Mr. Story.

Q Mr. Gray, I want to ask you one or two other questions. Speaking of the change in forms of turbines, since 1908, what is the present method of construction of the very high efficiency turbines?

A So called Francis turbine is the one that has been used very extensively lately. That turbine has been giving considerable success on high head work.

Q That was an under-shot, is it not, that is water comes up from the bottom?

A No, it comes in from the ---comes in axially along the shaft and goes out tangentially.

Q But in such manner as to raise the weight of the wheel, is it

not, and take the--

A Raise the weight of the wheel?

Q I mean, to sustain the weight of the wheel from the water left by the weight of the wheel.

A I don't know what youmean exactly.

Q To avoid the friction; isn't that construction in such a way to avoid the friction which would come from the weight of the wheel resting on the bearing?

A Sometimes these wheels--commoner type in this part of the country, is to have a wheel mounted on a horizontal shaft so that I imagine what you have in mind is a question of inthrust.

Q Yes, that is what I have refe once to, most efficient wheels avoid that inthrust, don't they?

A Yes.

Q You say it is possible to-day to get a guarantee of manufacturers of eighty per cent or over. How much over, under high head, now?

A Of course, all depends on the size. For very large units you can get up around eighty-three or four per cent.

Q All right; what size units?

A Anything over two or three thousand kilowatts horse power.

Q Two or three thousand horse power units?

A Yes.

Q Can you get guaranteed efficiency of that amount on smaller units, of say two thousand horse power?

A Thousand horse power, you can get about eighty-one or two per cent efficiency guarantee.

Q Now, that efficiency guarantee is the new plant and operating under ideal conditions, is it not?

A Yes. But, of course, they always say they expect to get and do get in tests several per cent more than that. That is the amount they absolutely guarantee to get.

Q Now, what plants do you know in this western country that to-day

are actually operating after having been in operation for say at least a year, or put it two years, at an eighty per cent efficiency?

A I don't know.

MR. A. C. HATCH: If the court please, that has been asked two or three times.

MR. STORY: No, it has not. I asked before what tests he himself made. I ask now if he knows of any plants in this western country.

THE COURT: I understood him to say he did not, so that settles it.

Q You cannot name me a plant to-day that is operating at eighty per cent efficiency in this country?

A Trouble is I don't know what they are operating under, and very few of the engineers do know.

Q You do know, as an engineer, that the general operating conditions are quite different from the ideal conditions, under which these tests are made, don't you?

A They are different, you say?

Q Yes.

A Will you kindly ask that question again?

Q I say, you do know that the general operating conditions in plants of this character are different from what the ideal conditions are under which these tests are made, do you not?

A Tests are usually made soon after a plant goes into commission in order to form a basis of settlement with the manufacturer. As to that, it is rare a plant is tested until it begins to deteriorate. That is why there isn't very much information available.

Q And those tests to determine the manufacturers' guarantee are made by the manufacturer and under the most ideal conditions he can devise, are they not?

A The manufacturer sometimes makes a test in a flume, but shopmen make a test at the factory. That is not the kind of a test I

refer to. I refer to making tests in the field after the plant has gone into use. That would be under actual working conditions, and when the plant was new.

Q But to sum up the whole thing, I take it, I understand you cannot testify as to what is the general operating efficiency in plants of this character after they have been in use for some time, say two years?

A I can only say I cannot tell youwhat the operating efficiency is in a plant after it has been going for quite a while. I know what it should be, and what it might be made, but what it is on the average, I cannot tell you.

REDIRECT EXAMINATION by Mr. A. C. Hatch.

Q Tell what it should be, or what it might be made to be.

A What do I mean by it?

Q No, tell what it should be or what it might be made to be.

MR. STORY: Just for the purpose of saving the record, I will object to it as immaterial and irrelevant. It must be under the general average conditions of this western country.

THE COURT: Objection overruled.

MR. STORY: Save an exception.

Q You may answer.

A What was the question?

Q Tell,what it should be or what it might be made to be, the efficiency of the plant.

A If the power, if there was any reason for doing it, plant could be kept up very near to its new efficiency. Purely a question of expense, and might be small and might be prohibitive.

Q What efficiency would that be?

A What would that mean?

Q What would that be? The efficiency of the plant?

A What would that be?

Q Yes.

A For large units and operating somewhere near full load, be something over eighty per cent.

Q And for smaller units, say of two thousand, or fifteen hundred.

A I meant anything over--I include anything over a thousand horse power.

Q Would be above eighty per cent?

A Yes, sir.

Q That is all.

A That is when operating near full load.

Q That is all.

MR. STORY: That is all, Mr. Gray.

JOSEPH W. LOVELESS, called by the plaintiff, being first duly sworn, testifies as follows:

DIRECT EXAMINATION By Mr. A. C. Hatch.

Q What, if any, official position do you hold in Provo City?

A I am chief of the fire department.

Q About how often are you called out to fires in the city?

A Oh, about twenty four times a year.

Q That would be about twice a month?

A Yes sir.

Q And do you have any knowledge as to the quantity of water that you use during the year?

A No, I don't. If they have a good pressure all right, if they don't I go and find out the reason, but I don't know what they use.

Q About how long do you have fires?

A I think they would last probably an hour to a fire.

Q So that you would be forty-eight hours using the fire hydrants

A Twenty-four.

Q How many hydrants have you?

A My memory is there is 104 or 105.

Q How many do you use at any one time, or can you use?

A Why, we could use three, but we hardly ever do. We haven't had no real big fire here.

Q Are they so arranged you can use three at one time?

A Yes sir.

Q In case of necessity?

A Yes sir.

Q Have you ever used three at any fire in the city ?

A No, I don't think at a fire we have used two. We have on tests used four.

Q On tests but not actual fires?

A No.

Q Two is the most you have ever used?

A That is the most we have ever had to use that I remember of.

Q How long have you been fire chief?

A Thirteen years.

Q Sir?

A Thirteen years.

Q What size nozzle do you have?

A About an inch and eighthis what we generally use, tip.

Q Sir.

A The tip at the nozzle is about an inch and an eighth.

Q And the size of your hose?

A Two and a half inch.

Q Do you know what the pressure is?

A Why, it is sometimes eighty pounds, sometimes runs up as high, I have seen it 118.

Q That is the highest you have ever seen it?

A That is the highest I have ever noticed it.

Q Hundred and eighteen? A. Yes sir.

Q Do you know the elevation of the settling basin?

A No, I don't.

Q Above the average elevation of provo City?

A No, I don't remember. I asked once what it was, but I don't remember.

Q How do you determine the amount of pressure that you have in your pipes.

A Only way I have got is-- they have a gauge over there that tells the amount of pressure, I look at that gauge.

Q You look at the gauge and know the pressure.

A You can tell by turning the water on the hose whether it is down low or high, that is the only way I have got.

Q Give the amount of pressure as being a hundred and eighteen pounds to the square inch?

A That is the only I have got is by the gauge.

Q That is what you mean when you say 118?

A Yes sir.

Q And 64, did you say?

A Well, I have been it, it has been down to -- why, I don't know-- I have went to fires, it has been so low I had to let it run in a bucket and throw it on the fire with a bucket.

Q That is when you would first turn your hose on?

A No, sometimes the pressure would be down, from some cause, there wouldn't be any.

Q Would that be when you first turned your hose on?

A It didn't make no different, the pressure didn't seem to be on there, water wasn't in the system.

CROSS EXAMINATION By Mr. Thomas.

Q Mr. Loveless, do you recall when it was that pressure was so low you had to empty it into a bucket?

A No, I don't remember, I have got it all down, but I don't remember.

Q Has that occurred more than once.

A Never but once I had to do that.

Q Was that during the summer?

A It was during the summer, yes sir.

Q You spoke of the size of the nozzle, are the holes or apertures in the hydrant itself the same size?

A That is two inch and a half opening.

Q Was there larger openings for pump service?

A Yes sir, four inch.

Q Two and a half and four inch opening in the hydrant?

A Yes sir.

MR. A. C. HATCH: The pump, do you mean by that the sprinkling service?

MR. THOMAS: No, for fire purposes, the pump.

RE-DIRECT EXAMINATION By Mr. A. C. Hatch.

Q Have you ever used the pumps?

A Not for a fire, I have not.

Q Do you know about when it was that low pressure was, about when?

A Why, it must have been along in May or June.

Q In what year?

A About '14, I think, 1914.

Q You are sure it wasn't in the late season, during the low water season?

A No, not at that time, I think it was May or June.

RECROSS EXAMINATION By Mr. Thomas.

Q You sometimes use the steamer, don't you?

A We can use it, yes. we have not used it a great deal, it is a little slow.

Q When you do use the steamer you use a larger aperture in the hydrant?

A Yes.

Q Four inch hose?

A We use the same size, that is, the suction hose.

REDIRECT EXAMINATON By Mr. A. C. Hatch.

Q You say you never have used the steamer?

A Not for a fire, only outside of the fire hydrant system.

SYLVESTER Q. CANNON, called by the plaintiff, being first duly sworn, testifies as follows:

DIRECT EXAMINATION BY Mr. A. C. Hatch.

Q Mr. Cannon, where do you reside?

A Salt Lake City.

Q What is your full name?

A Sylvester Q. Cannon.

Q What is your occupation?

A Engineer.

Q Have you had any connection with the water-works department of

the city of Salt Lake?

A I am City Engineer og the city at present, which covers the engineering of water, supplying water-works.

Q Can you state the number of sprinkling wagons they have in the city?

A Yes.

Q How many?

A Fifty.

Q What is the area covered by those wagons?

A Well, the number of miles I cannot tell you.

Q What is the quantity of water used by each wagon during--

A The wagons have a capacity, about half the wagons are 650 gallons capacity, the other half or 700 gallons capacity, and they make an average of forty trips, forty loads a day under maximum conditions.

Q You don't know the number of each class of wagon.

A The exact number I cannot tell, just about twenty-five of each.

MR. RAY: You said forty loads per day, Mr. Cannon?

A That is the average yes.

Q Have you computed the number of gallons per day used by the--

A Taking the average of forty loads a day the wagons -- some under favorable conditions they run as high as forty-eight loads and under unfavorable conditions about thirty-eight loads-- take the average about forty loads under the conditions which we have there, the wagons deliver about 27000 gallons per day of eight hours each.

Q What is the total amount in gallons for all of them?

A For all of them?

Q Yes.

A Now, I may say that for all the wagons the number actually used is about forty-eight, they generally keep two in reserve, and the forty-eight wagons, the average quantity of water consumed for sprinkling-- this of course is not paved district, this im in the unpaves district.

Q yes.

A Approximately thirteen hundred thousand gallons per day of ten hours.

Q How many second feet would that be?

A Thirteen hundred thousand gallons would be -- that is the quantity used during that time of eight hours.

Q What would that be, can you give us that in feet per second for twenty-four hours, that is eight hours, what would it amount to, what is the gallons?

A Thirteen hundred thousand gallons.

Q That is for an eight hour day?

A Yes, fifteen second feet--

Q I think that is sufficient, Mr. Cannon, there is another question or two. What distance do the wagons have to travel, about the average distance?

A In Salt Lake as the streets of course are wide, and hydrants are generally very close together, about two hydrants to the block of six hundred and six hundred and sixty feet, and so that most of the street sprinkled area the wagons have comparatively short travel, probably six hundred feet to the load. Of course some of the streets are narow, sixty-six feet wide, and hydrants farther apart. In that case the distance travelled, distance between hydrants would be greater than that, just exactly how much I don't know.

CROSS EXAMINATION By Mr. Thomas.

Q Is the service rendered by Salt Lake City in the unpaved district with this expenditure of water sufficient to lay the dust?

A I think generally speaking it is quite satisfactory.

Q Do you ever receive any complaint because of insufficient sprinkling of the unpaved district?

A No, I don,t know of any complaints. Of course --

Q It would have to be filed with you in any event?

A The streets that are sprinkled of course-- well not possibly,

not directly, they would come directly to the street supervisor.

Q During the heat of the summer, don't you know as a matter of fact that the streets are frequently dusty during the day because of insufficient sprinkling in Salt Lake City?

A I don't think they are absolutely dusty, Mr. Thomas, sprinkled once a day lays the dust.

Q The entire width of the unpaved street however is not sprinkled?

A Well, not entirely no, the traveled portion is sprinkled.

Q And usually thatis just a short distance each side of the wagon track in the center of the road?

A I think that would average probably, I think probably forty feet wide.

Q Leaves a considerable space of dusty road through the entire unpaved district, does it not?

A I would not say it is dusty, because it is traveled very slightly that portion that is not sprinkled.

Q Nevertheless, the dust is there and still is there, and may be removed by the wind and particles carried in the air.

A There is undoubtedly some dust.

Q And that is the truth, isn't it?

A Very little complaint on that account.

Q Because people take it as a matter of fact, it is one of the burdens of life they have to assume, and don't bother your department?

A No, my experiences have been streets are generally --

Q You don't live on Seventh Avenue in Salt Lake City?

A No, I am up and down there considerable.

Q I do. You said the hydrants throughout the paved district about two to the block.

A Well, through the paved district they are in fact some places more frequent than that. That is, considerable portion of the unpaved district.

Q What amount of water is used in the paved district?

A That of course is handled by street flushes and they, to the best

information I am able to obtain, about eighteen thousand gallons per day, used by each flusher during eight hours.

Q How many flushes ?

A The city has fifteen flushes.

Q So that the amount of water then that is used upon the street would be altogether 270,000 gallons for flushing as well as the thirteen hundred thousand for street sprinkling, is that correct?

A That would be approximately correct.

Q So that you have fifteen hundred and seventy thousand gallons used on the streets per day?

A Yes.

Q In addition to this you have sweepers in the paved district, sweeping machines, haven't you?

A No, we don,t use the sweepers.

Q Not now, not when you use the flushess?

A No.

Q You don't, as a matter of fact, use any of the sprinklers at night in the unpaved district do you?

A No.

Q I understood you to say, Mr. Cannon, you have not the number of miles of unpaved streets at your hand here?

A I have the total number of miles of unpaved streets in the city, but what proportion --

Q Mm I have reference to the milage sprinkled?

A I haven't that information.

Q Do you know what proportion of the unpaved streets are sprinkled, I don,t care for an exact statement?

A Rather rough , simply a guess.

Q You wouldn't care to give that mm statement?

A No.

Q Could you give the area covered by each of the wagons in the unpaved district?

A No, I couldn't give you that.

Q What is the pressure, the average pressure during the season

where they are using the sprinkling carts or sprinkling wagons?

A I haven't had occasion to test the pressure at the particular time the sprinklers were being used, but the pressure at various points throughout the city varies ordinarily from about eighty to as high as a hundred and ten pounds, and some places even higher.

Q You have in lieu of the street sweepers, you have a service known as the White Wing service on the paved district, haven't you?

A Yes.

Q Which very materially reduces the amount of water to be used in flushing and cleaning the streets, doesn't it?

A No, I don't think that would be true. The white wings, of course, they gather up the litter on the streets, but ordinarily the dirt that accumulates is cleaned by flushers entirely. There is any quantity of dirt after the streets have been left uncleaned that is not handled by the white wings at all, that is handled by the flushers directly.

Q Wouldn't you say if there were no white wings that the cleaning of the streets, flushing of the streets would have to be more frequent?

A Well, it would require some more, yes.

Q But you cannot state what extra amount?

A No, not exactly.

T. F. WENTZ recalled by the plaintiff, testified as follows:

DIRECT EXAMINATION By Mr. A. C. Hatch

Q You are acquainted with the Provo City pipe line system furnishing water to the city for domestic, sprinkling, lawn sprinkling, are you?

MR. THOMAS: Just a moment, we object to this as not

proper redirect or rebuttal, because this matter has been gone into I think before.

MR. A. C. HATCH: It is a matter, if the court please, we inadvertently overlooked in the offering of testimony. I don't think it before the court. It is only one question. As I understand the conditions, the city pipe line system is in two parts, it is divided at and near the mouth of Provo Canyon, one line runs over the hill and the other line goes along down the bottom, and there is a spillway testified to in the upper line where the water is allowed, excess water is allowed to ~~xxx~~ ~~xxx~~ spill out and run down. We have nothing to show up to this time as to whether or not there is a spill way or any use of water in the lower or old line, and it is as to that, and as to the spillway that we wish to offer just two or three questions of testimony.

MR. THOMAS: If the court please, I believe that very matter has been gone into, I think in June last.

THE COURT: The information came to the court in some form of that situation just as you have suggested it now. I don't remember whether it was on one of the trips when we were out inspecting the situation or whether it is in the record, testified to in open court, but I know I have the information that the situation you suggest now--

MR. A. C. HATCH: That there is a spillway on the lower line?

THE COURT: No, the upper one.

MR. A. C. HATCH: It is the lower one.

THE COURT: I don't know that the court has any information of a spillway on the lower one.

MR. A. C. HATCH: The spillway of the high line was testified to, but as to the spillway of the lower line.

THE COURT: Objection is overruled.

MR. THOMAS: Note an exception.

A Yes, I have knowledge of the system.

Q And do you know that there is a division of the pipe line system at or near the mouth of provo Canyon?

A Yes, there are two pipe lines from the mouth of the canyon down.

Q And are they, do they both derive their water from the same source?

A The old line takes in from the settling basin just below the mouth of the canyon.

MR. THOMAS: Just a moment, I don't want to be captious.

MR. A. C. HATCH: Wait, you don,t understand my question. Do they both receive water from the same source, both systems, both pipe lines.

MR. THOMAS: Just a moment, this testimony, your Honor has been gone into.

THE COURT: Is it in the record they do receive it from the same ~~xxx~~ source or don't.

MR. RAY: Part from the spring and part from the river, as I remember the testimony.

THE COURT: If there is no dispute about it and it is in the record.

MR. A. C. HATCH: I understand the water--

THE COURT: Objection is overruled, it will take less time to give the testimony.

A The old line was down in the bottoms originally took its water from the settling basin. When the new line was built going from the canyon and going south across the East Bench a line connecting the two lines was made at the mouth of -- just below the mouth of the Provo Canyon by a pipe connecting the two lines.

Q Is the source from which the water is supplied to each of the pipe lines the same from the springs?

A Yes.

Q What I want to know whether there is any water from any other source than the springs enteres either of those pipe lines?

A The water from the springs can go into either pipe line.

Q Is there any other water than that from the spring that does go into either pipe line?

A I can say there may be some coming from the settling basin into the old pipe line.

Q Now, as to that, do you know whether or not there is a spillway on the old line?

A Yes.

Q Where is that located?

A About three miles below the mouth of the canyon.

Q And have you passed by that spillway frequently during the past several years?

A Yes, during the summer months.

Q What has been its condition as to their being water flowing out of that spillway on that lower pipe line during the past several years?

A Well, there is water flowing out there all the time. I don't think that I have ever passed there, I have never seen it when it was closed off.

Q What quantity ?

A Well, it would range, I would judge, from five to seven second feet.

Q About how often have you seen it since 1912 during each season?

A Well, from 1912, I would probably see it two or three times in 1913. I would see it probably once a week 1914, 1915, I have seen it from three to six times a week during the irrigating season.

Q And you never saw it when there was not water, from five to seven feet flowing out of it?

A No, it is a continuous stream there all the time.

CROSS EXAMINATION By Mr. Ray.

Q Did you say, Mr. Wents, that ~~is~~ it was '14 and '15 you had seen

it from three to six times a week, or '15 and '16.

A '14, '15 and '16.

Q You only included two years, you include '16 in those years?

A I passed by there on a trip over the river, sometimes be there twice a week and maybe three trips a week and sometimes more.

CROSS EXAMINATION By Mr. Thomas.

Q Do you know where that water goes after it leaves the spillway?

A Yes, goes back to city creek.

Q And is used after it gets into City creek?

A Yes, it is measured to the canals below that point.

Q Does the water that is diverted into the old pipe line come directly from the river?

A I don,t know what part of it comes from the river, or what part comes from the line, from the canal.

Q Some part does come from the river, does it?

A I don't know.

Q Haven't you ever made any investigation of that?

A No.

Q So as to that you don't know anything of your own knowledge?

A No.

Q But the water that leaves the spillway is measured and charged against the proportion that of the city in City creek?

A Well, it goes back in, and is included in the whole total of the river that goes to the city or to diversions below.

Q So whatever water goes over that spillway, or is measured water, that doesn,t go over that spillway would not be measured?

A No, it is measured in the total river.

MR. A. C. HATCH: Our only purpose in offering this testimony is to show the city's use through its pipe line. We want to find out where this water comes from. We will call the City Engineer, if you are through.

Q Do you know what proportion of the water that is in the old pipe

line goes into the city system?

A No.

MR. A. C. HATCH : It has been our understanding it was all part of the city system and part of the city pipe line.

GEORGE C. SWAN, recalled by the plaintiff, testifies as follows:

DIRECT EXAMINATION By Mr. A. C. Hatch.

Q You are the City Engineer of Provo City?

A Yes sir.

Q Do you know whether or not the water in the two pipe lines reaching the city comes from the same source?

A No sir, it does not.

Q Is the water from the springs mixed, or any part of it, with the water that runs in the old pipe line system?

A No, not unless the river water for any reason is shut out, and the springs can be diverted in there, but ordinarily the spring water is taken over the bench and river water is taken down through the old pipe line merely for the purpose of keeping the old pipe line in condition, and is merely run through the old pipe line and out of this waste way that Mr. Wentz speaks of so that it will return back into City creek and will be re-measured.

Q Don,t you have numerous services along that old pipe line?

A I don,t know how many services there are attahhed to the old pipe line.

Q It is used for city purposes?

A I think there are some takers along on the ols pipe line.

Q But you don't know how many?

A I don't. There are--

Q Does anybody know?

A I suppose--

MR. THOMAS: Let me suggest if you call Mr. Goddard he can give you the number.

MR. JACOB EVANS: I think that was gone into, and some seventy-six users.

A There are seventy-six users out of town and part of those take off of the upper conduit and use the spring water, and part of them take from the lower pipe line, but I don't know the number of each, don't know the division between those two.

MR. A. C. HATCH: Do you claim any water, does Provo City claim any water right to any water to flow through that old pipe line?

MR. THOMAS: Yes, or any other line.

MR. A. C. HATCH: For what purpose?

MR. THOMAS: For any legal or beneficial purpose. we may see fit to put it to, and for any purpose to which we have put it.

MR. A. C. HATCH: How much do you claim for that lower pipe line?

MR. THOMAS: We claim just as much for that pipe line as we have xxxx hither-to had through it and just as much as the former decrees have granted to the city.

MR. A. C. HATCH: There are certain waters they have claimed under their complaint, if the court please, for their pipe line system. Then they claimed certain other waters for irrigation purposes and certain other waters for power purposes, and it is to determine in which class this particular water is claimed I am asking the question.

MR. THOMAS: I think that is wholly immaterial, the city has put in its case on those matters.

THE COURT: I understand you don't desire to answer the question. You are not compelled to, you are not on the witness stand.

MR. THOMAS: It is purely a matter of argument.

MR. A. C. HATCH: That is all.

THE COURT: It is a question counsel was asking you as a courtesy and not as a right, I take it.

MR. A. C. HATCH: We rest.

THE COURT: It is a question counsel was asking you as a courtesy and not as a right, I take it.

MR. A. C. HATCH: We rest.

L. M. PHARIS, called by the defendant, being first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Story.

Q You have testified before, have you not?

A Yes.

Q Please state again what your occupation is?

A I am Assistant Engineer of the Utah Power & Light Company.

Q What are your duties in that?

A Why, I have charge of the hydraulic work and heavy construction work.

Q Are you now engaged in the construction of any power plant?

A Yes, we are engaged in the construction of a power plant north of Salt Lake, and we have started the re-construction of the flume at Olmstead and the construction of an addition to the power station.

Q You mean additional to the power station--

A At Olmstead.

Q Have you in your immediate charge the construction of any large plant on Bear river?

A Yes, at a point near Grace, Idaho, on Bear river.

Q In other words, part of your duties as assistant engineer is to keep track of construction of power plants, is it?

A Yes, sir.

Q I will ask you whether or not part of your duties relate to obtaining data in connection with reference to the efficiency of plants included in the Utah Power & Light Company's system?

A We aim to obtain--

MR. HATCH: Just a moment, if the court please. Object to the answer, move to strike it out. It is a question that can be answered yes or no.

THE COURT: I think it should be answered yes or no.

THE WITNESS: What was the question again?

(Question read)

A They did.

Q What is your practice in that respect?

A We make measurements of the amount of water being utilized by various plants and comparing the amount of water utilized with kilowatt hour output. Obtain a fairly--we obtain fairly accurate information on the general over all efficiency of the plant.

Q Is it part of your duties to gather that information?

A Yes, this information is gathered under my direction.

Q How many plants have the Utah Power & Light Company?

A I can't tell off hand, about thirty or thirty-two at the present time, I believe.

Q What proportion of those approximately are plants in which power is generated by water?

A Power is generated by water in all of them with one exception;

Q In what percentage of the plants do they use turbine wheels?

A By that I presume you mean reaction wheels as opposed to impulse wheels, don't you?

Q Yes.

A In the majority of the plants, probably two-thirds of them.

Q When you speak of the reaction wheels, you mean wheels such as are used in the Olmsted plant?

A Yes.

Q You, I believe, testified at an early date in this case, you were formerly with the Telluride Power Company?

A Yes.

Q Which is the predecessor in interest of the Utah Power & Light Company, of some of the plants?

A Yes.

Q Are you familiar with all the plants of the Utah Power & Light Company?

A Yes.

Q State to the court in a general way how those plants were

constructed and gathered to-gether?

MR. A. C. HATCH: If the court please, we object to that as being immaterial, irrelevant and incompetent.

THE COURT: Have you some object in it?

MR. STORY: Perhaps that question is very poorly put. I will ask to strike it out.

Q Were those plants constructed by one person or by numerous persons?

A They were constructed by a number of the predecessor companies of the Utah Light & Power Company.

Q And they were gathered together by the Utah Power & Light Company, were they?

A Yes, sir.

Q Have you data at hand from which you can state with reasonable accuracy the efficiency of these various plants in which turbine wheels or reaction wheels are used?

A Yes, I have.

Q I wish you would please give a list of the plants and of the efficiency.

MR. A. C. HATCH: If the court please, we objedt to it as being incompetent, immaterial and irrelevant for the reason that every one of their plants, if they are like the Olmstead plant, may be wholly inefficient. The question we have raised here is what they ought to do. Now, to compare it with an irrigating system, we may have a hundred irrigators and what has been a waste of the water in their several ditches. Now, if they have been constructed in a certain manner, it means going into, in effect, the construction, length of life, and all of these, all of the plants owned by the Utah Power & Light Company, which means weeks if we go into it.

THE COURT: I am inclined to think you are right

about that, but I don't think that is a valid objection to this question. You have opened the question yourself and gone into it. I think this is proper rebuttal of the evidence that you introduced.

MR. A. C. HATCH: We were going into it only as to the wheels or efficiency of certain wheels and what as the proper efficiency

THE COURT: In order to determine what that was, you have asked the general question what ought to be maintained as an efficiency and what efficiency those wheels ought to have.

MR. A. C. HATCH: Yes, now we would not have objected to that question with this witness, but as to what is the efficiency of their several plants was what we objected to.

THE COURT: Objection is overruled.

MR. A. C. HATCH: Note our exception.

THE COURT: It will not have any weight unless it is followed by some other facts or factors. I am inclined to think your objection goes more to the order of proof than the admissibility of it. Of course, if Mr. Story just stops at that the court won't give it any weight, because that would not be entitled to any weight.

Q Just give the figures.

A Our Alpine plant has a general over all efficiency--

Q I am speaking only of the turbine plants.

A Of the turbines themselves?

Q No, of the plants with turbine wheels.

A All right.

THE COURT: Mr. Story, the court willsuggest, the court in this ruling did not intend for you to

open the door to go into the efficiency of these plants.

MR. STORY: No, and Your Honor, I wish to state my object, to show these plants were gath red together from a great lot of plants, to show what the average efficiency of plants of this character is.

THE COURT: The court has suggested the court did not by the ruling intend to permit you to give evidence as to the efficiency of these plants themselves. I understood your question to be with reference to these wheels, efficiency of the wheels. I don't think it is material what the efficient of the plants are at all.

MR. A. C. HATCH: That was my objection, that his question covered the efficiency.

MR. STORY: I will have to follow that up. I give over all efficiency. We have had over all efficiency in the former testimony and I have to follow it up.

THE COURT: I don't think so. I don't think we have had any over all efficiency. If we have, it is merely under your statement, you meant by plants the wheel, and I think the objection that Judge Hatch made sometime ago when Mr. Wenz was on the stand, that he was not satisfied with your suggestion you meant wheels when you said plants, I then from that time on limited your evidence with reference to the wheels, I don't think it is material in this case at all as to the efficiency of the other machinery.

MR. STORY: I grant that, Your Honor, but we have to work back from over all efficiency to efficiency of the wheel. We give the general efficiency and work

back to what is the wheel efficiency.

THE COURT: Let me ask a question, can you give the wheel efficiency without giving this over all efficiency and working back?

MR. STORY: No.

THE WITNESS: I can give it but have to do it in my head.

THE COURT: That is all we care for.

MR. STORY: Just one further suggestion, the plaintiff have introduced all these charts, some thirty six of them, and it is shown that is an over all efficiency. The testimony shows it is over all efficiency. We have to work back on those from over all efficiency to wheel efficiency.

THE COURT: I didn't understand it so. The court misunderstood this testimony entirely, if that is the case.

MR. STORY: That shows the power output, and showed nothing else, power output during the time the peak loads and average also for the entire twenty-four hours. That means after it has gone through the generator. The witnesses have testified what the generator loss is, ninety-five per cent efficiency and have to work back from tha to the wheel efficiency, All of that is over all efficiency.

THE COURT: You are mistaken when you say---

MR. A. C. HATCH: That was on cross examination.

THE COURT: I was going to suggest that was merely incidental and brought out by you. It had nothing to do, as I understood it, with the evidence relating to the efficiency of the wheel. I may be mistaken, if I am, you are entitled to this evidence.

MR. STORY: I am going to work back to the efficiency of the wheel. If we would start here with

over all efficiency and have to work back, I will put it that way, and ha e the witness work it back; and I wish to have it definitely understood by the court, and don't think Mr. Tanner, their witness will contradict my witness, that the sheets which have been introduced here, these thirty-six exhibits show an over all efficiency. In other words, it is the power output and to get the wheel you would have to consider both the efficiency of the turbine and of the generator. Would you not, Mr Tanner?

MR. TANNER: Yes, that is true.

THE COURT: Objection is overruled, if that is the understanding. That opens the whole matter.

MR. A. C. HATCH: If it was confined to the Olmsted plant, we have no objection to it, but if we are going into all these thirty-two plants owned by this company it means of course we have got to go into the condition of every one of them.

THE COURT: Every one of them, they have to be shown to be just the same or be of no weight of course. Objection is overruled, you may answer the question.

A I take it that over all, that is combining generator and water wheel efficiencies are desired, then?

Q I would prefer, if you can, as you go along, that you give the water wheel efficiency, using a generator capacity or efficiency of ninety-three to ninety-five.

MR. A. C. HATCH: He will give the efficiency as it is, not assuming anything.

Q All right; please give the over all efficiency.

A The lower American Fork plant has an efficiency of seventy-five per cent.

Q That is over all efficiency, is it?

A Yes.

Q What is your generator efficiency there, approximately?

A Generator efficiency at that point is either ninety-five or ninety-six.

Q What then is your wheel efficiency?

A About seventy-nine per cent.

Q On your wheel?

A On the wheel.

Q Continue with your list.

A Devil's Gate station in Weber Canyon has an over all efficiency of seventy-seven per cent, water wheel efficiency is eighty-one per cent. Georgetown station--

MR. A. C. HATCH: What is the generator in that last one?

A Ninety-five per cent. I am assuming the generators in each case to have an efficiency of approximately ninety-five per cent.

MR. A. C. HATCH: Why do you assume that?

A Because the development in generator construction has not materially changed in the last fifteen years and the efficiencies have not varies materially. The efficiency at the present time will be found--

MR A. C. HATCH: That is all.

A It is ninety-four to ninety-six.

MR. A. C. HATCH: That is just what I wanted to know.

A Georgetown station has an over all efficiency of forty-five per cent; the water wheel efficiency is approximately fifty per cent.

MR. A. C. HATCH: Generator ninety-five same as the other, is that right?

A Yes. Grace station has an over all efficiency of eighty-four per cent; water wheel efficiency of eighty-eight per cent.

Q That is the very newest station, is it not?

A Yes. Granite station in Big Cottonwood canyon has an over all

efficiency of sixty-five per cent, water wheel of sixty-nine per cent. The High Creek station has an over all efficiency of sixty-five per cent.

MR. A. C. HATCH: That is in Cache county?

A I don't know whether it is in Cache or Franklin, Franklin, I believe.

MR. A. C. HATCH: Idaho?

A Yes

MR. A. C. HATCH: What is the per cent?

A Sixty-five per cent. The Hyrum plant---

MR. A. C. HATCH: The wheel?

A The water wheel would be sixty-nine per cent. The Hyrum plant has an over all efficiency of seventy-two per cent; water wheel efficiency would be seventy-six per cent. Jordan Narrows plant has an efficiency of fifty per cent, water wheel of approximately fifty-three per cent.

The Logan plant has an over all efficiency of sixty-five per cent, water wheel efficiency sixty-nine per cent.

The Murdock plant has an over all efficiency of seventy per cent, water wheel efficiency of seventy-three per cent.

Olmsted plant has an over all efficiency of sixty-five per cent, water wheel efficiency sixty-nine per cent.

Oneida plant has an over all efficiency of eighty-four per cent, water wheel efficiency eighty-eight per cent.

Q That is also a new plant, is it not?

A It is.

Q When was it installed?

A The Oneida plant was completed last year.

Q What is the capacity of that plant?

A Twenty thousand kilo watts.

Q What is the capacity of the Grace plant?

A Thirty-three thousand kilo watts.

Paris plant has an over all efficiency of sixty per cent, water wheel capacity of sixty-three per cent.

Q Efficiency?

A Efficiency, yes. The Riverdale plant has an over all efficiency of seventy per cent, water wheel efficiency of seventy four per cent.

The Wheelon plant has an over all efficiency of seventy per cent; water wheel efficiency of seventy four per cent.

Those are all of the reaction wheel plants.

Q Are you familiar with other plants of this character in this western country?

A Well, not in this immediate vicinity, no.

Q I mean, are you familiar with this kind of--

A Familiar with these plants in other sections of the country.

Q That is what I mean. I will ask you to state whether or not the general efficiency to which you have testified in connection with the plants that you have mentioned are generally similar to the efficiencies of other plants of this character if you know?

A I believe they are.

Q What is the general state of repair of these plants concerning which you have testified?

A They are in various states of repair. Some of the plants are very old and the water wheels are therefore rather old and their future life is undoubtedly short. Some of the plants, however, are of recent construction and efficiencies are a little higher.

Q How do these plants compare generally in efficiencies with plants of a similar character which have been in operation over a period of two to ten years?

A These plans are typical of plants through out the country.

Q So far as efficiency is concerned?

A So far as efficiency is concerned.

Q State to the court on what the efficiency of the water wheel of this type depends?

MR. A. C. HATCH: That was all gone into, if

the court please heretofore by different witnesses.

MR. JACOB EVANS: I think this very witness himself testified to it.

MR. A. C. HATCH: Threshed out on what it depends and what it was.

MR. STORY: You brought out some testimony on cross examination, I think, in that connection, but this witness has not testified to it, and I wish to show when the loss of efficiency occurs and how it occurs.

THE COURT: I think Mr. Brundige went into that.

MR. STORY: That is true; Mr. Brundige gave testimony to that effect, and it was brought out on cross examination. Am I therefore prevented from giving it by this witness?

THE COURT: Certainly not.

MR. A. C. HATCH: You went into it on direct examination and told all about it with your witnesses, why the wheels were worn with gravel, and that they lost their efficiency within the first six months, I think it was, before they had hardly got them installed, they went down to Sixty-five per cent, We object to going into it again at this time.

MR. STORY: There may be a difference of opinion between Judge Hatch and myself, whether it was brought out on direct or cross examination, but am I restricted to one witness?

THE COURT: Certainly not, but this is sur-rebuttal really. The objection is overruled; you may go into it.

MR. STORY: It will be very short.

MR. A. C. HATCH: Note our exception.

A Depends in the first place upon the design of the wheel, and in

the second place on the operating conditions. A wheel when it is installed, providing it is properly designed, will have a fairly high efficiency. This efficiency is controlled when the wheel was new by the--to a large extent, aside from the proper values of the various angles, by the currents between the moving or rotating element called the runner, and the distributor, or what is commonly known as the guide case. Ten or fifteen years ago it was considered necessary to ha ve a radial clearance between the rotating element and stationary element of from an eighth to a quarter of an inch, but turbine manufacturers in the last ten years have increased their test efficiencies by reducing this clearance, thereby cutting down the loss or leakage of water which does not go through the runner at all. By cutting down this clearance they have increased the efficiency, but after the turbine is operated a short time the silt and sand in the water cuts this clearance out to an eighth, eighth to a quarter of an inch, and the turbines generally drops under those conditions, for quite a period of time.

Q In your general experience how long have you found it to be before a turbine loses efficiency on account or from that cause?

A Why, it starts to lose efficiency as soon as the machine is put in operation. The extent of the wear and the decrease in efficiency depends entirely on the amount of sediment and silt in the water. If there is a large amount of silt in the water, that wear takes place very rapidly. If there isn't any great amount of silt in the water it takes place more slowly.

Q In your general experience how long will it take before there is a material loss in efficiency?

A There is a material loss within six months.

Q And generally what would you say was the general experience with plants of this character with reference to loss in efficiency during the period of the first two years of operation?

A There is a period after the turbine is first put in operation, there is a period where the wear is very rapid, and reduction in efficiency very rapid. Beyond this point the wear and decrease in efficiency takes place more slowly. For a period of probably three or four years after the first six months the decrease in efficiency is not very great, possibly not over three to five or six per cent.

Q What would you say generally speaking is the loss in efficiency in plants of this character over the first two years, or wheels of this character?

A Well, I would say that there would b e a loss of from somewhere from six to nine per cent.

Q That would be the general average of loss, plants of this character?

A Yes, sir.

CROSS EXAMINATION by Mr A. C. Hatch.

Q Will you let me see the paper to which you referred in your testimony? You didn't testify from memory, you had it tabulated?

A Yes, sir.

Q Did you make this tabulation yourself?

A They were made under my direction. I didn't make the tabulation myself.

Q Did you obtain the knowledge or any part of it yourself to which you have testified with regard to these several plants?

A You mean actually performed the computation and operations?

Q Yes, did you actually observe the flow of the water?

A No, sir.

Q Did you make a measurement of any of the water?

A No, sir.

Q You have no actual personal knowledge, then, of any of this data that you have given us?

A No, sir.

Q It is all from that that you have ~~xxxx~~ heard from other parties?

A Yes, sir.

Q And it came to you in this form, did it not?

A Yes, sir.

Q And was wholly prepared by other people?

A Yes, sir.

Q Do you know when it was done at the various plants?

A It was done over considerable period, and is being carried on at the present time. Whenever we have an opportunity to make observations at a plant why we do it. The work is going on all the time, and this is a tabulation which was drawn up, I think, about a year or year and a half ago.

Q It is dated February 25, 1916?

A Yes.

Q It says estimated efficiency; that is what you have testified to, estimated efficiency?

A Yes.

Q That is the ov er all efficiency?

A Yes.

Q And in a number of these it says, take the Alpine plant,-- you didn't testify as to that, did you?

A That is an impulse wheel. I did not testify on any plants where we have impulse wheels.

Q American Fork lower plant, what you have testified to is from knowledge that you have received from other people wholly, is it not?

A Yes, sir.

Q And none of it has been obtained from actual observations by yourself?

A No.

Q Have you any knowledge of it other than what you obtained from this paper from which you rread while testifying?

A Why, I have seen the original computations from which that table was made up.

Q Did you make any of those computations yourself?

A No, sir.

Q And you say you made none of the measurements?

A No, sir.

Q And have never made any of the tests yourself?

A With two exceptions, there are two in there, the Grace plant and the Oneida plant, our newest plant, and largest plants, the figures there are the result of very accurate tests.

Q Made by yourself?

A Made under my direction on the ground, took approximately ay week to make each test.

Q You were present during the entire time while the observations were being made?

A Yes, sir.

Q Now, the Grace plant has what capacity

A Has a combined capacity of thirty-three thousand kilo watts.

Q What do youmean by combined capacity?

A Combined capacity of all machines. There is the old Grace plant and new Grace plant. The old plant was built in 1907, and had a c apacity of eleven thousand kilo watts.

Q There are two plants?

A Yes, the new plant was built in 1913, and had a capacity of twenty-two thousand kilo watts.

Q Twenty-two thousand, and eleven thousand old?

A Yes.

Q These tests were made by you under youn immediate direction?

A Yes, sir.

Q How long had those wheels been in when youmade these tests?

A How long had they been in service, is that what youmean?

Q Yes, at the Grace plant.

A Not more than a month.

Q As to the old plant?

A I did not test the old plant. I ran my tests of the new plant only.

Q So that you know nothing of the eleven thousand kilo watts pro-

duced by the old plant?

A No, sir.

Q Now, the American Fork lower plant, the Oneida plant, when was that built?

A That was completed last year, 1916.

Q How were the tests made on that?

A You mean to go into the method of the tests?

Q No, I mean whether it was under your immediate supervision.

A Yes, it was under my immediate supervision on the ground.

Q And when were the tests made?

A Test was made, I believe in, in October.

Q Immediately after the completion of the plant?

A Immediately after the installation of the second unit. There are two units there.

Q Now, you gave the output of that plant as twenty two thousand kilo watts?

A Yes, that is the installed capacity; at the present time the capacity of that plant is about seventeen thousand kilo watts, I believe. It is operating under lower head than that for which it was designed.

Q Seventeen thousand, now. Did it ever have a capacity of twenty two thousand kilo watts?

A No, the dam is not raised to its ultimate height.

Q And it is estimated it would have that capacity when it is finally completed?

A Yes.

Q Will the efficiency of the wheels be raised when the plant is finished?

A Yes, it will be.

Q What will be the efficiency of the wheels when the plant is completed?

A Well, that is pretty hard to state without a lot of computation, but I would say off hand, possibly two per cent.

Q It would make it up to ninety per cent?

A Yes.

Q And that would affect the over all efficiency?

A Yes.

Q About what per cent?

A About the same.

Q Make it seventy-six per cent?

A Eighty-six.

Q Do you know when the Jordan Narrows plant was built?

A No, I don't exactly.

Q Do you know when it was repaired, last repaired?

A Why, it has been repaired within the last, it had repair work done on it within the last year and a half, I believe.

Q On the wheels?

A Yes.

Q The generator?

A I think not.

Q Do you know, as a matter of fact, as to whether any of these generators have an efficiency of ninety-five per cent except the two plants to which you refer, the Grace and Oneida?

A Why, I have a record of the---

Q I am speaking of your own knowledge.

A No, I have not.

Q You have reports from the people in charge of those plants from time to time; are they made direct to you?

A Not from the people in charge of the plants, no.

Q To whom are the reports made?

A Well, I have corps of engineers who report directly to me and who are obtaining data of this nature under my direction .

Q Then it comes to you not--the information you get does not come direct from the parties who obtain it in the first instance?

A Yes, it does. This information does not come in general from the man who has charge of the plant, it comes from engineers whom we send out to the plant to obtain the information we desire.

Q Those engineers don't remain at the plant continuously?

A They do not.

Q They simply take the data for a certain period and report?

A Yes, sir.

Q How long a period do they cover?

A Well, it all depends upon the problem upon which they are working.

Q As to the particular subject matter of which we have inquired at this hearing, I mean.

A They may spend--I don't know that I just quite understand your question.

Q Suppose you sent the engineer out to obtain the efficiency of a wheel, and efficiency--the over all efficiency including the generator?

A Probably get it in a day or half a day.

Q Would he get it from his own observations?

A Yes, he would get it from his own observations.

Q He would get it from his own observations made at the plant?

A Yes.

Q And he would then report to you?

A Yes.

Q Do you know when the present machinery in the local plant was installed, the wheels?

A In 1904 I believe. It was either 1904 or 1903, I am not sure, which it was.

Q Is that of your own knowledge?

A No, I wasn't on the work.

Q Has there ever been anything done with them since they were installed?

A Yes.

Q What?

A The wearing rings or clearance rings which control the clearance between the rotating element and stationary element has been replaced, once, to my own knowledge; I don't know how many other times.

Q When?

A In 1911.

Q What was the original efficiency at that plant, if you know?

A The original water wheel efficiency was very close to eighty-five per cent.

Q And when it was repaired, what was it?

A I don't know.

Q How do you know that it is now sixty-nine per cent wheel efficiency?

A Why, I have had--we had a weir in the tail race at the Logan plant, and observations on that weir give the amount of water which is being used by the station. The watt meters in the station give the output of the station and from those two quantities, together with the reading of the pressure gauge in the station, from those quantities the over all station efficiency can be computed.

Q And you assume then there is ninety-five per cent efficiency in your generator?

A Yes.

Q How do you know there is ninety-five per cent efficiency in that generator?

A We simply go by the record of the shop test of the generator, made when the generator was built.

Q Do you know when that generator was built?

A I cannot tell you right now.

Q Do they ever lose any efficiency?

A A generator will not lose its efficiency to any appreciable extent.

Q In any length of time?

A No.

Q How long was it after you repaired the wheel at Logan when its efficiency tested--from which the sixty-nine per cent was obtained?

A How long after it was repaired was this sixty-nine per cent--

Q Yes.

A About four years.

Q And the decrasse was from eighty-five to sixty?

A No, I don't know what the efficiency was after the turbine had been repaired, after the turbine was repaired in 1911.

Q Have you other tests besides these tests that you have here, or is this an average, this sheet show the average?

A The figures given on the sheet are probably the result of single tests. We are from time to time getting additional tests, and we have since that sheet was published obtained additional data on efficiency.

Q On different ones of these plants?

A Yes, sir.

Q Have you obtained data on all of them with the turbine wheels, additional efficiencies?

A I cannot say as to that, whether they have all been covered or not.

Q And why did you select this particular sheet from which to testify?

A Because that was the most convenient, I presume.

Q Have you others?

A We have no other sheets in that form, no.

Q Now, is that the only test of the Olmsted efficiency, all that you have ever made or have now?

A I don't know. I don't know whether it is or not.

Q I note here, that you have marked after the Olmsted data, the output is limited by the capacity of the flume" what does that mean?

A The installed capacity at the Olmsted plant is seventy-two hundred kilo watts. There are three twenty-four hundred kilo watt units. It is impossible at the present time to obtain that amount of power due to the fact that the flume will not carry enough water to develop that amount of power.

Q And you are now building a new flume and enlarging the flume, as you testified?

A Yes.

Q To increase the capacity to the seventy-two hundred kilo watts?

A Yes.

Q Then, whenthis test was made it was run to its capacity at the time the test was made, was it not--the flume was run to its capacity at the time this test was made?

A Yes, it is my understanding it was.

Q And figuring back to the water how many second feet of water did you have to produce that power, giv e the efficiency to your generator and wheel that you have noted in your blue print.

A Two hundred and thirty-five second feet.

Q Then that was the extent of the capacity of your flume at that time?

A Yes, that was the operating capacity of the flume.

Q What was the date on which that data was obtained?

A I cannot tellyou.

Q Approximately?

A Probably during the summer of 1915, I should imagine so.

Q Summer of 1915. It would be in any event a t a time when there would be sufficient water in the river to give to you the full capacity of your flume?

A It might or might not, depending upon whether the river were lower than two hundred and thirty-five second feet or lower---

Q The capacity of your flume would neither be increased or decreased by the quantity of water in the river, would it?

A No.

Q And this is intended to show at least the capacity of the flume the limit of the capacity of your plant was the limit of your flume?

A Yes.

Q Did you figure your efficiency on the static head or on the

effective head?

A On the effective head.

Q And the effective head as given here is three hundred and thirty six feet, tha t is correct, I don't wish to mislead you, Olmsted plant down about the middle of the paper?

A I don't know whether that is three hundred and thirty-six or three hundred and thirty-eight. Looks like three hundred and thirty-eight to me, but I think that must be in error, I believe three hundred and thirtysix or three hundred,and thirty-five is more nearly correct.

Q It is three hundred and thirty-eight.

A That is what it looks like.

Q And the actual head or static head is three hundred and forty feet?

A Yes.

Q So that the two feet difference means what?

A Represents the loss of head through the penstock?

Q And that would be approximately the amount of loss of head, would it not, at that plant?

A The loss of head between the end of the flume and the water wheels, but not between the dam and water wheels.

Q I mean between the end of the flume, head of the pipe line.

A Yes.

Q Of the pipes leading to the wheels.

A Yes.

Q You would be running allthree of your wheels at this time, would you, or only two of them, at the Olmstead plant?

A I believe two under that condition.

Q And would the fact that you were running two decrease the efficiency in any reppect of the wheels?

A No.

Q Or the generator?

A It would increase the efficiency of the wheels, that is it would increase the over all efficiency, not the efficiency of the

wheel.

Q Ordinarily you run the three wheels, do you not?

A Well, it all depends on the demand on the plant.

Q Let me call your attention to some of the plaintiff's exhibits here, and it will probably---plaintiff's exhibit 236 at the time--

A There are only two units running this time. I think at the present time there are only two units.

Q In that exhibit how many units were running?

A Two

Q Two at that time?

A Yes.

Q If you will take two thirty five (235) and say how many units were running that time.

A Two units.

Q And 234.

A Two units.

Q Where does it indicate the units?

A Right here, generator No. 1 and generator No. 2, and this would be generator No. 3. You see it is marked "dead". These are the switch board meter readings.

Q In any event the effective head at the Olmsted plant would not be less than two-thirty-six--three hundred and thirty-six feet?

A Yes, it might, that head is for the condition given in that table, 235 second feet, and that amount of power, forty-five hundred kilo watts, I believe. The capacity of each machine is twenty-four hundred kilo watts, therefore the capacity of two machines would be forty-eight hundred kilo watts, or three hundred kilo watts more, and the effective head would be therefore, less.

Q The effective head would be less?

A Yes.

Q Would that three hundred kilo watts less decrease the efficiency of those two units?

A No, it would not.

Q Not so as to be discernible?

A No.

Q Did you say they sometimes did use the three units at the Olmsted plant?

A I don't know within what period they have used the three units, but they certainly have within the past two years.

Q Have used the three units?

A Yes.

Q But the using of the three units would not in any manner decrease the flow of water in the canal?

A No.

Q Or capacity of the canal?

A No.

Q You give the Jordan Narrows efficiency as fifty per cent, and the efficiency of the wheel at fifty-three. How do you account for the low efficiency in that wheel and over all efficiency at the Jordan Narrows?

A Due to the fact that the machinery is rather antiquated and out of date.

Q Similar to a leaky dam in an irrigating ditch or headgate?

A No, I wouldn't call it that. Due to the fact that at the time that turbine was made, the turbine manufacturers didn't know so much about turbine design as they do nowadays, and were not able to design a turbine with as high an efficiency as they are at the present time.

Q That is a low head plant, isn't it?

A It is a low head plant, yes, fairly low, about seventy-five feet, I believe.

Q Antiquated machinery all the way through at that plant?

A Yes.

Q Are you running that plant at the present time?

A I don't believe we are right now.

Q How long since it has been in operation?

A It was run last year, sometime last year.

Q For how long a period?

A I don't know.

Q It has not been run for several years except at intervals, has it?

A No, only at intervals.

Q It doesn't pay to run it, in fact?

A No.

Q Power generated by it is not sufficient to justify the expenditure except extra ordinary occasions?

A That is all.

Q The Devils Gate plant, do you know when that was built?

A Built in 1908--'08 or '09.

Q Do you know when the tests were made?

A You mean the tests shown in this tabulation?

Q For Devils Gate, yes, what year?

A I think the data for that plant was obtained during the summer of 1913.

Q How long had the wheels been installed?

A About six years.

Q And had they been repaired?

A I don't know.

Q Now, the highest efficiency you gave us was----over all efficiency was what?

A Oneida and Grace.--you mean at the Devils Gate station?

Q At any station?

A I think eighty-four per cent over all.

Q Now, at Devils Gate you gave us seventy-seven per cent over all efficiency, and generator ninety-five, and the wheel at eighty-one, how do you show that wheel efficiency at eighty-one?

A The over all efficiency was given as seventy-seven you say?

Q Yes.

A Simply divide the over all efficiency by the efficiency of the generator.

Q Do you know what the real efficiency of the Devil's Gate plant was when it was installed?

A No, I don't.

Q Was it either the Grace or Oneida, in your judgment?

A Probably, I would say off hand it wasn't higher.

Q Would you say whether or not it was lower?

A I would expect it to be a trifle lower.

Q Now in your testimony, you stated that in the first two years that the efficiency would fall off from six to nine per cent.

A Yes, sir.

Q Now the Grace had an 84% efficiency, when installed. The Devil's gate wheel had an 81% efficiency.

A A what?

Q Had an 88.

A Yes.

Q When it was first installed.

A Turbine efficiency of 88 when it was installed.

Q And Devil's Gate efficiency was 81 in 68.

A 81, yes, sir.

Q 68 after its installation.

A Yes.

Q What was it two years after its installation?

A That is pretty hard to say. I cannot answer that question.

Q It would not have been 69% would it?

A Two years after its installation?

Q Yes.

A Probably not, no.

Q What probably would it have been?

A Well, it may have dropped off two. If it was 81 at the time this test was made, the chances are that four years before that the efficiency was not more than two or three per cent. higher than that.

Q Upon what did you base your estimate that in two years the efficiency would fall, decrease 6 to 9%?

A Simply on what our observations, on some of our water wheels has shown us.

Q Now, which one of the water wheels has shown that decrease?

A The Grace wheel has shown that decrease.

Q What river is the Grace plant on?

A Bear River.

Q Same as the Wheelon?

A Yes, same river.

Q When was the 6 to 9% efficiency shown that showed decrease?

A What is that?

Q When was the 6 to 9 per cent efficienty determined?

A At Grace?

Q Showing the decrease at Grace.

Q You must be talking about the old station now I guess. Now 69 per cent -

Q Six to nine per cent.

A Oh---the plant was installed in 1913, and an accurate test was made in 1913.

Q That is this test?

A Yes, the results of that test are the ones shown there. Within the past year rough tests have shown that the efficiency has dropped off I think about eight per cent.

Q Can you give us the data of those tests?

A No, I haven't it with me.

Q Then, how rough were the tests and how accurate were they?

A They were accurate, probably not within two or three per cent -- three per cent, I should say.

Q For that reason you gave it a range of six to nine per cent?

A Yes, sir.

Q What did you say the rough test showed?

A About eight per cent.

Q The Devils Gate plant on the Weber river, isn't it?

A Yes, sir.

Q And it is similar river in its course and valleys and country

through which it runs to the Provo river.

A Quite similar, yes.

Q And the silt and sand and gravel in it?

A Yes, sir.

Q And in the water in it?

A Yes.

Q As in the Provo river?

A Yes.

Q Do you have any provision for separating the sand from the water before it goes through your wheels at the Devils Gate plant?

A There is a sand box in the intake, that is all.

Q You have a sand box in the flume, or pipe line of the Olmsted plant, haven't you?

A Yes, sir.

Q When was that put in?

A The sand box was put in in 1910, I believe, 1910 or 1911.

Q Then under present conditions, at the Olmstead plant the decrease of efficiency of the wheel would be no greater than the deficiency shown in the Devils Gate plant, should it?

A That is pretty hard to state. Turbines vary so in their construction and operation that two turbines installed at the same time and same capacity and coming from different manufacturers will have entirely different operating characteristics.

Q Who installed the Devils Gate plant, what make of wheel is it?

A I believe Utah Light & Power Company built the Devils Gate plant. The wheels, or the wheel, one wheel is a Pelton Francis Turbine Manufactured by the Pelton Manufacturing Company. At Olmsted the units or turbines were made by the Allis-Chalmers Company.

Q And there might be a difference in them be reason of the difference in the manufacture?

A Difference in the design, principally.

REDIRECT EXAMINATION by Mr. Story.

Q In speaking of the test on the Olmstead plant, I believe you said that two hundred and thirty-five second feet of water had been used in making the tests?

A Yes.

Q Do you know who made the tests?

A Yes, Mr. Stoner, I believe.

Q You didn't make it yourself?

A No.

Q Do you know what free board there was on the flume at that time?

A No, except from general knowledge of the condition of the flume at that ti e, and the conditions under which it was operating free board must have been from sixteen to eighteen inches.

Q What did you mean then by your statement that the flume was run to its capacity?

A Why, that was as high as the fire department thought it advisable to go, an height to which the water ought to be raised at that time.

Q Under the peculiar conditions that existed at that time?

A Under the conditions that existed at that time. Sixteen inches or eighteen inches, which I gave you as the free board is what is commonly called the mud slide or mud cut.

Q Do you wish to be understood as saying that is the maximum carrying capacity of that flume?

A No.

Q It w as merely the operating--

A I stated it was the operating capacity. I think I gave that, or made that statement.

Q Do I understand you that it refers to the operating capacity under the conditions which obtained at that particular time?

A That particular time.

Q That doesn't necessarily ha follow----

A We have since had more water through the flume than that.

RECROSS EXAMINATION by Mr. A. C. Hatch.

Q Now then, you didn 't mean that the capacity of your flume was 235 second feet?

A Not the water carrying capacity, no. There may be some misunderstanding on that table, that table was gotten up for a specific purpose, and therefore made rather conservative for the operation of the station.

Q It was gotten up for the actual knowledge and use of the corporation, was it not?

A Yes, sir.

Q In determining what they had?

A Yes, sir.

Q And wha t their capacity was?

A Yes, sir.

Q And the power that they could produce if nedessary of all of their plants?

A It does not mean, however,- or the capacity could not--

Q Answer the question.

MR. STORY: Let him answer the question.

MR. A. C. HATCH: He can answer it yes or no.

THE WITNESS: Willyou please read the question?

(Question read)

MR. STORY: Object to it on the ground that it is not a question, mere statement by the counsel it is not a question whether or not that does show the maximum capacity of all the plants, witness has not so testified.

THE COURT: That was not the question, the question now is whether it shows the maximum power that can be produced by all of the plants.

MR. A. C. HATCH: The purpose for which this was made.

A No, it is not the purpose for which that was made.

Q Then, for what purpose was it made?

A This is made to--rather hard to define it--it was made to show what can be done year in and year out, through a long period of time. It does show that through a short period of time the system as a whole can go beyond that point, but any individual plant can be crowded beyond that point.

Q I note here that you said "output is limited by water supply as to the Alpine plant."

A Yes, sir.

Q Tha t means--

A That means that the installed capacity is greater than the power, the supply of water will produce.

Q Then, the capacity is limited by condition of flume, what does that mean?

A That means--

Q As to the Mill Creek?

A That means that the flume is in such condition tha at certain times in the year it is not safe to run enough water through it, possibly, to develop the installed capacity of the plant.

Q Then we read, "the output is limited by capacity of intake and pipe line."

A Tha t means that the capacity of the pipe line at all times of the year is not-the capacity of the intake and pipe line at all times of the year is not sufficient to carry enough water to develop their capacity.

Q Then when we read--of course, if it not sufficient at all times it is not sufficient at any time, is it, if your pipe line and intake is not sufficient all the time, in capacity, it is not sufficient any of the time, is it?

A Yes, sir, it is.

Q How do you explain that?

A Why, during certain seasons of the year your head on the intake is a little lower than it is at other times; the capacity

may not be as great; at certain seasons of the year the head may be a little bit higher than it is other seasons of the year, which is enough to over come intake entry losses and so forth. The output is limited by the capacity of the intake and pipe line.

Q The capacity of the pipe line cannot be increased or decreased, can it?

A Yes, sir.

Q Materially in a long pipe line?

A It depends upon the length of the pipe line, and friction losses and entry losses, velocity through it. If it were a long pipe line and the increase or decrease in the head at the intake were very small the capacity would not vary greatly.

MR. STORY: That relates to an entirely different part.

Q Would a foot or two make any differente on the Murdock pipe line?

MR. STORY: You are speaking of the Murdock pipe line, are you?

MR. A.C.HATCH; Yes.

MR. STORY: I cannot see what the capacity of that pipe line has to do with this case.

MR. A.C.HATCH: It hasn't anything to do with this case, except to cross examine the witness as to the data and what it means, that is all.

A Yes, a foot or two feet at Murdock means quite a lot for the reason that the head of the pipe at the intake is very small, that is the difference in elevation between the crest of the dam and the top of the pipe at the intake is very small. A foot or two feet means a whole lot there as far as the capacity of the pipe line is concerned on account of the possibility of entraining air.

MR. STORY: I don't want to interrupt, but we have not attempted to give all the data on that blue print, never occured to us to do it, because

it is not material. Blue print is not in evidence.

Q When you say the output is limited by capacity of the flume, what does that mean?

MR. STORY: What plant does that refer to, Judge Hatch?

MR. A. C. HATCH: Immaterial what plant it refers to, it refers to half a dozen of them.

MR. STORY: Tha t is immaterial and irrelevant, Your Honor, and I am going to raise a specific objection at this time, unless it is shown that he refers to the Olmsted power plant because we have not attempted to give in evidence all the data on that blue print,

THE COURT: I hardly see the necessity of cross examining upon something appearing on the blue print that was not offered in evidence.

MR. A. C. HATCH: He testified from the blue print as to the Olmsted plant, and as to all the plants to which he testified.

THE COURT: Yes.

MR. A. C. HATCH: And the blue print he testified is the paper from which he obtained the facts about which he testified, that he knows of none of them of his own knowledge, except the Grace and the Oneida plants, and I think the whole matter--

THE COURT: I hardly think so I think if there are any statements contained upon this blue print, endorsements of any kind which in any way refer to the plants about which he testified, you have a perfect right to cross examine him as to all the statements contained there. If they are statements that refer only to some other plant about which he said nothing,--

MR. STORY: It must relate to efficiency.

THE COURT: Anything that relates to these plants that you went into.

MR. STORY: The testimony shows it covers not only efficiency but good many other things.

THE COURT: I sustained your objection. You need not argue it.

Q Now, in your redirect examination by Mr. Story, you said that your testimony as to the capacity of the Olmsted flume being only two hundred and thirty five second feet, by that you meant the operating capacity?

A What we consider the operating capacity, yes, sir.

Q And then you qualified it further by saying something about the flume down at the Mud plant?

A I stated under those conditions, two hundred and thirty-five second feet, in the flume, there was a considerable free board down at the mud slide or mud cut.

Q Did you observe that yourself?

A I was over the flume several times during that summer and know the general condition which prevailed. I don't know the conditions which prevailed at the time the test was made.

Q So that you don't know anything about the condition at the time those two hundred and thirty-five second feet----

A No, sir.

Q Is given as the capacity of the flume?

A No, sir, I know the condition which prevailed at the time when I, myself measured approximately that same amount of water.

MR. STORY: Your Honor, I object to the question where he says, "given as the capacity of that flume." That blue print does not give or purport to give the capacity of the flume. It gives the number of second feet of water in the flume at that time.

THE COURT: Objection is overruled, the witness testified repeatedly that was the capacity of the flume on his first cross examination, and it was some-

what modified by your redirect. Now, this is proper recross examination.

Q You say there was free board when you measured it, and got approximately that capacity?

A Yes, sir.

Q When was that measurement made by you and where did you make the measurement?

A Measurement was made near the head of the flume, near Donnan's. It was made in 1910, I believe, somewhere around there, somewheres 1910.

Q What was the free board at Donnan's?

A Free Board at Donnan's, I don't remember, it wasn't as much.

Q What was the depth of the water when youmeasured it?

A I cannot tell you that.

Q You could not give us any data as to that measurement?

A No, I haven't it with me.

Q Haven't you any recollection of it?

A No, I have not.

Q You didn't see the free board at that time down at the mud slide?

A Yes.

Q What was the free board there then?

A The free board was in the neighborhood of sixteen inches.

Q It wasn't so much at Donnan's?

A It wasn't so much.

Q How much would you say it was?

A Probably eight or ten inches.

Q By free board you mean above the top of the disturbances of the waves?

A Above the--

Q Or above the water in a still well?

A Above the average disturbances in the flume.

Q Then, if you have the flume full, it would runover the sides, would it not, with that condition?

A. Yes, I would imagine so.

MR. THOMAS: I have some evidence in relation to Provo City.

MR. RAY: I want to object to this evidence, and I think in fairness to counsel Mr. Thomas should state what is evidence is.

MR. THOMAS: Provo City desires and offers to present evidence as to the flow of water in the streams, which were-- the specific ditches which were visited by Mr. Stratton and his associates, that is, in the last sitting of the court.

MR. RAY: To that evidence I desire to object as not proper rebuttal and is irrelevant and immaterial. Your Honor will remember that I attempted to put upon the stand Mr. Stratton and Mr. Knight to introduce testimony.

THE COURT: Let me understand, since the last session of the court?

MR. RAY: Yes, the winter flow of those streams.

THE COURT: I don't think the court will open the case for that. It will have to close sometime.

MR. THOMAS: These measurements were made day before yesterday.

THE COURT: I will not reopen the case for that purpose. I will not come back for that. If we had time today I propably would have exercised the discretion, still, there must be some time when the testimony closes.

MR. THOMAS: I appreciate that, your Honor. The other matter of evidence was testimony as to the number of wagons used for sprinkling and capacity of the wagons used for sprinkling in this city. There was evidence, the court will remember, presented by Mr. Swan as to the miles of street sprinkling.

MR. A. C. HATCH: How many wagons have you?

MR. THOMAS: Four.

MR. A. C. HATCH: What is the capacity. That is all in the testimony?

MR. THOMAS: No, not that particular thing. This will

be the testimony that will be presented through Mr. LeRoy Dixon, one of the city commissioners that for the past -- during the term of office he has been in charge of the street sprinkling, and he will testify that Provo City has four sprinkling wagons, about seven hundred gallons capacity each, that they run two of those per day, averaging from forty-five to fifty loads per shift. That the streets are sprinkled on an average, twice or more per day, and the streets need more sprinkling. The city has also a flusher which runs one shift of about fifty loads. That is the testimony that will be offered or testified to by Mr. LeRoy Dixon, if the court permits its admission.

MR. RAY: I object to the admission of the testimony, your Honor please, on the ground that the plaintiff went into that through its witnesses and made tabulations as to the sprinkling requirements of provo City.

THE COURT: That is my recollection.

MR. THOMAS: As far as Mr. Swan is concerned, that is true.

MR. A. C. HATCH: The capacity of the wagons we admit, and number.

THE COURT: Number and capacity of the wagons.

MR. RAY: We will admit it.

MR. A. C. HATCH: That may be read into the record.

MR. THOMAS: Will you gentlemen admit with that service the streets are not now properly and thoroughly sprinkled?

MR. A. C. HATCH: No.

MR. RAY: Mr. Swan has given testimony as to the necessity.

MR. THOMAS: For the purpose of the record, I offer the testimony of Mr. LeRoy Dixon, who, if permitted to testify, will testify as I have read from the notes that I have.

THE COURT: I don't hear any objection to it.

MR. RAY: I object to it.

THE COURT: The objection is sustained, and it is largely sustained because of the fact we have no time to receive it, that it is offered at a time when the court could not receive it if the court cared to. I think you went into it, I think you went into it fully. I don't think it helps your evidence in the least, but if you care to amplify it in that way the court would permit you to do that.

MR. THOMAS: We offered it at the first available opportunity.

THE COURT: No, I don't think so. We have considerable time today when there was nothing to do, and the court had to wait for witnesses, took a recess because there wasn't anyone ready. The court will stand adjourned so far as the further hearing of this case is concerned at Provo, and argument will take place at Salt Lake City.

MR. THOMAS For the purpose of the record, may I take anexception to the ruling of the court. I should like to show Provo City excepted.

THE COURT certainly. I expect the argument to be heard in the council chamber at the City and County Building. I have not yet made the arrangements for it, but I apprehend I will be able to, if not, we will get some other room there in the City & County Building, so there will be ample room.

5:00 P.M., Recess to 10:00 A.M., April 30, 1917.

WHEREUPON the court say pursuant to adjournment at Salt Lake City, April 30, 1917.

WHEREUPON the argumentsin the above case were had and proceeded with upon said April 30, 1917; and May 1, 1917; May 2, 1917; May 3, 1917; May 4, 1917.

WHEREUPON the court adjourned to meet at Provo City at 10:00 A.M. on July 27, 1917.

OMISSION.

Hearing on petition of Provo City for the court to direct the commissioner as to distribution of water.

WHEREUPON the court adjourned to meet at Provo November 26, 1917, at which time the following proceedings were had:

THE COURT: Gentlemen, I have finally arrived at a decision in this case.

MR. A. C. HATCH: If the court will permit me for a moment, there is a matter that we overlooked, were probably negligent in not going into it before the case was finally closed at the taking of evidence, but with relation to the Provo Pressed Brick Company I say that until Tuesday or Wednesday of this week I had concluded that a certificate of appropriation of water was final and conclusive, and I was handed an application to appropriate made by the Provo Pressed Brick Company, and in reading it over in connection with the certificate of appropriation I concluded that the application which was not introduced in evidence in this case ought to be introduced in order that the certificate would be properly understood, and we now ask the court to allow us at this time to introduce the application upon which the certificate of course is based, and our reason for so doing is that we believed and still believe that a certificate cannot be properly construed as it reads without the application used in connection with it, and the offer is on the regular form to appropriate water, "Application to Appropriate Water, State of Utah, Provo, Utah, February 20, 1907. For the purpose of acquiring the right to use a portion of the unappropriated water of the State of Utah, application is hereby made to the State Engineer, based upon the following showing of facts, submitted in accordance with the requirements of Chapter 108 of the Session Laws of Utah, 1905.

The purpose for which the Water is to be appropriated is Power." Then a note which is directory as to the manner of filling in.

1. The name of the applicant, Provo Pressed Brick Company.

2. The postoffice address of the applicant is Provo City, Utah.

3. The flow of water to be used in cubic feet per second is 100.

3a. The quantity of water to be appropriated is blank acre feet.

4. The water is to be used each year from January first to December last, both inclusive.

5. The water is diverted from Utah Lake on provo River, Utah County,

6. The principal point at which the water is to be diverted is described as follows: A point on left bank of Provo River which is N. 40 degrees 05 minutes West 45.78 chains from the southeast corner of Section 25 in Township 6 South Range 2 East, Salt Lake Meridian.

7. The diverting works will consist of 4 foot gates, 3 in number placed side by side, and a diverting channel and tail race.

8. The cross section of the diverting channel will be -- then there are some figures-- gates and canal-- with a box form and sloping form indicating.

9. The nature of the diverting channel will be: earthen, wooden, concrete, culvert under the railroad.

10. The length of the diverting channel will be 4591, Tailrace 1339 feet.

11. The top width of the diverting channel will be 16, Tailrace 16 to 25 feet.

12. The bottom width of the diverting channel will be 12, tailrace 12 feet.

13. The depth of water in the diverting channel will be about 2, and tailrace 2.5 feet.

14. The diameter of the diverting channel will be blank.

15. The grade of the diverting channel will be about 29 tailrace 10 feet per mile.

16. The number of wheels employed in the development of power will be two.

17. The size of the wheels will be #23 inches.

18. The make of the wheels will be Samsons Improved Upright Turbines.

19. The wheels will operate under a head of 18 feet.

20. A total of about 173 horse power will be produced.

21. The power thus produced will be used for electic lighting and propelling machinery at Provo and other points in Utah.

22. After having passed through said wheels, the water will be returned to the natural stream or source at a point described as follows: On left bank of Provo River at point which is North 51 degrees 06 minutes East 10.68 chains 704.88 feet from the center of Section 30 in Township 6 South Range 2 East, Salt Lake Base and Meridian. Then there is an explanatory note and the following additional facts are set forth in order to more clearly define the full purpose of the proposed application. The object of this application is to provide a source of supply which will conserve some of the water by shortening the channel, and by putting all of the water now running in the three channels viz: Factory Race, City Race, and Tanner's Race, into one. Also to supply water during some of the winter months when much ice and flooding prevent its use now. And also to increase the power by the use of water now running in the City and Tanner Races. The water used will be diverted at the above described point, and carried to the present penstock of the Provo Pressed Brick Company where it will be used for the development of power at a point which is North 61 degrees 35 minutes east 28.53 chains 1883.0 feet from center of Section 36 in Township 6 South Range 2 East, Salt Lake Base and Meridian, immediately south of penstock will be Placed gates and rating flume for the diversion and control of the water. The Factory Race water being taken at this point. The water going to the

City and Tanner Races will be carried in a tailrace in Southwest direction to confluence with the City Race where gates and rating flume will be placed for the diversion of the City and Tanner water. This point is North 60 degrees 30 minutes East 12.25 chains 808.5 feet from the center of said Section 36. From this point the water belonging to the Tanner Race will be carried a distance of 240 feet to the above described point of return (Sec. No. 6). The railrace will be large enough to carry all of the diverted water if it should be necessary at any time. (Signed) Provo Pressed Brick Co. By S. H. Belmont Mgr. Then the Engineer's notes, and it is certified as a true copy of the application made by Provo Pressed Brick Company to appropriate water , and all the endorsements thereon as shown by the records of my office. G. F. McGonagle per C. J. Ulrich, Assistant State Engineer. Recorded March 18, 1907. File No. 1221. This is dated November 22, 1917. If you will mark it.

(Paper marked Exhibit 258.)

MR. CLUFF: Object to it at this time as wholly irrelevant and immaterial.

MR. A. C. HATCH: The certificate is for the appropriation of a hundred second feet of water to be taken from the Provo River, the point of diversion provides where it shall be diverted. After having been so diverted and used that part of the water which is required to serve prior rights in the Factory race is returned to the Factory race at a point -- telling where-- and that part of the water which is to serve the rights of the Provo City race is returned to the race at a point, describing it. The remaining water is returned to the river at a point which bears south 49 degrees 43 minutes 2050 from the corner above described, and the diverting works are to be maintained in such condition as will prevent an unreasonable loss of water. Now, that balance of the water is the water that was

used in the Tanner race and the application, as we construe it, the certificate is already in evidence, is an application for only such quantity of water as has been used through those three races; and it is in evidence that at times there has been as much as a hundred second feet flowing in those races at those times, these people would be entitled to it under the certificate probably. At other times the evidence in the record shows that there is not exceeding 35 second feet or thereabouts as we have it, and under that application is the language of the application had been used in the certificate there would be no question that they made none and intended to make no appropriation for any water which was then going in those three races, and it was to bring the water in those three races together before it reached their point of use, and they are to use it, and it was never their intent to use any other water. That is our construction of the certificate, that in connection with the application, and we wanted to offer it at this time so that it will go into the record in any event.

MR. CLUFF: we object to any offer of anything of the sort at this time, because we think it is wholly irrelevant and immaterial and too late. I don't know has it has any particular bearing on anything that might have been introduced at the trial or not, or how it can enlighten the court any, and certainly object to the introduction of this as opening up this case.

THE COURT: The only matter that appeals to the court is the time in which it is offered. I can see that it is material of course, upon the theory that a certificate issued by the State Engineer is but prima facie evidence of a right, the application would be the material matter, and not only material, but very material. If the contention made by Judge Hatch is correct with refeeence to the construction that should be placed upon the certificate in the light of the application, it would change very materially the award the

court has made to the Provo Pressed Brick Company, so that it is material without any question if that contention should be correct. I am inclined to permit the paper to be introduced.

MR. CLUFF: We would like time to look into it then.

THE COURT: You may have whatever time you desire to look into it,

MR. CLUFF: And take an exception to the introduction of it at this time.

THE COURT: Now, as I was about to say, gentlemen, I have prepared in writing the conclusions I arrived at, and this decision covers forty-four pages of typewritten matter and much of it is figures, so I will not attempt to read. I think about all that should be done at this time would be to file the original with the clerk, and I have had Mr. Davis make sufficient copies so that, I think, every attorney-- that is the attorney for each of the parties-- I don't mean one for each attorney where there is more than one for the same party-- may have a copy of it.

OMISSION.

Discussion as to drawing of decree.

WHEREUPON the court adjourned to meet at Provo at 10:00 A. M., December 15, 1917, at which time the question of omissions and mistakes in the decision of the court was presented by the various parties, together with proposed requests for modifications and changes of the decision.

WHEREUPON the court adjourned to 10:00 A. M., January 28, 1918, at which time discussion was had as to decision, proceedings in relation to appointment of commissioner, corrections of errors in decision and requests by various attorneys for further time in which to present applications to modify the decision.

WHEREUPON the court adjourned to meet at Salt Lake City, at 10:00 A. M., April 29, 1918.