WATER MEASUREMENT.

Terms for Mining, Irrigation and Mill Power.

The Procedure With the Aqueous Fluid in Utah, California, Colorado and Other Places.

The *Scientific American* of May 27 contains an article contributed by G. D. Hiscox, M. E., on the subject of "Terms of Water Measurement for Mining, Irrigation and Mill Power." It says: The designation of the terms of water measurement seems to be somewhat misunderstood, or has become misleading in many parts of the United States from the manner in which a primitive custom of water measurement has been adopted in different localities and afterward in some of its forms been made legal by the courts.

Differences in elevation above the sea and the latitude make a slight difference in the flow of water by gravity for a length of time, too small for practical consideration, but just enough for a legal quibble when water measure is referred to the courts.

Variation in the form of the orifice varies the actual delivery per square inch of orifice and with all the conditions of variation in head, form of orifice, elevation of locality, latitude and dissimilarity in the lengths of orifice, there is found a variation in the accepted unit flow through a square inch of orifice of over half a cubic foot per second.

In this view the miner's inch of water used in the early days of California mining has become a standard of varying proportions in different localities, most perplexing as a definite and legal measure; so that the nominal miner's inch may deliver any quantity from 1·20 to 1·78 cubic feet of water per minute.

The largest volume for a miner's inch is the measure used at Smartsville, Yuba county, Cal., called the Smartsville inch, is derived from a horizontal rectangular orifice 4 inches in depth, through a 2 inch plank, under a head of 9 inches from the center of the orifice, and of the required width for the total flow, this being equal to 1·78 cubic feet per minute per square inch of orifice.

The miner's inch of the Park Canal and Mining Co., El Dorado county, Cal., is equal to 1·45 cubic feet per minute, with an orifice two inches deep through a 1½ inch plank—head 6 inches above center of orifice—this being the rating of several ditch companies in California.

By a series of experiments at Columbia Hill, Cal., lat. 39 degrees, 2,900 feet above the sea, 1·5744 cubic feet per square inch per minute was assigned as a miner's inch, this being the flow per square inch through a rectangular slit 50 inches long, 2 inches deep, equal to 100 square inches, under a head of 7 inches from the center of the slit; this being also the rate with the North Bloomfield, Milton and La Grange Ditch companies.

In other parts of California 50 miner's inches are rated at 60 cubic feet of water, or 1·20 cubic feet per miner's inch. The statutory or legal miner's inch of California is equal to a flow of 1·594 cubic feet per minute, and is defined as the flow through a square orifice 1 inch in depth by 1 inch in width through a 1 inch plank, under a head of 4½ inches above the center of the orifice.

In Colorado, previous to statutory regulations and still in use by agreement, 40 miner's inches are reckoned at 60 cubic feet, or 1·50 cubic feet per square inch of orifice under a head of six inches above the orifice in the bottom of the delivery box, the stream falling vertically, the actual flow being 1·656 cubic feet per minute.

The statutes of Colorado now provide that "water sold by the inch by any individual or corporation shall be measured as follows, to wit: Every inch shall be considered equal to an inch square orifice, under a 5 inch pressure, and a 5 inch pressure shall be from the top of the orifice of the box, put into the banks of the ditch to the surface of the water."

The practice much in use in Montana is to deliver the water through a horizontal slit 1 inch in depth, of sufficient length for the required supply, under a head of 4 inches above the head of the slit, and is equal to a flow of 1·25 cubic feet per minute per square inch of orifice.

Six and a half inches head above the center of a 1 inch square orifice, or a long horizontal gate 1 inch in depth, is becoming the more usual practice in California, where the miner's inch originated, and will no doubt come into general use as the most satisfactory working condition of water supply for mining and irrigation purposes.

From experiments of the Pelton Water Wheel Co., the relation of flow under various heads and increasing widths of slot, with a uniform thickness of plank and distance of orifice from the bottom of the flume, becomes interesting, in view of the varying practices in different states and localities. With a square orifice 2 inches in depth, 4 inches wide, a 5 inch head above the center of the orifice gave a flow of 1·348 cubic feet per minute; 8 inch head, 1·473 cubic feet; 7 inch head, 1·568 cubic feet per minute per square inch of orifice. By lengthening the orifice horizontally the flow increased in quantity per square inch of orifice, owing to the increase of area relative to the increase of perimeter; so that at 12 inches in width, 5 inch head, flow 1·[illegible]; 6 inch head, 1·[illegible]; 7 inch head, 1·[illegible] cubic feet per square inch of orifice.

For the purpose of irrigation, the irrigating duty of water takes its base of computation from the flow per second or minute; but as this is not a constant quantity for different localities, owing to variation in value in the miner's inch, the term duty will be an uncertainty until some general law fixing a uniform standard of measure or detail, as to head and area to constitute a unit of measure, is made broadcast over the different states and territories requiring a system of irrigation.

As an irrigation term the "duty of water" means the area of land upon which a definite volume of water, applied during a given period, will successfully raise crops.

In Utah, where irrigation laws have largely covered the details of water rights, the "unit" of water measurement is designated as one cubic foot of water per second, called the "second foot," is the standard of expression for water service for irrigation, and is equal to 86,400 cubic feet per day. The "acre foot" is the equivalent of one acre covered one foot deep, or 43,560 cubic feet, to which is added the time requirement.

In Utah the "second foot" is equal to two "acre feet" per day—"60 acre feet" per month; 100 California inches equal 4 acre feet per day; and 100 Colorado inches equal 3 1-6 acre feet per day.

The "second foot" is becoming popular through all the Western states and territories, from its definiteness of meaning and understanding, and with which there is little chance for technical quibble.

The measurement of water for power in the eastern portion of the United States is the "inch," under a stated head. The "inch" or "inches," meaning the number of square inches opening in a gate, or orifice, leading to a water wheel under some specified head.

The practice varies largely in different states. In New England, the water power companies have specific measures of gate opening, from one foot head upward, and also rate by the theoretical horse power for any form of flow.

Where no specific head is named, a 4 feet head from the center of the gate orifice to the surface of the water in the flume has become legalized in some of the states by statute or court decision; the height or head above or below the statutory 4 feet being reckoned by its relation to the unit, in power-producing effect.

This is made the basis in water power leases in Wisconsin from the time of the earliest leases in that state.

In some cases the actual heads are named. The valuation of variation in the head below and above four feet, when named as a unit, has been a cause of legal contention in several states, and in Wisconsin it has been fairly defined that the power derived from a unit orifice varies proportionately with the variation of the head, and that the area for a given power varies inversely as the square roots of the heads less the proportion of increased head and the reverse for decreased head.

ARE YOU THINKING

Of what you ought to take when you go to the World's Fair? Your outfit will not be complete without a bottle of Chamberlain's Colic, Cholera and Diarrhœa Remedy. The change of water and diet, fatigue and irregular habits, during your trip are almost certain to produce diarrhœa and a dose or two of this remedy may save you serious sickness and perhaps much expense. Procure it before leaving home. 25 and 50 cent bottles for sale by Z. C. M. I. Drug Dept. d&w

Strongly Endorsed.

The advertising of Hood's Sarsaparilla appeals to the sober, common sense of thinking people, because it is true; and it is always fully substantiated by endorsements which in the financial world would be accepted without a moment's hesitation. They tell the story—HOOD'S CURES.

Hood's Pills cure liver ills, jaundice, biliousness, sick headache, constipation. 5

A Sure Cure for Piles.

Itching Piles are known by moisture like perspiration, causing intense itching when warm. This form as well as Blind, Bleeding or Protruding, yield at once to Dr. Bosanko's Pile Remedy, which acts directly on parts affected, absorbs tumors, allays itching and effects a permanent cure. 50 cts. Druggists or mail. Circulars free. Dr. Bosanko, Philadelphia, Pa. Sold by Z. C. M. I. Drug Dept.

Deserving Praise.

We desire to say to our citizens, that for years we have been selling Dr. King's New Discovery for Consumption, Dr. King's New Life Pills, Bucklen's Arnica Salve and Electric Bitters, and have never handled remedies that sell as well, or that have given such universal satisfaction. We do not hesitate to guarantee them every time, and we stand ready to refund the purchase price, if satisfactory results do not follow their use. These remedies have won their great popularity purely on their merits. A. C. Smith & Co., druggists. 1ew

---

Mrs. Anna Sutherland

Kalamazoo, Mich., had swellings in the neck or Goitre from her 10th year, causing 40 Years great suffering. When she caught the grip it increased and she had fearful spells with her breath. She took

Hood's Sarsaparilla

And is now free from it all. She has taken many remedies to take Hood's Sarsaparilla and they have also been cured. Hood's is good.

HOOD'S PILLS Cure all Liver Ills, Jaundice, sick headache, biliousness, sour stomach, nausea.

FAT PEOPLE [illegible]

Electric Bitters.

This remedy is becoming so well known and so popular as to need no special mention. All who have used Electric Bitters sing the same song of praise.—A purer medicine does not exist, and it is guaranteed to do all that is claimed. Electric Bitters will cure all diseases of the Liver and Kidneys, will remove Pimples, Boils, Salt Rheum and other affections caused by impure blood.—Will drive Malaria from the system and prevent as well as cure all Malarial Fevers.—For cure of Headache, Constipation and Indigestion, try Electric Bitters.—Entire satisfaction guaranteed, or money refunded.—Price, 50c. and $1.00 per bottle at A. C. Smith & Co's Drug Store. 1**

When tired and you want something to help you renew your youth try Gold Band Coffee.

See the handsome pictures contained in each package of Gold Band Coffee.

For 10 days Z. C. M. I. will discount all Wall Papers 33⅓ per cent. The greatest stock in the city.

Z. C. M. I. offers 33⅓ per cent discount off all Wall Papers in their immense stock for 10 days.

The Gold Band Coffee is always uniform in strength and flavor and full weight.

Dr. Ellis R. Shipp, Physician and Surgeon. Office and residence No. 18 Main street. Diseases of women a specialty.

Help us to help you by calling for Gold Band Coffee when ordering your groceries.

Gold Band Coffee is a quick seller; this is evidence that it is popular with the consumers.

World's Fair Rates Reduced.

Via the Union Pacific.

To Denver and Pueblo and return	$28 00
To Missouri River and return	45 00
To St. Louis and Return	48 00
To Chicago and return	50 00

Tickets good thirty days. Only 48 hours to Chicago via the World's Pictorial Line.

City Ticket Office, 201 Main Street.

Dr. Barrows, Oculist, Aurist and Optician. Spectacles fitted. Commercial block.

Bucklen's Arnica Salve.

The Best Salve in the world for Cuts, Bruises, Sores, Ulcers, Salt Rheum, Fever Sores, Tetter, Chapped Hands, Chilblains, Corns and all Skin Eruptions, and positively cures Piles, or no pay required. It is guaranteed to give perfect satisfaction or money refunded. Price 25 cents per box. For sale by A. C. Smith & Co.

A. B. C. Bottled Bohemian Beer.

Made by the American Brewing Company of St. Louis is brewed of the best barley and Bohemian hops. It has a beautiful amber color, a delicious hop flavor and sparkles like Champagne. Fred S. Haines, 44 East, First South Street, Salt Lake City, Utah.

It Should Be in Every House.

J. B. Wilson, 371 Clay Street, Sharpsburg, Pa., says he will not be without Dr. King's New Discovery for Consumption, Coughs and Colds; that it cured his wife who was threatened with Pneumonia after an attack of "La Grippe," when various other remedies and several physicians had done her no good. Robert Barber, of Cooksport, Pa., claims Dr. King's New Discovery has done him more good than anything he ever used for Lung Trouble. Nothing like it. Try it. Free Trial Bottles at A. C. Smith & Co's Drug Store. Large bottles 50c. and $1.00. 5*

A bottle of Manitou at the dinner table is a great luxury. Order a case sent home. W. H. Halbeimer, sole dealer. 237 S. Main.

Connoisseurs and Epicures drink Gold Band Coffee.

Stockholders in the Greeley can redeem their stock, recently sold, up to June 5th.

The Temple Spoon.

Said by thousands to be among the handsomest of all souvenir spoons. Is of compact size, full weight, made from Utah silver, Sterling fine. The Angel Moroni, as represented by Dallin's magnificent statue on the tower of the Mormon Temple, is on front handle. The words Salt Lake City and the beautiful spire of the four tower house, with the great seal of Utah on the reverse, where the Temple is artistically represented in the bowl.

A Souvenir of Utah, designed and Copyrighted BY THE

J. H. Leyson Company.

133 MAIN ST., SALT LAKE CITY.

PRICE, $2. WITH GILT BOWL, $2.50.

PATENTS

Caveats, and Trade-Marks obtained, and all Patent business conducted for Moderate Fees. Our Office is Opposite U. S. Patent Office, and we can secure patent in less time than those remote from Washington. Send model, drawing or photo, with description. We advise, if patentable or not, free of charge. Our fee not due till patent is secured. A Pamphlet, "How to Obtain Patents," with cost of same in the U. S. and foreign countries sent free. Address,

C. A. SNOW & CO.

Opp. Patent Office, Washington, D. C.

The Fact

That the St. Charles Unsweetened Evaporated Cream is receiving the endorsement of the Scientists throughout the country is sufficient evidence of its merits.

Try it. Your Grocers and Druggists sell it.

Tomorrow, June 2nd, Husband & Co., 422 W. 2nd South.

BANKS.

COMMERCIAL NATIONAL BANK,

Of Salt Lake City.

Interest Paid on Time Deposits.

Directors.—F. H. Auerbach, John J. Daly, O. J. Salisbury, Moylan C. Fox, Thos. Marshall, W. P. Noble, George M. Downey, John W. Donnellan, Erwin Leary.

JOHN W. DONNELLAN, Cashier.

WELLS, FARGO & CO.'S BANK.

SALT LAKE CITY, - UTAH. *Established 1852.*

Buys and sells Exchange, makes Telegraphic transfers on the principal cities of the United States and Europe, and all points on the Pacific Coast. Issues letters of credit available in the principal cities of the world. Special attention given to the selling of Ores and Bullion. Advances made on consignments at lowest rates.

Particular attention given to collections throughout Utah, Nevada and adjoining territories. Accounts solicited.

J. E. DOOLY, Cashier.

B. H. SCHETTLER,

—WHO DOES A—

GENERAL BANKING BUSINESS

AT NO. 60 MAIN STREET,

(Opposite the Co-op.) and

PAYS INTEREST ON DEPOSITS.

[illegible]

Napoleon

had life long regrets for his rash engagement at

Waterloo

But those who have engaged and are still engaging building lots in

East Waterloo

congratulate themselves on being richer from the day they made their purchases.

This Subdivision has FINE DWELLINGS, cement walks, good water, good car service, lovely surroundings. Within THREE YEARS these lots should bring $1,000 each. The shrewdest business men are buying them, and lots of them. Price now

$325 and upwards. Easy Payments.

W. E. HUBBARD,

41 WEST SECOND SOUTH STREET.

NATIONAL BANK OF THE REPUBLIC

Frank Knox, President.
L. C. Karrick, Vice-President.
J. A. Earls, Cashier.

CAPITAL PAID IN $500,000.

Banking in all its branches transacted. Exchange drawn on the principal cities of Europe.

Interest Paid on Time Deposits.

Directors—Geo. A. Lowe, Emanuel Kahn, Judge J. W. Sutherland, H. L. A. Culmer, W. E. Cowdry, O. S. Holmes, Frank Knox, L. C. Karrick, J. A. Earls.

THE

STATE BANK OF UTAH,

Corner of Main and South Temple Streets, Salt Lake City.

Capital, - $500,000
Surplus, - 5,000

HEBER J. GRANT, President.
WM. B. PRESTON, Vice-President.
HEBER M. WELLS, Cashier.

DIRECTORS:

Joseph F. Smith,
Abraham H. Cannon,
Chas. S. Burton,
Frank Y. Taylor,
Wm. B. Preston,
Spencer Clawson,
Heber M. Wells,
Philo T. Farnsworth,
Isaac Barton,
R. M. Wells,
Heber J. Woolley.

Commercial Banking in all its branches. Accounts solicited, large and small.

UTAH COMMERCIAL

—AND—

Savings Bank,

SALT LAKE CITY.

Capital, - - $200,000
Surplus, - - $40,000

GENERAL BANKING BUSINESS.

Five Per Cent. Interest Paid on Savings Deposits, Compounded Four Times a Year.

NICKEL SAVING STAMPS FOR SALE *AT THE BANK OR ANY OF ITS AGENTS.*

DIRECTORS.

Francis Armstrong,	F. W. Madsen,
Dr. Jos. S. Richards,	T. W. Ellerbeck,
Bolivar Roberts,	Thos. W. Jennings,
Oscar H. Hardy,	Samuel McIntyre,
M. E. Cummings.	

Deseret National Bank

SALT LAKE CITY, UTAH.

Paid-up Capital, - - $500,000.00
Surplus, - - - $200,000.00

DIRECTORS:

L. S. Hills, President.
Moses Thatcher, Vice-President.
W. W. Riter,
J. R. Barnes,
J. T. Little,
A. W. Carlson,
James Sharp,
Henry Dinwoodey,
D. H. Perry,
F. W. Jennings,
George Romney,
J. R. Winder,
R. S. Eldredge.
H. S. Young, Cashier.

Receives Deposits Payable on Demand.

Buys and Sells Exchange on New York, San Francisco, Chicago, St. Louis, Omaha, London and all the Principal Commercial Cities.

Safe Deposit Vaults, absolutely burglar and fireproof. Boxes $5 to $50 per year.

WILFORD WOODRUFF, President. GEORGE M. CANNON, Cashier.

Cash Capital	$100,000
Cash Surplus	$50,000

ZION'S SAVINGS BANK

—AND—

TRUST COMPANY,

Nos. 1 and 3 East Temple Street, *SALT LAKE CITY, UTAH.*

ESTABLISHED 1873. INCORPORATED 1888.

DIRECTORS.

Wilford Woodruff, President.
George Q. Cannon, Vice-President.

Joseph F. Smith,	George Reynolds,
Angus M. Cannon,	Heber J. Grant,
James Jack,	Lorenzo Snow,
T. G. Webber,	Francis M. Lyman,
H. B. Clawson,	Anthon H. Lund,
Leonard G. Hardy.	

Oldest Savings Bank in Utah, with deposits greater than all others combined.

SAFETY DEPOSIT BOXES FOR RENT.

Savings Deposits in any sum, from $1.00 up, received and interest allowed at 5 per cent. per annum, compounded four times a year. Correspondence solicited, and any sums forwarded by country depositors carefully attended to.

F. S. Richards, President. Thos. G. Webber, Vice-President. G. H. Backman, Sec'y and Treas.

THE

SECURITY ABSTRACT CO.

Office in Deseret National Bank Building, Salt Lake City, Utah. Telephone, 143.

Directors: F. S. Richards, Thos. G. Webber, H. W. Clayton, Elias A. Smith, M. E. Cummings, James H. Moyle, Chas. O. Richards, A. W. Carlson, J. G. Cutler.

G. H. TAYLOR, President. G. S. ROMNEY, Sec. and Treas.

TAYLOR, ROMNEY, ARMSTRONG CO.,

—DEALERS IN—

LUMBER!

Sash, Doors, Mouldings, Etc.

Planing Mill and Yard, One Block East of U. P. Depot, Salt Lake City, Utah.

GEO. ROMNEY, Manager. O. D. ROMNEY, Asst. Manager.

Address all Correspondence. 301, 303 & 305 W. South Temple Street.

DELICIOUS ICE CREAM.

Is Readily Prepared at the least expense of

HIGHLAND *Evaporated* Cream.

A DAINTY

For COFFEE and COCOA

FOR SALE BY GROCERS AND DRUGGISTS

Carpenter Paper Co.

WHOLESALE

PAPER and STATIONERY

CAR LOAD ORDERS FILLED PROMPTLY FROM STOCK OR MILLS.

PRINTED WRAPPING PAPER A SPECIALTY.

Price List sent cheerfully on application. Address

CARPENTER PAPER CO.,
1401, 1403 Howard Street,
OMAHA, NEB.

PURE California WINES.

H. J. WOOLLACOTT,

124 & 126 N. SPRING STREET,
LOS ANGELES, Cal.

I MAKE A SPECIALTY of Pure California Wines, put up in cases of one dozen quarts, and will deliver to any part of Utah on the line of the railroad [illegible]

BEST OAK TANNED

Leather Belting.

A. O. COOK & SON,

415 Market St., SAN FRANCISCO, Cal.

AT Z. C. M. I.

COBURN'S PURE OLIVE OIL.

First pressing guaranteed. Perfectly Pure.

COBURN, TEVIS & CO.,

Agents, San Francisco.

GO TO

Hackmeier's Hotel,

123 to 129 EDDY STREET,

SAN FRANCISCO, Cal.

RATES: $1, $1.25 & $1.50 PER DAY.

Founded in 1856. Incorporated April, 1882

TUBBS CORDAGE COMPANY,

MANUFACTURERS OF ALL SIZES OF

MANILA AND SISAL ROPE.

Binder Twine, Drilling Cables, Whale Line. | 611 & 613 Front St., SAN FRANCISCO.

J. Geoghegan, Resident Agent.

Joseph William Taylor

—UTAH'S LEADING—

UNDERTAKER AND EMBALMER.

Carry the Largest and Most Complete Stock of

COFFINS, CASKETS,

And Undertakers' Goods in Utah.

Wholesale and Retail at Extremely Reduced Prices, Lower than were ever offered in Utah.

LOTS AND GRAVES Furnished in any Cemetery in the city.

All orders filled Day or Night on the Shortest Possible Time.

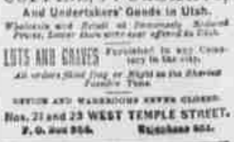
OFFICE AND WAREROOMS NEVER CLOSED.

Nos. 21 and 23 WEST TEMPLE STREET.
P. O. Box 954. Telephone 351.

ESTABLISHED, 1865.

Joseph E. Taylor,

Pioneer Undertaker of Utah.



Manufacturer and Dealer in All Kinds of Metallic, Wood and Cloth Covered

COFFINS AND CASKETS.

Full Line of Coffin Furnishings kept constantly on hand.

Telephone and Telegraph Orders promptly filled.

Burial Robes preserved in their Natural Condition without extra charge.

OPEN DAY AND NIGHT.

Factory and Warerooms No. 253 E. First South,

One and a half blocks east of Theatre.

TELEPHONE No. 70.

HAVE YOUR BASE BURNERS STORED FOR THE WINTER.

We

Will send competent men to take down your stoves, store them, polish, repair and replace in the Fall cheaper than you can do it yourself. Our terms are reasonable.

Salt Lake Hardware Co.,

42-44 W. 2nd South. Sign of Big Gun.