1895 San Diego Flume Co. offered to sell a large block of water S.D. City council turned It down Sabcock managed the Cuyamaca water Company; also manager of the San Diego water Company, which was operated as a public utility, rates being fixed annually by the city council.

at Fletcher dam.

ertificate of due diligence.

Water filings at El Capitan
in 1911

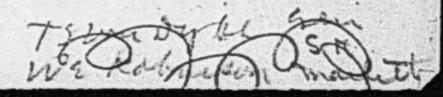
Acquisition El Monte pumping plants.

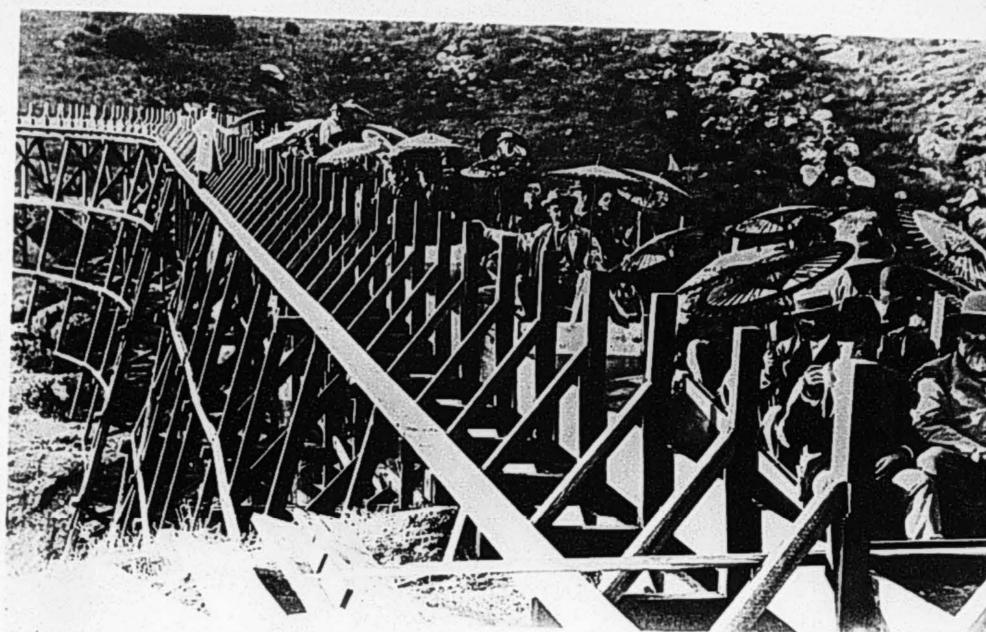
Pumping rights from El Capitan reservation granted by government

Mission orge No. 3 acquired in/1918. Water Silings later.

Improvements made on system including Murray Dam.

Cities and towns developed.





Photographer, San Diego Fleme

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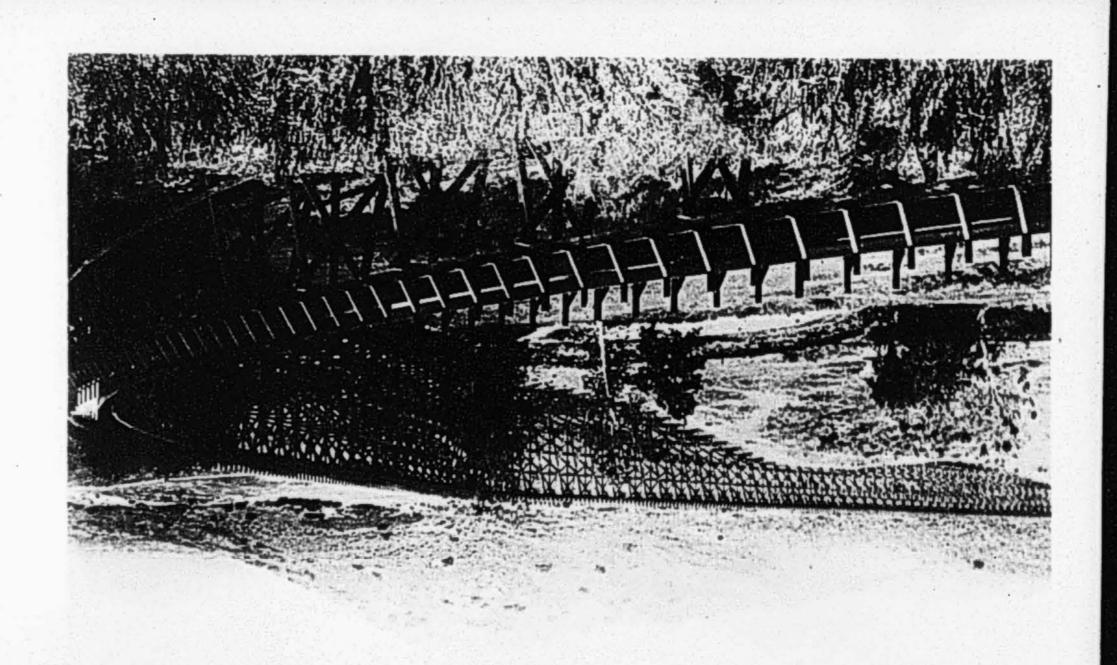


Exhibit No. 6.

From the letters of Ed Fletcher, the following letters were removed to the alphabetized correspondence files:

"SAN DIEGO FLUME CO. AND WATER HISTORY CORRESPONDENCES"

LUCE, M. A., January 4, 1919
HOWELLS, J. M., January 9, 1919
SMITH, JOSEPH H., January 13, 1919
HEILION, M. C. of the San Diego Flume Co.:
Flume Co. to BRYAN, T. J., July 7, 1905
Fletcher to Heilion, June 10, 1910

# NOTICE OF APPROPRIATION OF WATER

The San Diego Flume Company hereby claims and appropriates all the waters of Boulder Creek in the County of San Diego, California, to the extent of Two Thousand Miner's Inches measured under a four inch pressure, whether above or below ground and now flowing or hereafter to flow at the following point on said stream, the same being the point where this notice is posted and the point at which the Company intends to divert said water, to-wit:

The narrow gorge between the two most northern peaks of the Cuyamaca Mountains where the creek leaves the meadows between the Laguna and the Mountains, said water is claimed to the head of said creek.

Said water is appropriated, claimed and intended for irrigation and domestic use and mechanical purposes.

The place where it is intended to use said water are the City of San Diego, Ex Mission Rancho, Rancho El Cajon and

The Company intends to divert said water by means of a dam in said stream and by a flume ditch tunnel or other aqueluct three feet wide and two feet deep or less if the fall will permit and by iron pipes twenty inches in diameter or less if the fall will permit.

This water is claimed as a part of the water and flume.

System already begun on the San Diego River by Wm. E. Robinson and others whose rights the Company has acquired and as a branch of said system, the main work upon which is now being done upon the main line on said river to be connected to this with a flume or pipe.

The San Diego Flume Company Goo. D. Copeland, Pres.

A.C. Platt, Secretary Posted July 31, 1886

Received for record Aug. 4th, 1886 at 9 O'clock A.M. at re-

S. A. McDowell, County Recorder

### NOTICE OF APPROPRIATION OF WATER.

The San Diego Flume Company hereby claims and appropriates all the waters of the South Fork of the San Diego River in the County of San Diego, California, to the extent of Four Thousand Miner's Inches measured under a four inch pressure whether above or below ground, and now flowing or hereafter to flow, at the following point on said stream, the same being the point where this notice is posted and the point at which the Company intends to divert said water, to-wit:

On the South Fork of the San Diego River at a point about one mile above the junction with the main river and as near as can be told in section thirty-six or thereabouts Township 14 North, Range 2 East, San Bernardino Meridian.

Said water is appropriated, claimed and intended for irrigation and domestic use and mechanical purposes.

The places where it is intended to use said water are the City of San Diego, Ex Mission Rancho, Rancho of El Cajon and other places between the point of diversion and the sea-board.

The Company intends to divert said water by means of a dam in said stream and by a flume, ditch, tunnel or other aqueduct four wide and three deep or less if the fall will permit and by iron pipes -- inches in diameter or less if the fall will permit.

This water is claimed as a part of the water and Flume system already begun on the San Diego River by Wm. E. Robinson and others, whose rights the company has acquired and as a branch of said system, the main work upon which is now being done upon the main line on said river to be connected to this with a flume or pipe.

THE SAN DIEGO FLUME COMPANY

(SEAL)

George D. Copeland, President

A. C. Platt, Secretary, Witness to Posting, R. H. Stretch, June 29, 1886.

Received for record July 2, 1886 at 9 o'clock A.M. at request of T. S. Van Dyke.

S.A.McDowell, County Recorder, By J. S. Sandeman, Deputy.

# NOTICE OF APPROPRIATION OF WATER

The San Diego Flume Company hereby claims and appropriates all the waters of the San Diego River to the head of Boulder Creek in the County of San Diego, California, to the extent of Six Thousand Miners Inches measured under a four inch pressure whether above or below ground and now flowing or hereafter to flow, at the following point on said stream the same being the point where this Notice is posted and the point at which the Company intends to divert said water, to-wit:

About One Thousand feet above the lower end of the Boulder Wash known as Rocky Bar above Capitan Grande on said river, where the river has been excavated to bed rock by Wm. E. Robinson and associates.

Said water is appropriated, claimed and intended for irrigation and domestic use and mechanical purposes.

The places where it is intended to use said water are the City of San Diego, Ex Mission Rancho, Rancho of El Cajon and the company intends to divert said water by means of a dam in said stream and by a flume ditch, tunnel or other aqueduct six feet wide and four feet deep or less if the fall will permit and by iron pipes 30 inches in diameter or less if the fall will permit.

The San Diego Flume Company,

A.D. Platt, Sec.

George D. Copeland, President.

Posted on the ground May 28, 1886, Received for record June 1, 1886 at 4 o'clock P.M. at request of T. S. Van Dyke.

S. A. McDowell, County Recorder,

By J. J. Sandeman, Deputy Recorder.

# EXHIBIT D

# Copy of No. 4.

# NOTICE OF APPROPRIATION.

NOTICE IS HEREBY GIVEN: That the undersigned B. Otterstedt does hereby claim all the flood water of the San Diego River, and all surface and subterranean water of said river, not otherwise appropriated, flowing at the point where this notice is posted to the extent of 100,000 Miner's Inches, measured under a four inch pressure; said water to be impounded by means of a dam and at this point and stored at this point and at various reservoirs to which said flood and other water is intended to be conveyed;

That the point of intended diversion is at or near the dam known as the Diverting Dam of the San Diego Flume Company:

That the purposes for which the water is claimed is primarily for domestic and irrigation purposes;

That the place of intended use is on lands lying between the point of diversion westward to the Pacific Ocean;

That the means by which it is intended to divert, and to impound, and convey the same are by means of dams, and by means of a canal consisting of ditches, flumes, tunnels, pipes and conduits, all of the capacity and size sufficient to store and carry said 100,000 Miner's Inches from the intended point of diversion to the point of use thereof.

Dated June 1, 1910.

B. Otterstedt Appropriator.

Witness: Geo. A. Doyle.

Recorded at request of Claimant June 1, 1910 at 36 min. past 3 O'Clock P.M.

# NOTICE OF APPROPRIATION.

NOTICE IS HEREBY GIVEN, that the undersigned. L. A. Olsen, claims and appropriates all the water flowing or hereafter to flow in the channel of the San Diego River, in the County of San Diego, State of California, at the point where this notice is posted, being in the northwest quarter of Section 8, Township 15, South, Range 2 East, San Bernardino Meridian, together with the water of all creeks or affluents of said river, to the extent of Five Hundred Miners Inches, measured under a four inch pressure of the continuous flow of said stream.

The purposes for which said L. A. Olsen appropriates and claims said water are for the irrigation of land in the said County of San Diego, State of California, and for horticultural and agricultural purposes on said lands and for domestic purposes.

The places of intended use of said water are on lands within the Rancho El Cajon and Ex Mission San Diego, and for domestic purposes in the Cities of La Mesa, East San Diego, and San Diego.

The means by which said L. A. Olsen intends to divert the said water is by the construction of a solid dam across the channel of said river at the point where this notice is posted, as aforesaid, 50 feet in height, more or less, in order to divert sufficient waters of said stream to make up with the flow of said stream the said continuous flow of five hundred inches of water so measured as aforesaid; also by means of three pipe lines 12 inches in diameter on a grade of 16 feet per mile; and also by means of a flume, coment aqueduct, and tunnels, the same to be 6 feet wide and 2 feet in height on a grade of 4.75 feet per mile.

The place of intended diversion of said water is the place where said dam is to be constructed, and where this notice is posted as heretofore stated, and also at points along the margin of the reservoir created by said dam, where water will be diverted by pumping.

IN WITHESS WHEREOF; I put my hand this 12th day of June 1914.

J. N. Mullins

Witnesses.

L. A. Olsen Appropriator.

E. F. Stockley

# NOTICE OF APPROPRIATION

NOTICE IS HEREBY GIVEN, that the undersigned, W. E. Keenan, claims and appropriates all the water flowing or hereafter to flow in the channel of the San Diego River, in the County of San Diego, State of California, at the point where this notice is posted, being in the southwest quarter of Section 22, Township 14, South, Range 2 East, San Bernardino Meridian, to the extent of Fifty Miners Inches, measured under a 4 inch pressure of the continuous flow of said stream.

The purposes for which said W. E. Keenan appropriates and claims said water are for the irrigation of land in the said County of San Disgo, State of California, and for horticaltural and agricultural purposes on said lands and for domestic purposes.

The places of intended use of said water are on lands within the Rancho El Cajon and Ex Mission San Diego, and for domestic purposes in the Cities of La Mesa, East San Diego, and San Diego.

The means by which said W. E. Keenan intends to divert the said water is by means of wells constructed across the channel of said river at the point where this notice is posted as aforesaid; also by means of a pumping plant; also by means of two pipes 6 inches in diameter on a grade of 16 feet per mile, and also by means of a flume, cement aqueduct, and tunnels, the same to be 6 feet wide and 2 feet in height on a grade of 4.75 feet per mile.

The place of intended diversion of said water is the place where said wells are constructed and said pumping plant is located, and where this notice is posted, as heretofore stated.

IN WITNESS WHEREOF, I put my hand this 12th day of June, 1914.

W. E. Keenan Appropriator.

# EXHIBIT D

Copy of No. 4 (Continued)

I, B. Otterstedt, in consideration of Ten Dollars (\$10.00) do hereby grant, bargain, sell, assign and transfer to Ed Fletcher, all water and water rights and privileges and all claims and right to appropriate water referred to in the notice of appropriation dated the 1st day of June. 1910, and subscribed by me and filed for record in the office of the County Recorder of the County of San Diego. State of California, on the 1st day of June, 1910, and recorded in Book Number 4 of Water Claims, at page 51 in said County Recorder's office and all my rights and privileges in or under such appropriation and notice of appropriation, and also all my rights, title, interest and claims in or to the water referred to in said notice of appropriation and all my right to appropriate, take, impound and use said water and any water flowing, or that may hereafter flow in the San Diego River, in the County of San Diego, State of California, or any of its affluents or tributaries.

To have and to hold all the above mentioned water and water rights and privileges and property unto the said Ed Fletcher, his heirs and assigns forever.

IN WITNESS WHEREOF, I hereunto set my hand this 14th day of February, 1913.

B. Otterstedt.

State of Oregon, SS. County of Multnomah

On this 14th day of February, A.D. 1915, before me, A. J. Moore, a Notary Public in and for the said County and State, residing therein, duly commissioned and sworn, personally appeared B. Otterstedt, known to me to be the person whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

A. J. MORE. Notary Public in and for the County of Multnomah, State of Oregon I. W. E. Keeman, in consideration of Ten Dollars (\$10.00), the receipt of which is hereby acknowledged, bargain, sell, assign and transfer to Ed. Fletcher, all water and water rights, privileges and all claims and right to appropriate water referred to in the notice of appropriation dated this 12th day of June, 1914, subscribed by me and a copy of which is hereto attached and made a part of this instrument and I further hereby grant, targain, sell, assign and transfer to said Ed Fletcher, all my right, title, interest and claim in or to the water referred to in the said notice of appropriation and all my right to appropriate to take and use and impound said water and all my right to the water of the San Diego River, or any of its affluents or tributaries.

IN WITHESS WHEREOF, I have hereunto set my hand this 7th day of July, 1914.

W. E. Keenan.

STATE OF CLAIFORNIA ) SS.

On this 7th day of July, in the year One Thousand Nine Hundred and Fourteen, before me, Lou B. Mathews, a Notary Public in and for the County of San Diego, personally appeared W. E. Keenan, known to me to be the person whose name is subscribed to the above instrument, and he duly acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notraial Seal, of my office, in the County of San Diego, the day and year in this certificate first above written.

Lou B. Mathews

Notary Public in and for the County of San Diego, State of California.

(SEAL)

My Commission expires January 16, 1915.

I. L. A. Olsen, in consideration of Ten Dollars (\$10.00), the receipt of which is hereby acknowledged, bargain, sell, assign and transfer to Ed. Fletcher, all water and water rights, privileges and all claims and right to appropriate water referred to in the notice of appropriation dated this 12th day of June, 1914, subscribed by me and a copy of which is hereto attached and made a part of this instrument and I further hereby grant, bargain, sell, assign and transfer to said Ed. Fletcher, all my right, title, interest and claim in or to the water referred to in the said notice of appropriation and all my right to appropriate to take and use and impound said water and all my right to the water of the San Diego diver, or any of its affluents or tributaries.

IN WITHESS WHEREOF, I have hereunto set my hand his 7th day of July, 1914.

L. A. Olson

STATE OF CALIFORNIA ) 88. SOUNTY OF SAN DIEGO )

On this 7th day of July, in the year One Thousand Nine Hundred and Fourteen, before me, Lou B. Mathews, a Motary Public in and for the County of San Diego, personally appeared L. A. Olsen, known to me to be the person whose hame is subscribed to the above instrument, and he duly acknowledged to me that he executed the same.

IN WITHESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal, of my office, in the County of San Diego the day and year in this certificate first above written.

LOU B. MATHEWS.

Notary Public in and for the County of San Diego, State of California.

(SEAL)

My Commission expires January 16, 1915.

# (Notice of Appropriation of Consolidated Water Co.)

(5000 Miners Inches at Monte Pump)

### NOTICE OF APPROPRIATION

Notice is hereby given that the undersigned, the Consolidated Water Company, a corporation, claims and appropriates all the waters flowing or hereafter to flow in the channel of the San Diego River in the County of San Diego, State of California, at the point at which this notice is posted, being a willow tree, North 26° 45° West, 163.3 feet from a stone monument set in the intersection of the center line of Julian Avenue and the boundary lines common to Tracts "R" and "S" Rancho El Cajon, to the extent of Five Thousand, (5000) miner's inches measured under a four-inch pressure, of the continuous flow of said stream, whether flowing on the surface of the ground or underground.

The purpose for which said company claims the said waters are for sale, rental and distribution for irrigation of lands for agricultural and horticultural purposes, for mining and manufacturing, mechanical, domestic and all other lawful and useful purposes.

The places of intended use are Sheekels Hesa, Jamal Bancho, Tia Juana Valley, head of the bay region, Jamacha Rancho, El Cajon, National Rancho, Otay Rancho, Otay Mesa, Otay Valley, Spring Valley, El Cajon Rancho, Ex Mission Rancho, Linda Vista, the Pueble lands of San Diego and all the neighboring and adjacent lands and all the lands that can be irrigated from the waters of said stream; also the cities of San Diego, Mational City, Goronado, Otay, Tia Juana, and any and all neighboring and adjacent lands, cities, towns, villages, hamlets or places; also all towns, cities, hamlets, villages, manufacturing centers, mining samps or any other source of lawful and useful demands for said water that may hereafter arise upon the territory herein described or adjacent thereto, all in the County of San Diego, State of California.

The means by which the said Company intends to divert the said water is by the sinking or driving of wells in the bed of said stream, the placing of a pumping plant or plants necessary to develop and supply said water and such pipe lines and flumes as may be necessary for said purpose, and the flumes, pipe lines, reservairs and distributing system of the San Diego Flume Company now in use and hereafter to be constructed, and such other distributing flumes and pipe lines as may be necessary to distribute and supply said waters to the places above mentioned.

The pipe lines and flumes connecting the wells sunk or driven and hereafter to be sunk or driven with the flume line of the said San Diego Flume Company, will be an follows:

Four, six, eight and eleven inch pipe, 14 inch by 19 inch flume or larger sized pipes and flumes if necessary to carry the amount of water developed. Consolidated Water Company

By John D. Works,

Its Attorney.

Witness to the posting of said notice, This 16th day of March, 1899.

George Putnam.

State of California) 1-58 County of San Diego

George Putnam - being duly sworm, on his oath says that he did, on the sixteenth day of March, 1899, post a copy of the foregoing notice at the place designated therein, which place was conspicuous.

Subscribed and sworn to before me, this 16th day of March, 1899.

George Putnam.

Inura B. Anderson, Notary Public, San Diego, Calif. Laura B. Anderson,

Hotary Public in and for the

County of San Diego,

State of California.

Recorded at the request of M. C. Healion, March 25, 1899, at 15 min. past 3 o'clock, P. M.

Pee 80¢

Jno. F. Forward, Recorder, By A. P. Johnson, Jr., Deputy Recorder.

Recorded in Book 3, Page 268 of "Water Claims."

#### SAN DIECO FLUME CO.

STH NILES OF FLUME AND TRESTLES.

COMPLETED FEB 'Y. 6TH 1888.

MORSE & SMITH, CONTRACTORS.

IS PLUME BOMPS, 8 FT.LONG, 120.FT.  348 DO DO 12 FT. DO 4176 FT.  289 DO DO 16 FT. DO 4624 FT.  91 DO DO 20 FT. DO 1820 FT.  745 DO DO 10740 FT.  SHORTAGE & AVOIDABLE WASTE 70  AT 17 1-3 B.M. PR. FT. 10670 184947  EXTRA LUMBER IN 18 & 20 SIDES, 1867  21 STOP CATES, 462  1 WASTE CATE, 650 1112  TOTAL FLUME LINING PLANK, 187,926 49.25 \$9255.36  FLUME SILLS, 756 - 6 X 8 X 12 46272  100 POSTS, 1464 - 4 X 6 X 12 46272  100 POSTS, 1464 - 4 X 6 X 4 20715  200 BRACED 5368 - 3 X 4 X 3 16104  100 STRINGERS, - 4 X 6 34776  TRESTLE DO - 4 X 12 15232  EXTRA STRINGERS & 6 X 12 11424  FLUME HUD PLANK, 2169 2 X 12 X 9 39042  EXTRA STRINGERS & 10560 17600  TY DUAL HUBBER IN FLUMS, - 244,982 44.25 \$10840.45  TOTAL HOUGH LUMBER IN FLUMS, - 244,982 44.25 \$70.36  DO 20 TO 40 DO 10,255 44.75 458.20	548 DO DO 12 FT. DO 4176 FT. 289 DO DO 16 FT. DO 4624 FT. 291 DO DO 20 FT. DO 1820 FT. 291 DO DO 10740 FT. 5HORTAGE & AVOIDABLE WASTE 70  AT 17 1-3 B.M. FR.FT. 10670  AT 184947  EXTRA LUMBER IN 18 & 20 SIDES, 1867  21 STOP CATES, - 462  1 WASTE CATE, - 650  TOTAL FLUME LINING PLANK, - 187, 926  49.25  \$9255.36  FLUME SILLS, 756 - 6 X 8 X 12  1028 - 4 X 6 X 12  46272  10 POSTS, 1404 - 4 X 6 X 4  11872  3884 - 4 X 4 X 4  20715  DO BRACEE 5368 - 3 X 4 X 3  16104  A	KIND OF MATERIAL IN WORK.		Fr.B.M.	PRICE.	Aliounii.
TOTAL MOUCH LUMBER IN FLUME, - 244,982 44.25 \$10840.45 TRESTLES, 0 TO 20 IN GREATEST HEIGHT, 16,855. 40.25 670.38 DO 20 TO 40 DO 10,239 44.75 458.20	12 BRAIN BOXES 1385 & I WASTE CATE  976 2381  TOTAL ROUGH LUMBER IN FLUME, - 244,982 44.25 \$10840.45  TRESTLES, O TO 20 IN GREATEST HEIGHT, 16,655. 40.25 670.36  DO 20 TO 40 DO 10,239 44.75 458.20  DO 60 TO 85 DO 59,177 48.75 2884.88  ONE TRUSS BRIDGE - 80 FT. SPAN, 26.00 2080.00	### 100 DO 12 FT. DO 4176 ####################################	FT. FT.  184947 1867 1112 - 27216 46272 11872 20715 16104 34776 15232 11424 39042	187,926	49.25	\$9255.36
DO 20 TO 40 DO 10,239 44.75 458.20	DO 20 TO 40 DO 10,239 44.75 458.20  DO 60 TO 85 DO 59,177 48.75 2884.88  ONE TRUSS BRIDGE - 80 FT. SPAN, 26.00 2080.00	FOTAL MOUGH LUMBER IN FLUME, -	976 2361	244,082	54 C053 PCS50 NRSC256 NAKE C	(2)(3)(2)(1)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)
	ONTE TRUSS BRIDGE - 80 FT. SPAN,   26.00 2080.00	DO 20 TO 40 DO		10,239	44.75	458.20
PLANTING BRIDGE TIMBER 6704  B, 335  5.00  41.68  AND  AND  TOTAL,  1912.64		COUNT ALLOWED ON FINAL SELLENE	Auto-District Control of the Control	Charles and the Control of the Control	THE CHARLES AND EAST OF SHEET	PROFESSION OF THE PARTY OF THE PROPERTY.

J. M. Fraham

TOTH MILES OF FLUME AND TRESTLES.

COMPLETED JAN'Y. 20 -- 1888.

MOORE & SMITH,

CONTRACTORS.

KIND OF MATERIAL IN WORK.	FT.B.M.	PRICE.	AMOUNT.
TRESTLES, O TO 20 FT. IN GREATEST HE	EIGHT. 32,285.	40.25	\$1,299.47
DO 20 TO 40 FT. DO.	14,015.	44.75	627.17
FLUME LIMING PLANK	- I83,647.	49.25	9,047.82
100 POSTS, SILLE, BRACES, STRINGERS,	STRING-		
ERS ON TRESTLES, AND OTHER ROUGH LUI	BEIL	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
IN FLUME,	- 246, 184.	44.25	10,904.22
ROUGH LUMBER IN TUNNEL NO. 3.	- I,751.	36.75	64.40
tribe in a processor.	TOTAL, -	- ( - ( - ( - ( - ( - ( - ( - ( - ( - (	\$21,943.08
NOUNT ALLOWED ON FINAL SETTLEMENT,		- \-	145.85
			\$22,086.03

I CERTIFY THE FOREGOING ESTIMATE TO BE CONTECT,

J. m. Graham

CHF. ENG'R.

THE 7TH AND 8TH MILES CAN BE COMPLETED IN TWO WEEKS.



ESTIMATE OF MATERIAL IN THE 7TH & 8th MILES OF FLUME AND TRESTLES.

COMPLETED FEB'Y. 6th 1888.

MORSE & SMITH, CONTRACTORS.

KIND OF MATERIAL IN WORK.	:FT. B.M. :	PRICE.	: AMOUNT
15 Flume Boxes, 8 ft. long, 120 ft. 348 Do Do 12 ft. Do 4176 ft. 289 Do Do 16 ft. Do 4624 ft. 91 Do Do 20 ft. Do 1820 ft. 91 Do Do 10740 ft. 35 Do Do 10740 ft. 36 To 17 1-3 B.M. Pr.Ft. 10670 36 Extra Lumber in 18 & 20 Sides, 21 Stop Gates, - 462 1 Waste Gate, - 650 Total Flume Lining Plank, - Flume Sills, 756 - 6 x 6 x 12 1928 - 4 x 6 x 12 1928 - 4 x 6 x 12 2 Do Posts, 1484 - 4 x 6 x 4 2 3884 - 4 x 4 x 4 2 Do Braces 5368 - 3 x 4 x 3 2 Do Stringers, - 4 x 6 2 Flume Mud Plank, 269 2 x 12 x 9 2 Extra Stringers & 1464 Blocks, 4 x 6 x 8	27216: 46272: 11872: 20715: 16104:	49.25	\$9255.3
Run Plank, 2 x 10 10560 : 12 Drain Boxes 1385 & 1 Waste Gate :	2361 244,982 16,655 10,239 59,177	40.25 44.75 48.75 26.00	670.3 458.2 2884.8 2080.0
Amount Allowed on Final Settlement,	TOTAL,		\$26230.9 1912.6 \$28143.5

I Certify the Above Estimate to be Correct,

(Signed) J. M. Graham

CHF. ENG'R.

ESTIMATE OF MATERIAL IN THE 9TH & 10TH MILES OF FLUME AND TRESTLES.

COMPLETED JAN'Y 20 -- 1888.

MOORE & SMITH.
CONTRACTORS.

KIND OF MATERIAL IN WORK.	FT. B.M	PRICE.	AMOUNT
Trestles, O to 20 Ft. in Greatest Height	32,285.	40.25	\$ 1,299.47
Do 20 to 40 Ft. Do.	14,015.	44.75	627.17
Flume Lining Plank	183,647.	49.25	9,047.82
Do Posts, Sills, Braces, Stringers, Strin	ig-		
ers on Trestles, and Other Rough Lumber			
In Flume,	246,184.	44.25	10,904.22
Rough Lumber In Tunnel No. 3.	1,751.	36.75	64.40
T	OTAL, -		\$21,943.08
Amount Allowed on Final Settlement,			143.85
			\$22,086.93

I Certify the Foregoing Estimate To Be Correct,

(Signed) .J. M. Graham .....

CHF. ENG'R.

The 7th and 8th Miles Can be Completed in Two Weeks.

LEUAL AUTICES.

SUMMONS,

In the Superior Court of the County Diego, State of California. The San Diego and Coronado Water Com-pany, Plaintiff,

Milton Santee, Thomas Fessenden, R. Steiner, A. Klauber, Jane P. Rowe, O. B. Witherby, Isidor Lonis, Florentine Gerrichten, Levia Gerrichten, Emily Gerrichten, Katy Gerrichten, Ella Gerrichten, Anna Wentscher, Louis Rose, Simon Levi, D. Cave, G. M. Dannals, C. P. Noell, John A. Love John Powers, James Dona Anna Wenischer, Louis Rose, Simon Levi, D. Cave, G. M. Dannals, C. P. Noell, John A. Love John Powers, James Dona hue, Annie E. Whaley, H. H. Whaley, D. Choate, F. R. Sawday, Mary R. Trask, Charles Trask, Rosa Trask, Anna Trask, Polly Trask, Josephine Trask, Bertie May Trask, Calvin Washburn, Angelo Smith, Albert Smith, A. Cassidy, Mary Cassidy, George Connors, George Connors, Jr., Mary Cosmors, George Connors, Jr., Mary Cosmors, Kittle Connors, Esther S. Kerren, Dolores Hoffman, Augustine Hackett, Nellie Pedrorena, Elleen Pedrorena, D. B. Kurtz, Emma Woodward, Alexander Brazelton, Hannah Brazelton, May Brazelton, John Brazelton, George Brazelton, J. S. Beardsley, Victoria P. de Magee, Yrabel A. de Altamarano, Elemo P. de Wolfskill, F. J. Huse, F. Salmon, Edward Dougherty, James D. Tarrante, Marian L. de Tarrante, John Bensley, James Kearney, Piego Alvarado, Estephan Johnson, W. W. Stewart, John Hanlon, Arpad Harraszthy, C. A. Wetmore, Peter C. Kretz, C. P. Noell, H. Mabury, The Los Angeles and San Diego Railmad Company, The City of San Diego, The State of California, John Doe, Eichard Doe, Henry Doe, Mary Roe and Jane Roe, Defendants, The People of the State of California send The People of the State of California send

The People of the State of California send greeting to:
Milton Santee, Thomas Fessenden, S. Steiner, A. Klauber, Jane P. Rowe, O. B. Witherby, Isidor Louis, Florentine Gerrichten, Leda Gerrichten, Emily Gerrichten, Katy Gerrichten, Ella Gerrichten, Anna Wentscher, Louis Rose, Simon Levi, D. Cave, G. M. Dannals, C. P. Noell, John A. Love, John Powers, James Donahue, Annie E. Whaley, H. H. Whaley, D. Choate, F. R. Sawday, Mary R. Trask, Charles Trask, Rosa Trask, Anna Trask, Dolly Trask, Josephine Trask, Bertie May Trask, Calvin Washburn, Angelo Smith, Albert Smith, A. Casady, Mary Casady, George Connors, George Connors, Jr., Mary Connors, Kittie Connors, Esther S. Kerren, Dolores Hoffman, Augustine Hackett, Nellie Pedrorena, Elleen Pedrorena, D. B. Kurtz, Eruma Woodward, Alexander Brazelton, Emma Woodward, Alexander Brazelton, Hannah Brazelton, May Brazelton, John Brazelton, George Brazelton, J.S. Beards-ley, Victoria P. de Magre, Ysabel A. de Altamarano, Eleno P. de Wolfskill, F. J. rente, John Bensley, James Kearney, Di Stewart, John Hanton, Arpad Harrage, thy, C. A. Wetmore, Peter C. Kretz, C. P. Noell, H. Mabury, The Los Angeles and San Diego Railroad Company. The City of Ean Diego, The State of California, John Doe, Richard Doe, Henry Doe, Mary Doe, Jane Doe, John Roe, Richard Roe, Henry Roe, Mary Roe and Jane Roe.

sented to the San Diego Society of Natural History by the citizens of North San Diego (Old Town). Unfortunately the campon after being brought from the Old Town plaza, was placed on an open block in San and plugged it with mud in order to have a loud report. On this occasion the cannon of the pieces crashing through the roofs of houses in the vicinity. These fragments were gathered together by the Society of Natural History, and the old cannon was reconstructed and placed on the same car In 1837 this brass cannon was taken to North San Diego from the old harbor fortifications at Ballast Point, for the protection thereof filed in the said Superior Court of the l'ueblo, when the soldiers of the l'residio had gone to Los Angeles, where a rev Conts et al.) Also over lot I in After 1846 it was popularly known as the Cannon de Don Miguel," owing to the fact that Don Niguel de l'edroena, Er., stowed ity to Clotilda Wright by taway to prevent it from being thrown into the sloughs when the American forces entered the town in that year. In 1847. to said map of Couts) respectively south o when Commodore Stockton returned from the capture of Los Angeles city, he ordered the dismantling of the fortifications be had previously thrown up on "Stockton Hill,"

> granted by said city to one 8. B. Horton by deed dated 30th April, 1850, and recorded in book "B" of deeds page 144; also over a city to one Atkins 8, Wright, by deed dated 31 July, 1850, and recorded in Book "B" of deeds, page 131; also over that parcel of land lying (according to said map of Couta) east of the intersection of Hortense and Jay streets in Old San Diego aforesaid, and which, by an purecorded deed, dated 13 Francisco Maria Alvarado, and lastly over that percel of land lying (according to said map of Couts) north of the intersection of Newton and Moore streets in Old San Dicco aforesaid, and which was granted by said. dated 2d May, 1850, and recorded in

Book 1 of deeds, page 19.

The public use to which it is sought to condenin the above mentioned property. and every part thereof, is the supplying of the inhabitants and public of the said city of San Diego and that tract of land known as Coronado Beach, lying in the vicinity thereof, with pure fresh water for domestic manufacturing, irrigating and general pur-

You are hereby referred to the complaint filed in this action and the map or exhibit accompanying the same, for further and fuller particulars; and for the descriptions of the several and respective parcels of land sought to be condemned, and hereinbefore

generally described.

And you are hereby notified to appear and show cause why the property above referred to should not be, to the extent and in the manner specified, condemned as prayed for in the said complaint; and further, that if you fail to appear and answer the said complaint as above required, and within the time specified the plaintiff will cause your default to be entered, and will apply to the Court for the relief demanded

in the complaint. Given under my hand and the seal of the Superior Court of the County of San Diego. State of California, this seventeenth day of June, 1886. J. M. DODNIE.

Levi Chase and Edward Deakin, athar for plaintiffs, San Diego.

Notice of Co-Partnership. Tillista to certife that we have this day for a conjusteerable for the purposes of day courts merchandise interpress at Escendido Boranto, this counts, under the urm making at le of tiraham is believe. Said firm is come of P. A. Graham and Sig Steiner, and their of residence is at Knowlein, San Disgo resum Esconcide, San Disgo resum Lavoncide, San Disgo resum July Blat, 1988.

THE SAN DIEGO FLUME COMPANY.

The Ment Important Enterprise Ever Begun in via County An Aughte Water nypoly bussy to Bighty Thousand Acres of Ireign. is probably no other part of

the United States where the interdependence of laid and water in the economy of production is more forcibly illustrated than in Bouthern California. There is no part in which their co-operation, artificially established, has produced such striking results. There is no part in which such apparently barryn wastes have been so quickly transformed into such eally beautiful, luxuriant and fruitful gardens by bringing these elements. into such relation as is demanded for the operation of Nature's productive forces. Deserts blossoming as the rose are not an 'anomaly in Southern California.

It is not always necessary that water be drawn either from a near or remote source and applied upon the surface, for there are localities where simply the careful cultivation of the soil establishes conditions under which water is drawn fowards the surface by natural forces, for use in the mysterious laboratory of vegetable production. But these localities are exceptional. For general purposes, and without reference to the peculiar conditions of exceptional localities, the water necessary to give certainly to production must come as the rains roose, not from the sky necessarily, but in copious quantity and for surincomplication.

The absolute necessity of water to insure certain and paying production, especially of the finer and rarer pronets, coupled with the comparatively smited supply, has set a value upon sment in Southern California people living under different sons find it hard to believe pos-Anywhere in the irrigable porsons water is worth \$1,000 an inch. au luch will brigate len acres making the value of the water \$100 an ere. But an acre baptized with that a hundred dollar water will produce es and a water right in Southern alifornia are better than a quarter ction or than many a section on s broad and fertile prairies of the Sermed the water que

the question whether, and by at methods and regulations water all be diverted from the streams and ed for irrigating purposes.

WATER AND DEVELOPMENT. mick development in any part of ing to determine the best point for a four feet to the mile. Between the line body of fertile lands lying to the five tunnels on the San Diego flume. southern California that was not diverting dam, purchase of riperian west line of El Cajon and San Diego east and southeast of National City the longest 1,850 feet, and the others timulated by a water supply existing rights, rights of way, etc., was con- lie the mesa lands of which we have In fine, there will be anywhere from | 640, 600, 300 and 150 feet respectively. in the localities where such growth tinued for peveral months at an ex- spoken. Across this mesa to the city forty to eighty thousand, acres of fer- These penetrate no harder substance. and development have occurred, pense of nearly \$11,000, When so of San Diego the water will be con- tile land mide the line of this flume, than gray granite, which is not con-There has been there will continue much had been accomplished the ducted in a smaller finne on a deto be growth and development with time was ripe for a more decisive seending grade of twenty to twentyout parallel in those localities where movement. On the 14th of May, five feet to the mile. The line of the where water for irrigation is necessary lorganizing the San Diego Flume Com- Unitely lexited. bjection that in such places ho water purchase to all the rights and property which will be utilized for storage puravailable, because in such places it acquired by the three original projects pages. One of these is about eight, the easily demonstrated that farming is lors, to which important additions by other about eleven miles from the on much of a lottery. With water on purchase, grant and otherwise, have city. The bottom of the first has an he land production in ample quanti- since been made. ties is as near a certainty as anything mundane can be, and such certainty is the strongest persuasive that can be ters of the San Diego river may be resented to those seeking settlements. traced upon the above map by a curv-Against San Diego county it has for ed line drawn from the diverting dam rears been arged with anabating pers around the points at which the stence by rival localities, that it has streams which combine to form the so adequate water supply. This crit- river are seen to have their source. cism would never have had so much! This area embraces one hundred and force against us, except for the appare! five square miles, Upon this area the ent confirmation given to it by the average annual rainfall is about thirtydry and untilled mesas immediately eight inches. From this area it is adjacent to San Diego City. These proposed to draw a water supply ademenas always met the eye of the visi- quate for a city of two or three huntor and not unnaturally the character dred thousand inhabitants and to irriof the entire county was judged by gate from forty to eighty thousand

It is a matter of hearty congratula- to the San Diego river. These can- the world. All of the arable lands of miles, upon which the average annual opment of San Diego county, is in river without waste. At the river the ley land in this rancho, In the valley Diego Flume Company's main catchprogress of being removed by intro- water will be picked up by a dam and water is abundant within a few feet of ment area contains 105 square miles, ducing water upon these mesas, and turned into the flune, whose course is the surface. The owners of some of upon which the average annual converting them into vineyard and indicated by the black line on the the fine vineyards and orchards in the rainfall is nearly thirty eight erchard and garden. The project to map. The elevation of the dam above valley prefer to do without irrigation, inches, and the average annual snowaccompanying map.

W. E. Robinson, Gen. S. H. Marlette to \$12,000. The contract for it is al- increase production to many times its And by utilizing smaller adjacent and T. S. Van Dyke undertook to ready let and a large force is now at present proportions. demonstrate the feasibility of bringing work upon it.

0 STANDARI SAN DIEGO CO. SHOWING LINES AND WATER SHED OF SAN DIEGO FLUME CO.

manify and quality as no other thoroughly believed in the priciles, for the purpose, from the redwood for lotte to be the very best femon land in ee. Hence it happens that ten had the asgacity to discern, what will twice inspected before it is placed in the best in the United States. Of this the accompanying map, that this was served, is a very durable material for side, after a personal examination of a Northwest. Hence happens, the water supply needed. Gen. Mar- Diego will be forty-nine and a half San-Diego. the growing importance here of lette, an experienced and careful water miles. From the day the west line. Not is the all a day the from the treaties will be short and low the

The eatchment area at the healwa-

be apparent to everyone who commits; the flume, Redwood, it may be ob- mess land Ms L.M. Holt, of Riveronly-practicable method for obtaining flume from the dam to the city of San 'sle Riverside's between El Cajon and The San Diego flume encounters no

> elevation of 460 feet, and of the secconstructed and inexpensive danr is all that is needed to fit these natural basins for storage purposes. These reservoirs will cover an area of about 70 to 100 acres each, and will store an ample supply of water, that can be drawn upon at will for all purposes, The Company's tract embraces some of the most fertile lands in the countyo It will be subdivided and rold in brought upon it. It will then be very desirable, and will sell readily. IRRIGABLE LANDS.

El Cajon and the mesa surrounded concurre about seven million feet. This mesa is absolutely free from circo supply is derived, a

ing San Diego. These gentlemen The lumber will be sawed expressly frosts . Experts pronounce portions and under the shiring sum will pro- bility of the scheme. Moreover, they est of the northern coast, and will be the State of California, which means plaining that the flume method of silly as is consistent with thoroughpers. not only a practicable method but the such purposes. The length of the it recently sail that it would make level by the Plume Company's route.

> regimeer, spent several months super- of Et Cijon valley it will be six feet the Flume Company's tract on the mesa | highest-being only eighty feet. The valled away by important business, top and four feet deep, and will haven done towards supplying water to that county, hung a large flume by from when he surrendered this work to carrying capacity of dre thousand rapidly growing place and its environs, brackets along the face of a perpen-Capt. R. H. Stretch, a very expuble inches. The grade of the flume from From the south side of El Cajon a dicular wall of rock for a distance of successor. Preliminary work in the the dam to the west line of ki Cajon portion can be diverted to the sweet nearly 500 feet, to avoid building a

water is available. From localities 1886, the first steps were taken toward flume over the mesa is not yet defi- area of 105 square miles referred to, Company's right to construct the will yield a constant supply of at least ! flume and divert the water can in no for the production of everything ex- pany, and on the 17th of the same At the west line of El Cajon the 4,000 inches of water. An inch of wise-be affected by any course the setsept the common cereals, it has been month the Secretary of State issued to Flume Company owns a tract of over water is the quantity that will flow thement of the water question now agand will continue to be easy to turn, the company a certificate of incorpo- three thousand acres of land. Upon from an inch hole under a four-inch state may take. The Comway the tide of immigration by the ration. The company succeeded by this land are two natural reservoirs; pressure, that is, with four inches of pany has acquired indefeasible lights water above it. Experience shows both as riparian owners and approprithis to be about 13,500 gallons every ators, and hence is not liable to be twenty-four hours. An inch of water disturbed. is ample to irrigate ten acres of land. It will cover ten acres eighteen to and 540 feet above sea level. An easily- twenty inches deep in one year, and Palmer, in the "Report of Surveys that quantity is ample for production. Across the Continent on the 35th and In some places, as at Paradena, an 32d Parallels," referred to the country inch suffices for fifteen acres. But at back of San Diego as capable of furan inch to ten acres, 4,000 inches will, nishing an ample supply of all kinds irrigate 40,000 acres: It will be seve of food products, and added: eral years before so large a quantity "Water adequate to the wants will, be wanted. And an additional of a very large population quantity can be provided by increas- can be readily obtained by bringing in ing the number of storage reservoirs the San Diego river from a point in and enlarging the eatehment area by the interior where it is sweet and persmaller tracts when water has been short flumes, leading to other areas manent." The San Diego Flume Comadjacent to the main one. The main pany is now engaged in carrying out catchment area has an elevation of Gen. Palmer's suggestion. The im-4,000 to 6,500 feet, with an average portance of the work will not be fully The use of the map makes it easy to annual rainfall of nearly thirty-eight realized until the transforming effects ful valleys beyond. Unquestionably purpose, it is proposed to utilize Sev- will be frigable by water from this fall. If there are any who are skepti- to appear. The enhancement in value those dry mesas have hindered the eral storage reservoirs in the mount flume. From the diverting dam to El cal about this kind of storage as a and beauty that will follow the hanggrowth of the city, as well as the set- tains, as indicated upon the map. Cajon Rancho, the river valley is nar- means of obtaining a reliable water ing of that necklace of silver about the tlement of the county. It was in vain These reservoirs will be filled with wa- row, and contains no productive lands supply, it will be sufficient to remind valley of El Cajon can only be realthat visitors were assured that those ter by the winter rains. This water that are at present of consequence. El them that seven-eighths of the entire | ized by those who shall live to see it. same mesas were as fruitful as Eden, will be used during that part of the Cajon Rancho embraces 57,000 acres, of water supply of San Francisco is ole The "desert" mesas will be stripped of fonly water was put upon them. The summer when the supply in the river, which nearly 30,000 are arable, El Ca- tained from three storage reservoirs their worthless garb of adenostoma Materier might believe in the fruitful- at the diverting dam, is too low to jon, as it is usually called, is noted for owned by the Spring Valley Water; and clad with fruit-bearing shrub and of the soil, but saw no source meet the demand. At such times, the lits beauty and fertility, and especially, Company. These reservoirs are filled tree and vine. Barrenness will give from which the needful water could contents of the reservoirs will be turn- for its adaptability to grape culture; by winter rains from a catchment place to beauty and thrift. ed down the rocky canyons that lead Here are produced the finest raisins in area of twenty-five and a half square tion, therefore, that this, the only im- your form channels through which El Cajon will be irrigable from this minfall is about thirty-seven inches. Mr. Holt, of the Riverside Press. Afportant hindrance to the rapid devel- the water will be conducted to the flume. There are 15,000 acres of val- and there is no showfall. The San ter looking this enterprise over, he

catchment areas, the San Diego that there is nothing chimerical The mesa lying between El Cajon Flume Company can increase their about this enterprise. This flume as abundant water supply from un. The flume will be built of the club and the city embraces reveral thou- total area to 225 square miles, or infec will be built. If there are any doubters failing mountain sources to the vailey cost redwood humber, of which it will sand seres of fine froit and vine lands, fines that from which the San Francisch may as well resolve, coforce his alleged order torbidding Federal

of we speak when we say that the PRABIBILITY OF THE SCHEME flume will be built, and built as rap Words need not be wasted in e conducting water is not a novel and the nature of the work. experiment, and that it is used over much longer distances than that cordifficult engineering whatever, All of intending the making of surreys until | wide on the bostom, seven feet wide on to National City, indicates what can be. Mincene Mine Company, in Butte

There has been no rapid growth or way of surveys, explorations, excurat- valley will be a uniform descent of water and thence conducted to the trestle 186 feet high. There will be a uniform descent of water and thence conducted to the sidered difficult to tunnel through.

There are no obstacles of a legal na-It is known that the catchment ture in the way of the project. The

THE IMPORTANCE OF IT. As far back as 1867-68, Gen. W. J.

Upon this point we lo well to again quote the words of a practical man, said in his paper of July 9, 1886;

The greatest enterprise yet undertaken in San Diego county is the building of a water system consisting of storage reservoirs in the mountains and flumes to conduct the water to. the coast. This enterprise is of more importance than the building of the

In conclusion, it may be observed

Australian oranges have been them instead of the beautiful and fruit- seres of land. In carrying out this point out the scope of country that juches, without considering the snow- of water upon valley and mesa begin livered in London in sound condition, and found a feady sale at from \$202.50 per half-lox. The fruit was shipped as ordinary "storage," had been packed two month-, and was found of good quality, size and color. Each half-box contained about eighty oranges, so that the average price of each orange was about three cents when sold by auction. This is more than double the price of the fruit when sold by the case in Sydney.

HISTORICAL CANEOR

ter." which has a history of its own.

In January, 1881, this cannon was pre-

was burst and broken into fragments, som

and that all the cannon in San Diego

should be thrown into the sea. According-

whe cannon on the hill were brought

lown, and, with El Jupiter, were on the

road to La Playa when Philip Crosthwaite,

who was at that time second Alcalde, went,

on the part of the Paeblo, to the Commo

fore, and showed the siecessity for keeping

that piece in the town to fire salutes and in

case of an uprising of the Indians. Com-

modore Stockton readily granted this re-

12 Jupiter was cast in Manilla, Spain.

A. D. 1783. Its companion pieces of ord-nance were, by order of the Commodore as above stated, thrown into the deepest waters

quest, so this relic remained.

Exchanges which some time ago midished a communication from ex-Mayor lymer, of Reading, recommending that persons afflicted with sleeplessness should try a bruised fresh; onion, tied about the neck upon retiring, have since been publishing assurances from correspondents that had successfully tried the experiment. The idea seems to be to so bruise and attach the onion as to let the subject get a liberal inhalation of its edor.

Prof. Long, of the Illinois State Mienecopical Society, after repeated experi-Atchison system of railroads to San | ments, is reported as sayings "Taking all Diego Bay, or the prospective extens things into consideration, I am forced to sion of the Southern Pacific to that believe that we have no absolutely certain method of illistinguishing between butter and some of its substitutes, and that, of all methods proposed, the interescripte are, perhaps, the least reliable."

Now is the time for the President to

their doubts at once. We know where officers to participate in party conventions, at the

which we allude is illustrated by the sea level is eight hundred and two depending upon cultivation and the fall is not less than five feet. A foot feet. The masonry will be based upon | moisture from beneath, but there is no of snow equals an inch of rain, so that bed rock and composed of solid granite question that irrigating facilities will the snow adds five inches more to the The San Diego Flame company is a and the best Portland cement, 'The Induce the rapid settlement of every annual rainfall' upon the San Diego San Diego enterprise. Early in 1887, cost of the dam will be from \$10,000 arable acre on the entire rancho, and Flume Company's catchment area. country.

#### THE SAN DIEGO FLUME COMPANY'S ENTERPRISE

The commanding elecation occupied by the works under construction by the San Diego Flume Company, their far reaching design in accumulating from different sources the waters of distant streams, their costliness, the wide-extent of the district commanded, and the fact that they terminate at the city of San Diego, which may receive its supply at high pressure on the summits of its greatest elevations, render them in many respects more important to the prosperity of the region than any other, and second in rank to the Sweetwater dam and its distribution only because they are yet in an incomplete state.

DISTRICT AND WORKS:— As far as they have been outlined by what has been begun or completed, the works consist of a storage reservoir on the head-waters of the Bowlder creek tributary of the San Diego River, a diverting dam of masonry in the river proper, and a line of flume thirty-six miles in length — skirting the canon's side for twenty-one miles, then circling south of the Valley of \$1 Cajon, and finally emerging upon the mesa ten miles east of the city of San Diego. The plans of the company contemplate the divertion of the head-waters of the Tia Juana and Sweetwater rivers on the south, and the San Dieguito on the north, into the head of the main flume, the construction of various additional storage reservoirs in the mountains, and a distributary reservoir at the end of the flume, the development of tributaries of the San Diego by tunnels under their beds and gathering them into the main conduit by smaller lateral flumes, and the distribution of the water from the end of the main flume by pipe lines over the mesa.

The field of irrigation development which these works command embraces the entire valley of the San Diego River, including El Cajon, the high mesas between the river and the Sweetwater on the south, and the Linda Vista mesa north of San Diego, an aggregate area of seventy-five thousand to one hundred thousand acres. The flume line proper dominates the whole of El Cajon, and a portion of the upper Sweetwater valley, while the pipe lines, which are to be laid westerly from the end of the flume, command the mesa east of the city. In order to reach the Linda Vista mesa, a long pressure pipe will be needed to pass the depression of Mission valley. The distribution generally over the mesa might be by pipes under pressure, or by cement pipe channels, as explained in subsequent chapters hereof, relating to San Bernardino county works.

STORAGE RESERVOIR:— The main dependence of the works for a summer and fall supply is at present the Cuyamaca reservoir, located forty-threemiles northeast of San Diego in the Cuyamaca mountains, at an altitude of four thousand five hundred feet. The water-shed of this reservoir is about fifteen square miles in area, draining two of the highest peaks of the range. The reservoir is formed by an earthen dam six hundred and thirty five feet long on top, forty feet in height, thrown across the outlet of a broad, flat mountain valley. The little streams tributary to the reservoir are supplied by the winter rains and melting snow of early spring. From the eastern rim of the water-shed the country drops abruptly into the desert. The hills on this side arelow and barren. The two Cuyamacas Peaks on the west are clothed with forests of pine and oak.

As compared with the Sweetwater reservoir, its capacity when full is 65 per cent of the latter. The full-water reservoir space covers over one thousand acres. Its capacity, according to the elevation of its water above the outlet is as follows:

	Mill. Galls.	Cubic Ft.
5 feet above outlet	.11	15,060
10 feet above outlet	5.04	675,065
15 feet above outlet	126.54	16,017,400
20 feet above outlet	523.15	69,940,300
25 feet above outlet	1,262.10	168,750,200
30 feet above outlet	2,542.28	313,139,500
35 feet above outlet	3,739.11	499,880,950
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	THE PROPERTY OF THE PROPERTY O

COYAMACA DAM: The site of the dam was one which had all the surface indications of solid rock. The whole surface was covered with loose granite bowlders, and before sinking test pits, preparations and plans had been made for building a masonry dam. The excavation for foundation developed a bed of clay instead of bed-rock as anticipated, and an abundance of good clay being found in the immediate neighborhood, the plans were changed and an earth-work dam built. A puddle trench was cut under the center of the embankment, and the clay filling built up in layers. The embankment has a base of one hundred and fifteen feet, inside slope of two to one, outside slope of one and one half to one, top width fifteen feet. The high-water mark is fixed at five feet below the top, at which point a waste-way fifty feet wide is placed on one side. The water-face of the dam is covered with stone riprap laid, dry, eight inches in t thickness.

-2-

the outlet culvert is of masonry three and a half feet wide by four feet six inches high inside, one hundred and twenty feet long, its bottom placed at the level of the original surface with a fall of three and a half feet in its length. At the upper and it opens into the base of a circular brick tower eight feet in diameter outside, five feet in diameter inside, and carried to the level of the top of the dam. This tower is provided with two gates of wood, closing openings three feet wide by four feet six inches high. The lowest opening is at the bottome of the tower, the second fifteen feet nine inches higher, immediately above the lower. These gates slide up and down in wooden grooves, and as they are to be moved by chains or ropes, are not convenient, particularly when they are to be closed quickly under pressure. An iron gate is provided inside the tower to close the head of the outlet culvert. The work was begun late in the fall of 1886, and completed about the middle of February, 1887, in time to catch a part of the only heavy rainfall of the season of 1886-87. The catchment was about thirty-three million cubic feet, equivalent to a little over an inch in depth over the water-shed, and filled the reservoir to fifteen feet in depth. The reservoir was filled to a depth of twenty-four feet by the rainfall of the wollowing season, 1887-88. Both seasons were dry ones, as compared with the ordinary mountain rainfall. It is intended to release the water at the dam and allow it to follow the rocky canon of Bowlder creek, ten miles, to the diverting dam in the river.

DIVERSION AND DELIVERY WORKS:- The diversion is made from the San Diego river about thirtyens miles from its mouth, at an elevation of about eight hundred feet above sea-level, and where the stream, falling at the rate of about thirty feet per mile, is a in an open canon flanked by barren mountain slopes rugged and steep.

SAN DIEGO DIVERTING DAM: - The diverting dam is built of masonry of the following dimensions: Maximum height, 54.5 feet; length, 447.5 feet; width at top, 5 feet; up stream batter, 1½ feet in 20 feet; back batter, 7 feet in 20; width at base, 18 feet. The dam contains 4,000 cubic yards of masonry, and required 2,410 Barrels of cement. The average depth of excavation in the bowlders that formed the bed of the stream was ten to twelve feet, and the foundation rests upon the soft, disintegrating granite, forming the bed-rock of the country. This material may be readily cut with the pick and crunbles on exposure to the air. After the dam was completed and tested, the leakage was considered excessive, and the upper face was again stripped to the foundation, and an apron of masonry two feet thick was sunk to a depth of some six feet lower than the original base. The wall was then repointed and partially plastered on the face. The top of the dam is at an altitude of 815.5 feet. Inalignment of the dam has an angle in the center whose apex is pointed up stream. Otherwise the structure is straight, depending upon the weight of its mass for stability.

The head of the flume passes through the wall with wooden gates to control the water. The level of the flume bed is nine feet below the top of the dam,

or four feet below the overflow weir. The main waste weir is two hundred and ten feet long, with a seco dary weir twenty feet long. The floor of these weirs is of pine plank spiked to timbers that are holted to the masonry. In addition to the overfall waste weirs, there are two culverts passing through the dam for draining the basin above. One of these is 2.5 feet square seven feet below the grade of the flume, the other three feet square, eight feet lower than the first.

MAIN CONDUIT: FLUME LINE:- The flume is set on a bed cut in the mountain side except where it is supported on trestling. All fills are made with loose rock laid with some care on the outer face. Its total length is thirty-six miles. The grade is 4.75 feet per mile.

TUNNELS:- There are eight tunnels upon the work, lined with masonry on the sides, timbered overhead, except in solid rock, and plastered with cement on bottom and sides.

Tunnels No. 1 is 530 feet long; No. 2 is 230; No. 3 is 85; No. 4 is 705; No. 5 is 319; No. 6 is 316; No. 7 is 1,905; No. 8 is 280. Total 4,168 feet. The tunnels are finished six feet wide by six feet one inch high in the clear. In loose material the sides are walled up with masonry twelve inches thick to a height of four feet, on top of which rests timbering, six by eight—inch, with lagging of three—inch plank; the bottom and sides being finished smoothly with cement.

FLUME: The flume is made in rectangular form, five feet ten inches wide by three feet ten inches deep, in the clear. The bottom and sides are of two-2nch redwood plank, planed on the inside. The frames, placed at intervals of four feet, consist of a sill four by six inches by twelve feet, two posts four by four inches by four feet, and two diagonal braces two by four inches, three feet three inches long. The sub-structure where it rests on the ground consists of mud-sills of redwood, two by twelve inches by nine feet, two stingers four by six inches, one under each side of the flume box, and a block eight inches long supporting the sill in the center. Where on trestle, the sills of the flume rest on three longitudinal stringers, two of which are four by twelve inches, and one in center six by twelve inches. The trestle bents are placed sixteen feet apart, and for trestles up to twenty feet in height, consist of two posts eight by eight inches set on a batter of one to six, a cap eight by eight inches by six feet, a sill eight by eight inches of proper length, and two diagonal sway braces two by ten inches. For higher trestles, more posts are introduced, and trussed bridges carry the flume over the deepest gorges that are crossed. Ten million feet of timber will be consumed in the structure. The flume has a theoretical capacity when filled within three inches of the top of onehundred and ten cubic feet per second, or about five thousand five hundred miner's inches. The flume for its full length of 56.6 miles is now carrying water, with sideboards sixteen inches high; the remainding boards for full completion are to be added later. (1) Water was being delivered in Kl Cajon Valley, and irrigation commenced from it in the latter part of June.

DISTRIBUTION SYSTEM:— Pipes & RESERVOIR:— From the end of the flume to San Diego, the main pipe line will be nine miles in length to the top of the mesa overlooking the city. A branch pipe one mile in length will deliver surplus water to a reservoir to be constructed for storing the unused delivery. A main four miles long will be required to tap this reservoir and join the through line below. This reservoir is called the City reservoir, and will have a capacity of seven hundred and sixty-one million gallons, covering an area of one hundred acres. It will be formed by a masonry dam fifty feet high, located in a narrow gorge through blue trap rock, whose width at a height of thirty feet is but fifty feet. Its elevation above sea-level is four hundred and sixty feet at the base.

Note (1) This data and that of the following financial statement have been revised while in process of publication to later dates than originally written for.

COS T OF THE WORKS:- The following statement made on authoritative data shows the cost to October 20, 1888, with the main conduit completed, as above:

Surveying, engineering, and superintendence:	\$54,821.55
Tunneling and grading (contract, \$58,544.71; day works \$76,092.87( Miscellaneous construction (digging treatle pits, ditching	184,637.58
culverts, hauling supplies, etc.)	38,409.51
Rights of way	481,555.00
Flume construction	486,956.09
Expense account	24,624.04
Telephone	689.72
Wagon roads	7,228.03
Cuayaca dam construction	47,057.63
Diverting dam construction	51,601.59
Total cost of works to date	\$847,578.72
To this must be added the cost of land for reservoir sites:	
Cuyamaca and City reservoirs, about	\$76,908.00
Interest account	25,853.56
Legal services and expenses in litigation	8,449.70
TOTAL	\$111,211.26

This makes a grand total of expenditure to date of \$959,789.98 met by the company. The original projectors of the enterprise claim to have spent \$10,000 on surveys and preliminary work before the company was organized. This brings the water to Eucalyptus pass, on the western rim of El Cajon valley, on the highest point of the mesa commaned by the flume, a distance of ten miles from San Diego. The estimated cost of the pipe line to the city is about \$65,000, including the loop to the City reservoir (one mile north from the main pipe at a point about two miles west of the flume terminus) and return connections with the main four miles below the City reservoir - fifteen miles in all, of fifteen-inch pipe. The City reservoir dam is estimated at \$34,000.

OPERATION AND MAINTENANCE:- The San Diego Flume Company undetakes to distribute its water supply under specific contracts to furnish stated quantities of water, annually, in perpetuity, at designated points, in an agreed manner, and for uses named in each case and no other. The holder of such contract has a "water-right" in theflume supply. If held for irrigation, the right is made appurtenant to certain described lands, the property of the holder.

IRRIGATORS' WATER-RIGHTS:- The agreement recite in the form of a preamble the great benefits to accrue to the region generally "by the reclamation of the now desert mesas surrounding the city of San Diego by water brought from the distant mountain ranges," and specifically acknowledge the enhancements in value of the property of the contracting party by reason of this general beneficiation brought about by the construction of the "vast, complicated, and unusually expensive system of works", by the anticipated benefits for the lands for which the specified wter rights are taken, "and as an m inducement" to the company "to incur great and unusual expense in and about the increase of its works, and to aid and encourage it in its attempts to secure a large and reliable supply of water, etc." and in consideration of the comenant on the part of the company to deliver water in certain amounts, etc. for use on the lands described, the contracting party agrees to pay, etc., a certain sum (in the nature of a bonus), when the water becomes available for his use, or at some other period named.

And the, "in further consideration of the premises and as an inducement to the company to extend and improve its works from time to time, and to aid in extending, improving, and maintaining the same so as to increse either the flow of water, by which increase the value of all the lands in the vicinity of the lands," of the contracting party, and his own lands, also, "will necessarily be continually

enhanced by reason of the increased certainty of sufficient water for irrigation purposes in the driest seasons," the contracting party agrees for himself and his heirs, etc., to pay a sum annually (apparently in lieu of a rental for the use of the waters). Then follow certain conditions of forfeiture, to the general effect that if the contracting party fails to comply with the terms of the contract he forfeits his right forever without recourse. All covenants and agreements made by the land owner for the land described go with it, and are binding upon all future owners of it, and as security for performance of them the lands are mortgaged to the Flume company.

In accepting the agreement, the Flume company binds itself, etc., to furnish annually for use on the land described, and none other, a water-supply in measure and mode of delivery as specified; provided, that the company's water-supply be not shortened br the company's ability to deliver it be not impaired by the act of God, or the elements, or failure of the average rainfall in the mountains, or by the operation of law, public enemies, or by riot or insurrection, or by accident to the works of the company. In event of short supply from any of these causes, each piece of land for which a water-right is taken is entitled to a pro rata of such water as can be supplied during the period that such impairments shall exist, and as shall be consistent with like fulfillment of other contracts of the company and the full supplying of cities and towns.

The contracting party agrees that none of the water furnished him under his contract shall be used on any other land than that specified in the agreement, nor sold for any other purpose, or at all, xxxxxxxxxx except with the land, and that none of the water furnished him shall be allowed to run to waste, but shall be carefully utilized and when not wanted on his lands shall be shut off therefrom and retained in the company's flume or other conduit. In further consideration of the benefits and watersupply to be obtained the contracting party grants the flume party right of way for its pipes, flumes, or other conduits, over the lands for which the water-rights are purchased; and also grants, bargains, and sells to the company, all his rights, whether he is a riparian owner or otherwise, to divert, use, and impound the waters of San Diego river, or of other streams, rights to which are claimed by the Flume company. In brief, the individual irrigator's water rights are attached to the land, and convey only the perpetual right to take twater at a certain fixed rate per annum (not less than \$3 per acre).

At the beginning of the enterprise a few water-rights were sold at the rate of \$150 per miner's inch. As the work progressed values were increased, and in the summer of 1887 the company wontracted to sell four hundred inches to the San Diego Land and Water Company at the rate of \$2,200 per inch, which has since been reduced by special agreement to \$800 per inch. The total amount of sales and contracts by the Flume company amount to \$57,200, in addition to the sale of several hundred acres of land with water-rights. (1)

WATER SUPPLY AND WATER CLAIMS - The volume of supply which may be safely reckoned upon by these works, as a minimum, cannot be definitely estimated, on account of the general lack of statistics as to rainfall. A record kept at Julian (elev. 4,200 ft.) for five years gives a mean rainfall of 37.55 inches (max. 61.62 in., min. 25.89 in.). Julian is located in the watershed of the San Diego, on the mountain top, a few miles north of Cuaramca Reservoir. Other records kept for short periods north and south of Julian seem to agree substantially with this record.

The water shed above the diverting dam is about one hundred and ten square miles. And there are feeders to be brought in or taken up whose drainage areas will aggregate forty-five to fifty miles more. With a mean rainfall that can be relied upon, the supply to the streams distributed evenly through the year would, no doubt, far more than suffice to maintain the flow of the flume to its full capacity the year through. This even distribution could only be affected by mans of storage reservoirs, but on account of the lack of sites on the water-shed it is doubtful whether this can be accomplished.

(Note (1) This data is unly up to June, 1888)

Assuming that the ordinary flow of the river is sufficient to keep to the probable demand from November first to May first of each year, without drawing from reservoirs, and that the maximum draft from reservoirs will occur from June first to November first of each year, the amount necessary to be stored each year will be, approximately, fourteen thousand million gallons. The Cuyamaca reservoir and the City reservoir combined will store less than one third of this volume, no allowance being made for evaporation. Hence, it is evident that very much further storage is requisite to give the enterprise a full measure of usefulness. The company have contemplated several additional reservoirs, as hereafter mentioned.

APPROPRIATION CLAIMS:- Claims to water have been posted and recorded, covering all the tributaries of the San Diego river at all favorable points of diversion, as well as the streams on adjacent water-sheds that may be brought into the same system. The filings and claims, except those at the diverting dam on the main stream, are each made as for a part of branch of the main system, and the work on the flume is supposed to obviate the necessity of special work under each filing. These claims filed are presented as an instance of an extended application of this method of acquiring claims to water as follows:

APPROPRIATOR Date Filing Purpose, Means STREAM Date Amts. Posting of Diversion, etc. claimed Place of Diversion S. H. Marlette June 17,1885 June 25, 1885 At point 100 yds San Diego River above Rocky Bar (site of diverting dam is at Rocky

> Bar) 6,000 inche W. E. Robinson Aug. 17, 1885 Aug. 25, 1885 About 2000 ft. above Rocky Bar All water to extent of 6,000

inches At a point about 5 miles above Dr. Post's near mouth of upper canon of Sweetwater. For use on Jamacha Ro.,

Ro de la Nacion, and

Otay Ro, claimed as

6/1/86

T.S. Van Dyke Dec. 3, 1885 12/11/85

branch of main 4,000 inches mystem About 1000 ft. above Rocky Bar 6,000

Diverts at first falls of creek above Descauso about 15 miles. Intended for use in city San Diego, Ex Mission Ro., Ro dela Nacion, Jamacha, and Sweetwater Valley as part of main system 2,000 "

S. D. River S. D. Flume Co. 5/28/86

Sweetwater River W.E. Robinson &

Upper Sweetwater or Guatay Creek

Same

Same

6/25/86

6/26/86

STREAM AP	PROPRIATION	Date Posting	Date Filing	Purpose, Means of diversion, etc. Place of diversion	Amts. Claimed.
Santa Ysabel Creek	S.D. Flume Co	o. June 24,	1886 6/26/86	At point in gorge where creek leaves Santa Ysabel Valley. All was claimed to heads of 3 main branches.	
Ballena Creek	Same	6/24/86	6/26/86	Part of main system. This is the "Ballena" Reservoir site appropriation	1,000 in
So. Fork S.D. River	Same	6/29/86	7/2/86	Diverts by flume one mile above mouth	4,000 in
Bowlder Creek Fork San Diego River	Same	7/31/86	8/4/86		2,000 in
Pine Valley Creek	Same	1886	1885		2,000 in
Chocolate Creek Fork of S.D. River	Same	8/14/86	8/19/86	Diverts at point 5/4 mile above fork of creek	100 in
Same	Same	Same	Same	Diverts 1,600 ft. from flume crossing	100 in
Dye Valley Fork SanDiego River	Same	9/16/86	9/20/86	This is the appro- priationfor the Upper Dye Valley Reservoir	2000 in.
Japatul Valley Fork of Sweetwater	Same	6/27/86		This is at the dam site in Japatul Valley	500 in.
San Diego River	Same	8/27/87	9/3/87	Proposes to divert at Knowles ranch, some miles below	
Coleman Creek Fork	Same	5/27/88	3/31/88	Point of diversion about 2/3 mile above junction of Coleman	500 in.
Same	Same	Same	Same	and Bowlder Creeks 250 yards above	1,000 in
Same	Same	Same	Same	Blattner's house 1/3 mile above Coleman and Bowlder	1,000 in
				Creeks	1,000 in

RIPARIAN AND OTHER RIGHTS - It is stated that riparian rights on the stream below the diverting dam have been purchased, or the claim adjusted, so as to dispose of the possibility of future litigation on that score - the riparian owners generally surrendering all claims to damage on account of diversion or storage of the water, or any injury that might ensus by reason of the proposed works. These rights were thus obtained without cost, as an encouragement to the construction of the flume as a general benefit to the country. But one man recei ed compensation, and this was in consideration of his prior appropriation of water. Being the only prior appropriator, and having irrigated but a small field, he was givem a contract for an equivalent supply from the flume.

Governor R. W. Waterman brought suit in 1887 to have the Cuyamaca dam removed as a nuisance, on account of the fear of an excessive percolation into the Stonewall mine, owned by him, from the reservoir, and because his lands were flooded by the waters. The Flume company sought to condemn the land belonging to Governor Waterman that was in the reservoir basin. These suits never came to trial, but were compromised; the company paying fully for the lands and giving certain guarantees.

HISTORY OF THE WORK AND FINANCIAL OUTLOOK:— The enterprise was conceived by T. S. Van Dyke and W. E. nobinson, whose familiarity with the mountain streams and reservoirs sites was obtained on frequent hunting excursions. They made the water claims and surveys to prove the general feasibility of the scheme, prior to the incorporation of the San Diego Flume Company, May 14, 1886. The capital stock of the company was fixed at \$1,000,000 chiefly subscribed by citizens of San Diego. Surveys were prosecuted during the summer of 1886, and in the fall of that year contracts were let for the diverting dam onthe river, and the Cuyamaca storage dam. The actual construction of the flume was begun in the summer of 1887, after grading of its foundation had been in progress for some months.

of the ten thousand shares of the company, two thousand were given to Robinson in consideration of the transfer of his interests, appropriation, surveys, maps, rights of way, deeds, assignments of riparian rights, etc., to be non-assessable until the completion of the flume, when he wad to pay an amount equal to the pro rata assessments that may have been levied up to that time. Of the remaining eight thousand shares, seven thousand seven hundred and sixty-six shares were subscribed by residents of San Diego and outsiee capitalists (San Francisco and Eastern) directly interested in the advancement of San Diego. The remaining two hundred and thirtyfour shares are still in the treasury. Some of the shares subscribed were sold at a premium, the total amount thus realized on premiums being about \$40,000. (Data of June 1888)

The first assessment was levied in September, 1886 of \$5 per share, to begin work on the two dams. Since then three other assessments of \$10 each have been levied. The total amount raised by assessment has been \$271,810. (The above is from data of June. Since then to October twentieth another assessment of \$5 has been levied. The total amount raised by assessment and loans on stock has been \$423,975.84, with the last assessment not yet paid.) An issue of \$600,000 of twenty year 6 per cent bonds was authorized, and about \$300,000 were sold at 95 cents. In addition to these resources, the company has sold a considerable portion of a three thousand acre tract of land lying at the terminus of the flume on the mesa. They bought the land for \$10 per acre, and sold it for\$100 to \$300 per acre, with water-rights at the rate of one inch to ten acres. They have also sold or contracted for water-rights amounting in all to seven hundred and fifty inches, of which nearly one half was at the rate of \$800 per inch, and the remainder at \$150 and upward, to \$2,000 per inch. Partial payments havebeen received on some of these sales. A part of the contract work was payable in bonds. They have recently obtained a loan of \$100,000, for which bonds are given as security with the option to purchase at 90 per cent. This amount is considered to be enough to carry the flume to the end of the route, and on this sufficient completion of the flume for use it is expected that the remaining bonds can be placed to provide funds for building the City reservoir, laying the pipes across the mesa, and to put on the upper side-planking of the flume. (The work has now been completed ecept the upper-side planking, as told on pp. 73 and 74 ante. October 1888)

The next work then to be done will be the construction of additional mountain reservoirs. In Dye Canyon fork of the San Diego, there are two sites selected, and one in the Ballena on one of the tributaries of the Santa Maria creek, a fourth in Japatul Valley on the Upper Sweetwater, to befed by means of a flume from the headwaters of Cottonwood creek (a tributary of the Tia Juana river). And, finally, there will have to be connecting flumes for the diversion of the waters of the trade to be connecting flumes for the diversion of the waters of the trade.

named reservoirs, into the San Diego River watershed above the diverting dam. No detailed estimate of the cost of this extension of the scheme has been made, and no data is a available of the capacity of the various reservoirs, but the extension is admitted to be essential to the scheme, in order that there may be a water supply for much fuller delivery than is now at command during the irrigating season.

TOTAL COST; ESTIMATED:- On the basis of construction to date, the completetion of works now commenced, to utilize the present water-supply, including the mesa pipe line and the City reservoir, will cost \$1,089,000, not including distribution.

Say \$1,000,000.00

(The flume with one board on each side, carrying water within two inches of top, will deliver about nine hundred inches.)
Estimated cost of extension of system to endeavor to secure for every irrigating season, according to project, a full supply to capacity of flume (5,500 inches -110 cubic feet per second)

600,000.00

Total \$1,700,000.00

It is even possible that these works, carried out as they might be to advantage within the next ten years, to secure, store, and bring in all available water to supply the flume run, would cost \$2,000,000.

waters, and deliver but eight hundred and fifty inches, the revenue derivable at \$90 per inch per annum (On the basis of an inch of water to thirty acres, and \$3 per acre per year, which are the figures for a number of the company's contracts. The supply of water for municipal purposes is an anticipated source of recvenue, but the conditions are not settled, and matters are yet too uncertain to justify any further attempt at estimating a probable income, for entry in this report). is \$76,500. Allowing, say \$15,000 per annum for running expenses, and say \$25,000 per annum interest on bonds, this would be less than 6 per cent perxamamaxinterextxonxbands; on the cost after deducting amount received from sale of water rights. There being no allowance in the above estimate made for a sinking fund (for insurance and repairs, which on a work of this kind must be liberally provided for), it would seem that as an irrigating enterprise it must be carried further forward with a strong hand, to reap deserved success.

# San Diego River Works and Projects Mission Valley Water Company

DISTRICT AND WORK: Second in rating to the Flume company's works, diverting the waters of San Diego Tiver, is an enterprise projected by the Mission Valley Water Company. The scheme contemplates the erection of a masonry dam in the lower canon of the San Diego river, some twelve miles above the mouth of that stream, for the storage and diversion of the winter flow; the construction of a masonry conduit, and laying of iron pipes in a series of eight storage reservoirs of varying elevation and capacity; and the supply of irrigation to about ten thousand acres of valley land within the boundaries of Mission valley, and some eight thousand or ten thousand acres lying adjacent to the SanDiego River, and along ban Diego bay and False Bay.

Mission Valley is the locan name which the lower valley of the San Diego has acquired by reason of its having been selected by the Jesuit missionaries as the site of their first California mission establishement. Itxixx Its length is ten to twelve miles, with an average width of one mile, bordered on either side by the mesa lands lying two hundred to three hundred feet higher than the valley. At the mouth of the river a wide area of alluvial soil has been formed by the deposits of floods deboughing into the bay. The lands sought to be irrigated are principally of a sandy, alluvial character, adapted to market gaz gardening when under cultivation by irrigation.

No works of any importance have been attempted for irrigation in this district since those of the mission fathers fell into disuse. The latter consisted of a mi diverting dam of brick in the canon, and an earthen canal Mf large dimensions along the south side of the valley extending almost its whole length to Old San Diego with a branch crossing the river to the north side, supplying the orchards and fields around the Old Mission. Traces of these canals are yet to be seen, and the diverting dam is intact. It is located about a mile above the site selected by the Mission Valley Water Company for their diversion, and is near the west line of the Cajon rancho.

10- • •

Total

DIVERTING, DELIVERY, AND STORAGE WORKS:- The base of the diverting dam is at an elevation of one hundred and mig ninety feet above sea-level, and it is proposed to carry it to a height of eighty(these figures are as reported tracture according to the plans. It is not stated whether it is proposed to increase the thickness of the foundation before carrying the work to its full height.) feet, where the length of top will be about four hundred feet. The foundation for this dam, about ten feet high, sixteen feet

thick at base, and two hundred feet long, has already been built of granite masonry laid in Portland cement on bedrock. It is proposed to carry it about ten feet higher the first year, and for temporary purposes lay a pipe sixteen inches in diameter down the valley to Old Town and Roseville. When completed to its full height of eighty feet, the reservoir formed by this dam will store about one thousand five hundred million gallons. It will be long and narrow, seeing that it is located in the canon.

The other works projected are as follows: From the diverting dam a cement-lined conduit, twelve feet wide on the bottom, six feet deep, on grade of four feet per mile, is planned for along the south side of the river one mile, where, according to the plans, it will branch into two conduits eight feet wide by four feet deep, one of which will cross the river to the north side and extend three and one half miles to Reservoir No. 5 and the other will follow the south side for two and one half miles and terminate in Reservoir No. 2. Other reservoirs will be supplied by pipes laid on grade lines beyond the ends of the open conduits. The estimated capacities and elevation of the various reservoirs projected are as follows:

Reservo	irs Distances from	Elevation of top	Height of	Capacity of
	Diverting Dam	of dam	Dem	Reservoir
	Miles	Feet	Feet	Mill. Galls
Diverting Dam		270	80	1,500
No. 1	1 <del>1</del>	180	30	124
No. 2	3 <del>1</del>	170	70	2,203
No. 3	1청 3천 3	160	60	448
No. 4	9			382
No. 5	42	160	60	1,545
No. 6		120	40	125
No. 7		120	40	554
No. 8		140	90	2,141

All of the dams for the subsidiary storage r eservoirs are to be of earth. No careful estimate of cost has been made, and it seems improbable that the entire system of storage as outlined will be carried out for at least many years to come.

9,002

WATER SUPPLY: The San Diego river is especially intermittent in its flow in its lower course, and in midsummer and fall is frequently nearly dry at the site of this diverting dam, and for miles above and below. In winter its volume sometimes reaches fifty thousand inches or more, and it is believed by the projectors of the enterprise, for four months of winter and spring the flow will exceed an average of ten thousand inches daily. The appropriation will always be subject in some degree to the prior diversion of the San Diego Flume Company higher up the stream. The diverting dam is located to utilize all the stream in its lower course, and it advantageously commands the district which it seeks to supply.

HISTORY OF PROJECT AND WATER CLAIMS: The Mission Valley Water Company was incorporated in July, 1887, whit with a nominal capital of seven thousand five hundred shares of \$100 each, par value. A filing was made on ten thousand inches of water at the point of diversion, and work was begun on the construction of the diverting dam in the fall of 1887. The parties chiefly in interest are citizens of San Diego, who are following the judgment of the Jesuit priests who selected this same field for the establishment of their first footing in California, and made this the point where the first of many notable irrigation works was constructed, and where irribation is believed to have been first successfully practiced in the State.

THE SAN DIEGUTIO RIVER PROJECT
Pamo Water Company's Proposed Works

DISTRICT AND PROJECT: A notable scheme projected for the utilization of water of the San Dieguito or Bernardo river is that of the Pamo Water Company, which seeks to provide irrigation facilities to Poway valley and the Linda Vista mesa, lying between the San Diego river, and Penasquitas creek, near the coast, by means of a storage dam on the headwaters of the river below the mouth of Pamo creek, and a flume twentyfive miles long terminating in a secondary storage reservoir on the mesa, near the lands to be watered. The field which would be commanded by the intended works largely exceeds their projected capacity for supply, as the main conduit will skirt the San Pasqual and Bernardo valleys before reaching the particular district to which, under the project, the water is to be specially applied. No other works now outlined dominate this region, except those from the more distant supply of the San Luis Rey Flume Company, and these two above named valleys alone could consume the flow of the proposed flume by the Pamo company.

STORAGE AND DELIVERY WORKS: Above the valley of San Pasqual the river occupies a rocky canon some three and a half to four miles in length opening out above the canon into the Pamo valley, at the mouth of Pamo creek, an important tributary to the river, draining a portion of the Mesa Grande. At the head of this canon the company design building a masonry dam on bedrock, eighty feet high, four hundred feet long on the crest, one hundred and seventy five feet long on the bottom, which will form a reservoir having a capaicyt of about three thousand million gallons.

carry the water through the canon, whence it will be conveyed by a flume about four by four feet, skirting the hillsides far above the river, past the San Pasqual and Bernardo valleys to a gap in the divide between the Bernardo and Poway valleys; thence through the gap, skirting the Poway valley, and terminating in a reservoir of two thousand million gallons capacity, to be formed by a second masonry dam, forty feet in height, two hundred to two hundred and fifty feet long on crest, one hundred to one hundred and twenty five feet long on base. The stream and its tributaries above the proposed point of diversion has a water shed area of nearly one hundred and fifty square miles, of which fully two thirds has an altitude of over three thousand feet, and reaching as high as six thousand feet. The two principal tributaries are Pamo and Santa Ysabel creeks, both perennial streams of comparatively large volume, draining a portion of the Volcan mountain and the Mesa Grande.

The elevation of the base of the main storage and diverting dam is eight hundred and fifty feet above sea level. This reservoir basin is a long narrow valley of alluvial soil inclosed on either side by precipitous hills and mountains. The site of the dam is at a point where hard, gray granite crops out, affording abundant material for construction purposes. The material at the lower reservoir, for dam building, will be a hard basaltic rock of close texture. The altitude at base is about seven hundred feet, which readily commands the tract to be watered, its elevation being two hundred to six hundred feet above the sea. The elevation of the upper dam as compared to the great area of arable lands that may be reached from it by gravity, facilitates the choice of routes for conduit. The San Pasqual valley (elevation 550 feet) Bernardo valley, elevation 440 feet), the Escondido valley (elevation 650 feet), and Poway valley (elevation 500 feet), are all within comparatively easy reach, as the main conduit will follow the divides above them.

That the chief reliance of the works will depend upon the winter flow of the stream stored by reservoirs, for summer use, is as true of this enterprise as of all other projected in San Diego county. The fact that the streams in this case never go entirely dry should add materially to the effectiveness of the enterprise, seeing that they may largely contribute to make up the inevitable losses in transit and in evarpoation from the surface of the reservoirs. But without storage the supply would be unreliable for the irrigation of any considerable area. The winter flow, however, will probably much exceed the capacity of the present projected means of storage and transit.

HISTORY; ORGANIZATION: The Pamo Water Company which has taken up this stream was incorporated in March, 1888, with a capatal stock of \$1,000,000, in ten thousand shares of \$100, par value. Thus far nothing has been done beyond the work of making preliminary surveys and the purchase of the lands to be embraced by the reservoir. The company propose to make the landholders along the route directly interested in the project by taking contracts for deeds to a portion of their lands as consideration for water rights for the r mainder, the deeds to be made in advance and held in escrow, or to be made on the completion of the w works. With a land subsidy of this character, they consider that they will have tangible assets to hypothecate for the money needed to construct the works.

### SAN LUIS REY RIVER PROJECTS San Luise Rey Flume Company

DISTRICT AND PROJECT: - Steps were taken in 1886 by several San Diego and operators looking to the systematic utilization of the San Luis Rey river, and the irrigation of the coast mesa in the vicinity of Oceanside near its mouth, on the south side. An organization was affected, and surveys for a canal or flume line were made, and water rights were filed upon at the second narrows, some five miles below Pala, where the elevation is about three hundred and seventy five feet. A submerged dam extending from bluff to bluff, seven hundred feet, to raise the under flow to the surface was contemplated, but the cost of the work, the long line of conduit required, and the uncertainty of the water supply available at the point of diversion six selected, led to the expansion of the project and the formation of the present company, with a large capital and embracing a more comprehensive scheme. The new company set to work to acquire all water rights on the river that might in any way conflict with their proposed appropriations, as well as fiparian right along the stream.

STORAGE AND DELIVERY WORKS PROPOSED:— An outline of the main project is, briefly, the construction of a mammoth reservoir dam on Warner's ranch, a canal from the canon of the river some miles below the dam, extending about twenty miles along the mountain and rolling hillsides south and west of the river, and a secondary storage reservoir at the terminus of the canal in Bear valley at an elevation of one thousand three hundred feet. From this commanding elevation, but twenty miles from the sea at the nearest point, and thirty five miles from the city of San Diego, the territory that may be served is only limited by the supply of water available. Pipe lines are projected in various directions. The main conduit drops into this secondary reservoir with a direct fall of seven hundred feet, and the utilization of this water power and transmission by electricity to points of use are contemplated.

The company have brought actions to condemn the land on Warner's ranch required for purposes of the reservoir. Until the possession of these lands is required for purposes of the reservoir of the confined to the construction of the conduit and lower reservoir dam, where the lands have already been acquired. The first pipe line to be laid from the Bear valley reservoir will probably be through Escondido and San Marcos valleys to Oceanside. San Pasqual, Bernardo, and Poway valleys are also readily commanded, and the coast mesa between Oceanside and San Diego and north of Oceanside. The full development of this scheme would take several years to accomplish, and the total cost of works to fully avail of its possibilities would np doubt exceed a million dollars. (As this report goes to press (October) it is learned that the company has secured \$500,000 with the engagement of as much more, from New York capitalists, on the basis of its bonds, and land and water rights contracts, and that the work is to be immediately pushed forward).

#### SANTA MARGARITA RIVER PROJECT Fall Brook Water and Power Company

DISTRICT AND PROJECT: The existing diversion of water from the Temecula or Santa Margarita river are unimportant compared with that projected and under construction by the

Fall Brook Water and Power Company. This company was organized in 1887, with the prupose of erecting a capacious storage dam at the head of Temecula canon, and carrying the waters in a flume and pipe line to a body of some thirty thousand acres of rolling table lands in the vicinity of Fall Brook, lying to the south of the river, twelve to fifteen miles inland from the coast. Ten miles of flune, and two miles of pipe line laid on a graduating gradient of eight feet per mile comprise the main ranged that conduit. An average flow of eight hundred miner's inches, maintained by the living waters of the stream, as supplemented during the dry season of the year by water stored in the reservoir, is the delivery counted upon by the company.

The proprietors of the Santa Mar garita ranch, at the mounth of the river, have an appropriation at the lower end of the canon., which may interfere with the plans of the Fall Brook company. To avoid this difficulty, it is proposed to return to the stream the water belonging to the rancho at the end of the flume line, and utilize the fall of five hundred feet for water power. The company have purchased certain conflicting riparian rights along the stream, and hope to have their works completed at \$200,000. The character of the country to be irrigated, its picturesque beauty, clothed with live oak the trees, and the special adaptability of the soil to the growth of the citrus fruits, render the project an interesting one.

TIA JUANA RIVER PROJECT
The Mount Tecarte Land and Water Company.

DISTRICT AND PROJECT: Reviewing this region by the route alone which the streams have been described - the order of their geographical position from the state boundary northerly—the first irrigation project is found immediately at the line, and is international in its scope, in that it aims to utilize both the American and Mexican tributaries of the Tia Juana river; to carry American waters through Mexican territory, and to deliver them again in the United States; to store both Mexican and American waters for irrigating Mexican and American soils; and to harmonize local questions of international water rights, by serving lands on either side of the line encally with water to the extent of the capacity of the stream. Eight reservoir sites have been selected for storage.

The Otay mesa lying north of the Tia Juana river, at an elevation of three hundred to seven hundred feet, extending as far north as the Otay river, and lying chiefly on the American side, is the principal field to be commanded. A subsidy of one fourth, of ce tain large bodies of these lands on the American side, and one half on the Mexican side, is being negotiated by the company with land owners as a consideration for water rights for the reaminder. The proposed main conduit flumes are two in number. One, to convey the waters of the Cottonwood fork some sixteen miles to the upper edge of the Otay mesa, is to start at an elevation of sixteen hundred feet and run part may south of the line, although a tunnel has been projected to avoid passing the border, if need be. The second flume line is planned to lead out from the main stream at a point on the boundary three fourths of a mile below the Tecarte fork. This is a mere outline of the character of the enterprise, upon which no actual work has yet been started beyond the preliminary surveys. The extent of the field commanded by the proposed works is very large, and irrigation need be limited only to the supply of water available, and the measure of success in its storage.

ORGANIZATION: The Mount Tecarte Land and Water Company, which has taken up this project, was incorporated February, 1888, with a capital stock of \$3,500,000, in three hundred and fifty thousand shares of \$10 each. Since that date the company has made contracts with a number of land commers on the Otay mesa to supply their lands with water, and are preparing for construction on the upper flume line during the coming season.

# OTAY RIVER PROJECTS The Otay Water Company's Scheme

For some years past preparations have been made periodically by the Otay Water Company, whose leaders were of the Coronado Beach Company, for the construction of a mammoth dam at the Tower canon of the Otay, but as yet nothing of importance has been done. The proposed dam was to be of concrete, one hundred feet in height. Its site is four hundred and sixty six feet above tide water, and the capacity of the reservoir when full would be about eight thousand million gallons.

#### Otay Mesa Scheme

On a southerly branch of the Otay that joins the main stream below the canon, a masonry dam, to be sixty feet high and two hundred and sixty feet long on top, was started in 1887 by a partnership association of three San Diegens. After spending some \$10,000 in roads and foun ation, the work was stopped. The reservoir was to be but three hundred million gallons capacity, and to cover seventeen acres. Its limited water shed and light rainfall render it of minor importance. It was designed for the irrigation of a part of the Otay mesa.

SWEETWATER RIVER IRRIGATION AND WATER SUPPLY WORKS
The San Diego Land & Town Company's Works

Because the first of the various projected irrigation works in the county, depending on storage for supply, that has been completed, the enterprise of the San Diego Land and Town Company is thus far first in interest. The engineering works would be notable in any country, and the lesson which the enterprise is working out on the subject of large storage reservoirs for the conservation of winter water for summer irrigation in this dry country is already highly instructive. It is now looked to with satisfaction by San Diegans, as a type of what may be accomplished under even unfavorable circumstances upon nearly all the streams of this region.

DISTRICT AND WORKS: The works consit of a high masonry dam, forming a large storage reservoir, and an extensive system of iron pipes reaching thence for distribution over a great part of the district commanded by the reservoir. The district embraces the Lower Sweetwater valley, and the mesa lands bordering San Diego bay, to the north and south of the Sweetwater, and extending back to an elevation of one hundred and seventy five to two hundred feet above sea level. In general this elevation is reached in two to two and a half miles from the bay shore. Its area within the limits of the National rancho, including National City, is about fifteen thousand acres. The Water may be carried both orth and south, beyond the limits of the rancho, by an extension of the pipes, and its is feasible to cover nearly forty thousand acres by the system. Any scheek such extension would, however, enter the district systems more directly commanded by other projected works, and at present the distribution is confined to the lines of the National rancho.

STORAGE RESERVOIR: - The reservoir site is located almost entirely within the Rancho Jamacha (as the dam is but one thousand feet inside the boundary of the National Rancho) having an extreme length of three and ahalf miles and a maximum width of three fourths of a mile. It is inclosed by high hills, and lies at the foot of Mt. St. Miguel, whose elevation is about two thousand five hundred feet, the most conspicuous peak lying near the coast.

SWEETWATER DAM: The dam is located across the canon of Sweetwater river, near the head of the rocky pass, there through which the river escapes from Jamcha valley. At the beginning, a dam wholly of earth was contemplated. The best of clay was available for a puddle wall, and an earthen dam could have been built more cheaply that the masonry structure ultimately cost. The superior quality and unlimited quantity of the stone on the spot, however, decided the adoption of that material. When the work was begun the dominant idea was to secure a water supply of some volume as soon as possible. The question of quantity that might be stored, the area of land that might be served, the volume of supply needed, or the relative costs of different heights of structure were not preliminarily studied or at all considered.

The plan originally was to build a dam fifty feet high above the general revl of the canon bed sixty feet above the general level of the river channel, or sixty five feet above the general level of the bedrock plane which was exceedingly uneven. When, however, it was ascertained some months after the work had begun, and subsequent to the development of facts that are usually known before any decision or plan is reached that a greater supply was desirable than such a dam could assure, and that an increase in height afforded such a great advantage in retaining a supply sufficient for more than

one season, and that holding water at a higher average level would serve some most desirable higher lands, it was decided to continue the structure to the height of ninety feet.

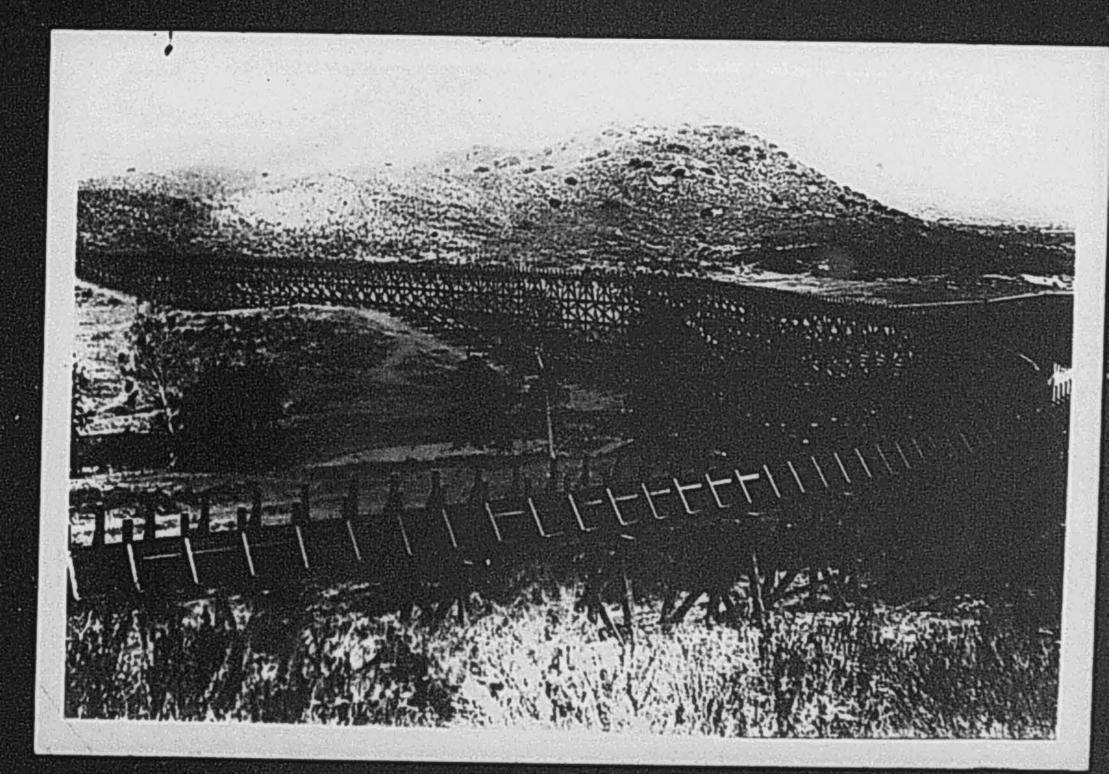
Hefore this decision was reached the originally planned work was nearly completed. The subsequent work necessitated an increase in the width of base. The lower tow of the dam was stripped to bed rock and the new Kakkstarted work started from the bottom, joining and overlapping the old work in successive steps, which had been left for the purpose on the lower face. As completed the dam has the following dimensions: That Thickness at base forty six feet, at top twelve feet; height ninety feet to floor of roadway; length on top three hundred and forty feet, at base about one hundred feet. In plan the dam lies in the form of an arch, whose radius is two hundred and twenty-two feet to the upper face line at the top. Including gate tower, waste-way walls, and other immediate accessories, it contains twenty thousand five hundred and seven cubic yards of masonry.

The masonry is of the type known as rough rubble —rough blocks of stone, laid without courses or ranges, with all interstices filled with smaller stones and mortar of Portland cement rammed in place. Along the upper face at top runs a parapet wall, three and one half feet high and two feet thick, which servesnot only as a guard wall to the roadway on that side, but which, when the reservoir is full, will serve to prevent waves from washing over the roadway. This road, which is wide enough for a carriage drive, is protected on the lower side by an iron fence, the posts of which are imbedded in the masonry, and set at intervals of six feet. A stone stairway with iron railing reaches from top of dam tobottom of canon below the structure at the north end.

The waste way is located at the south end. It consists of a weir opening forty feet in length by five feet in depth, divided into eight bays, of five feet each, by masonry piers, inclined on the face to receive loose flash boards. By removing these boards, the water level can be lowered five feet from the top of dam. A training will built parallel with the direction of the canon forms one side of this flood escape channel and carries the waste water fifty feet below the lower toe of the dam, where it falls down an incline over the face of the canon wall. The capacity of the waste way is one thousand five hundred cubic feet persecond, and is designed to carry the maximum flood flow of the stream when the reservoir is full. There is no sluice way at the bottom of the dam other than the main conduit, which has a thirty inch blow off gate one thousand kix hundred feet below, capable of discharging three hundred cubic feet per second.

The delivery to the main conduit is effected through a masonry tower, situated fifty feet above the dam, and reaching three feet above high water mark. Cast iron elbows, twenty four and thirty six inches in diameter, are placed at intervals of ten feet from the top to bottom. These open upward with bell mouths, that may be closed with plain cast iron covers. The work was begun in November, 1886 and finished in March, 1888, occu ying sixteen and one half months in construction.







#### **Ed Fletcher Papers**

1870-1955

**MSS.81** 

Box: 53 Folder: 6

Business Records - Water Companies - Cuyamaca Water Company - San Diego Flume Company -Flume Company history, photos and memorabilia



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