Li-Rite

PATENTS PENDING

# Stenographic Notes

No. 103P

LI-RITE LICENSE NO. 1

Soda Springs Project

No. 1

From November 11, 1942

To December 17, 1942

1

November 11, 1942.

Wiring of Triple Register. 3 or 4 wires?
Sun and wind velocity.

Shields from Stevens.
Transfer shield to Donner Pass.
Rebounders from Fred Paget.
Taboggan
Tubes (14 in. long) for Stevens 30 Day Recorder
Philip Light. System.
Lundquist's chart - Salesprints.
Barometer for Curly.

Need sheets for Triple Register (daily)
" " Thermo-hygrograph
Support for anemometer + Vane.

Set: 30-Day Recorder in Pasture Nov. 11, 1942
Seasonal Rain and Snow Gage Nov. 13, 1942.

Papers for Corvallis Meeting:
Codd's results in Alaska.
Forecasts
Snow Studies at Soda Springs.
Harmony of storms in Continental Divide.
Fish mortality in Michigan.
Recording Gages -
Discussion of Alter's paper at Seattle.
Steam-pipe snow markers.
Experiment at Castle Lake

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3) Mrs. Ingram -
The Feb - storm has caused only 1 day's observations Nov. 11. So no report required

Saturday, Nov. 15

Heavy rain last night, stormy & cold. Clear & warm.

Weather: Engineers today, gale last night. Still blowing hard on Twin Buttes.
Camera testing Preston.
Col. Shores Secretary gone, Albert Pickett acting.
Extra officers and help for Saturday. Brown? Give people to notified on.

Duties:
Stevens Standard clean in fully 10 in. below the top of the cord. Must have four months. Fort Stevens 30-day recorder for Yakima Yakima and use full depth of inside of Wheat. Sun-dial in August.
Snow or rainfall of two seasons.
Greater precipitation Cascade mountains.
Snow on ranges.

Notes:
Ft Stevens 30-day gage, Goldbar accumulated ice and fog falls.

Sandy: Little check on water measurements but State one feeds. Rain-rain of water accumulated on wood

2)

Flow of ice - by Kox Democrat.
— — as solvent agency.
Prestone ?
The U.S.W.B. snow-gage program.

Nov. 14 - Need cans soldered to standard weighing gages — 2 gages in pasture lot, 2 gages on platform at hotel.

Also a spring balance and hook at each place by which to hang it.

30-day clock runs four times too fast. Need new gear.

Why not paint cone of receiver black. All gray or light metal except U.S.W.B. Standard Gage, which is of dark copper.

Get dimensions for anemometer and vane support. Of pipe threads also.

Need two more thermometer shelters. So thermog-hygrograph can be set in present shelter.

3 or 4 X 300 feet insulated wire for triple-register. If 3 x 300, one wire must be double heavy.

Need ⊥ 8" in diam. for Standard Gages in pasture.

Need assortment of flat headed screws to fasten instruments down.

5)

Observe Seasonal Changes -

Wherever snow is met with during measurements about Dec. 1st observe by 8 inches above top. Temp. 25°F.

Tendency for rain also observe & relate to that of all instruments. Today. Extreme adhesion details of Stevens gage. Try glass point on the metal.

Recording mechanism can be removed Trace [illegible]

Volunteer:

Work completed just before storm broke. Tomorrow final checks. Will notify Mr. Goode. Mr. Doolittle has arranged to phone Pomeroy Point on afternoon trip. Anything on pasture lightened.

Cook wanted & Pacific Mtn Telephone Co. Office & get Crowell Box and Book.

Bell & Doty came & need over right/two weeks, return then over-night, refugee. Thunderstorm warning at noon then the very day during part my data remarks.

Recommendations needed:

Staff for anemometer and vane.

(a) Staff of pine. 8 dia. 9/8" & Recommend 1/2" tube holder. Thread 8 & 1/2 in. [illegible]

(b) Staff & anemometer cups

Holders. Use 3/4" in diam. x 3" long.

Trapezoid [illegible]

16" 13"

4) Record: Present Storm Nov. 15-16. +0.17 Sept

U.S. Standard 1.35 in to 7 a.m. 6pm = 1.52 in.

Stevens 30-day 0.85 1.72 at 4:30pm. } On time 4 days at noon clock ½ hr slow.

Trice 1.65 in. Shield blown down.

Snow Depth 5 in. 4:30pm. Nov. 15

Trees all white but less on higher trees exposed to winds

Rain + sleet + snow (5 in.) = 1.72 in. Snow itself fine and powdery.

Wiring: Abandoned telephone wire along snowsheds. Double twisted wire. May have been installed last year for Army use but probably belongs to S.P.Co. Write Division Supt at Sacramento. — McLaughlin.

McL will inquire further regarding second-hand wire.

Leakage:

Tiny splatches of water (frozen) in both Stevens gage. i.e. outer casing.

Trice gage frozen up 3/4" Pen thrown below rim probably by shock of blowing shield loose. But total recorded obtained by releasing pen.

Vibration:

Stevens 30-day trace vibrates badly in wind and especially when tower is climbed, but the trend is plain. Pen moves perfectly.

6)

Query: Would Stevens 30-day pegs have a projection base of peg which would rest on ground & thus indicate once a week if there was a melt? Confirm this 4-day melt observed 30-day.

Could there be confusion in Stevens records?

Text Alterations of record and table. More additions of precipitation & the later ones any effect? Justify omitting the unfinished ones by pointing out the more extreme data contained in them.

Precipitation: Couldn't the funnel & tube. Snow may have caused it to plug.

Camera:

Get a picture 3×4½. Be ready to replace the picture given Stevens.

John Muir:

Suggests last winter's work & Monday at 10am.

Monday, Nov. 16:

Clear as bell after 10 last night. Quiet as noon. At 10°F (-) last night morning. Man overcoat and morning sights.

Early Winter: Mr. Langille suggests that pioneer & snow gauge still subsequent measurements and no gauge over roofs of low cabins.

7)

Cross-rest:

The guard rail on Stevens tower is ideal. Leaves hands fully free and body at ease. and safe. Steps not too wide apart for climbing.

Snow Stake:

Marked in feet but with inch graduations by tens. add black stripes at the foot numbers.

Black Paint:

Get more flat black, which is unaffected by temperature.

Completed cement pouring of platform. Hot water, then covered with celular cardboard, excelsior and snow.

Rear, strong guard rail around Fritz recorder.

Still to be done:

(a) 3×3 supports for timbers in posture with straps [sketch] lagscrews.
4 straps needed. Finally used U bolts.

(b) Painting.

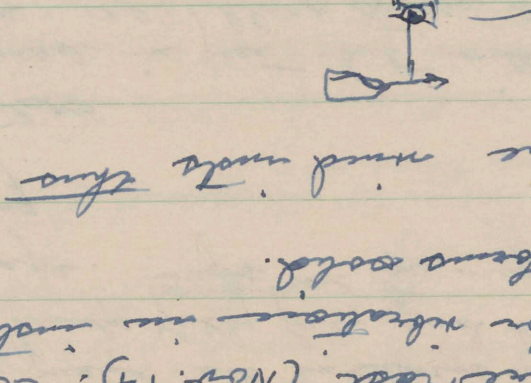
(c) Bolts to be put in.

(d) Bundle of edgings to mark experiments. Snow sampling points.

8

1400 feet — Snowflake from down
night before last. (Nov. 14). Season
started for visitors in mountains,
Ski plows seen.

Stronger wind into tops:




Base 2 Tuesday night plow cut.
Wages $3.50 - Saturday.
Summer date - approx. max. right next
Base 14+2 ft.
Ski season 3½ x 6½ ft. early.

Snow on ground - Castle & Hinkelbe.
Sun setting then rain and ashpool
Alpine at Nordic - Rock storage.



9

Sunday Nov. 22-

Snow Cover: Soft on snow at top 11¾ in. Frost whiskers 3/4 in.

Caught bus at 7 a.m. (Three taxi calls)
Fog ribbon and fluffs in Truckee Canyon with lake of fog in Donner Lake basin.
Chains necessary 2/3 up Donner grade.

Snow on Branches: Last trip fine snow packed into needles of pines. Now entire palms of branches laden until they bend down, particularly on east side of summit.

Crust: Snow crusted. Curly reports 4 in. of precipitation one day. Rain? Snow dry underneath. (Sounds ?)

See Pgs 11-12 how far down?

Seasonal Tape: Orifice clear for 6 in. Snow melting slightly on cone.

Wind shield blown out of socket again where elbow is short. Must be mended.

Instrument started recording when I climbed platform. Trace is not in steps and terraces but in peaks and valleys. Time is regular.

U. S. W. B. Record

Precipitation:

| | Max | Min. | Precip in (Snow) | Sn. on Gr | Sky | Wind |
|---|---|---|---|---|---|---|
| Nov. 1 | 59 | 24 | | | Cl. | LS |
| 2 | 66 | 23 | | | Cl | LW |
| 3 | 61 | 25 | 0,74 | 2 in | Pt Cldy | LS |
| 4 | 34 | 8 | .32 (S/4) | 6 | Pt Cldy | LSW |
| 5 | 41 | 9 | | 5 | Cl | Cldy |

U.S.W.B. Observer (Ext.)

| Nov. | Max. | Min. | Precip. – Water Equiv. (Snow) | Depth of Snow on Ground | Sky | Wind |
|---|---|---|---|---|---|---|
| 6 | 43 | 9 | | | | |
| 7 | 49 | 17 | | 4 | oc | L.S. |
| 8 | 35 | 18 | | 4 | oc | L.W |
| 9 | 42 | 25 | .19 | 4 | cldy | L.SW |
| 10 | 50 | 22 | | 3 | oc | L.E |
| 11 | 37 | 22 | | 3 | oc | G.E |
| 12 | 61 | 21 | | 3 | oc | L.W |
| 13 | 67 | 24 | | 2 | oc | L.S |
| 14 | 62 | 34 | .13 | 2 | Ocdy | L.W |
| 15 | 50 | 25 | 1.35(4) | 6 | cldy | L.SW |
| 16 | 35 | 10 | .26(3) | 7 | cldy | L.W |
| 17 | 34 | 19 | 2.88(18) | 25 | cldy | G.SW |
| 18 | 44 | 31 | 4.08** | 22 | cldy | G.NW |
| 19 | 38 | 10 | 1.10(13) | 35 | cldy | G.W |
| 20 | 40 | 4 | 9.80 | 34 | oc | L.SE |
| 21 | 34 | 8 | | 32 | oc | L.W |
| 22 | 43 | 10 | | 31 | oc | L.E |
| 23 | | | | | oc | |

Snowing.

* All snow since yesterday. Sod not back away.

** Practically all rain. Snow & following showers. Fine since Nov. 24. Can measure it.

11

"Ice Lakes" Resort: Moving out with caterpillar. Going to run. "Lilting Liggies" called "Snow Birds" by their owner.

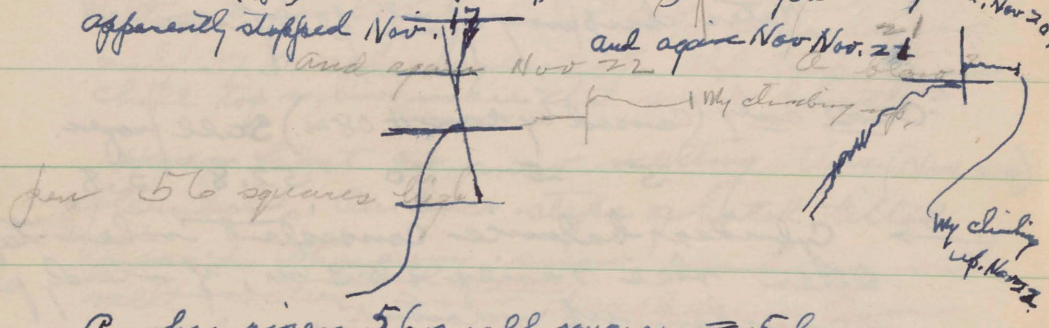
30 day Recorder

Trestle practically clear

Clock running, but sheet evidently stopped on two occasions.

Nov. 11 (4pm) To Nov. 22 (Sunday, 11:20 am.)

Apparently stopped Nov. 17




Pen has risen 56 small squares. = 5 large squares and 11 medium squares.

Medium square = 1 in. water equiv. ?

Tiny square = 0.2 in. ? Total 11.2 in. ?

Unshielded Standard gage 9.80 in.

Wind shield blades caught slightly on tower posts*. Sheet winded slightly by moisture. Pen working perfectly. On Nov 20(?) in excessive precipitation pen vibrated (or did it catch and release?)

The skiers are back - yodeling. Same to top of Beacon Hill.

Depth of snow at snow stake 23 in.

* Pins can be adjusted and then bolted tight a little farther from posts.

Melting probably did not reach the 4.08 in. rain fell on only 4.62 in. snow (water equiv.) Lapse rain ~~depth~~ probably 30% on basis of pasture log depth of 7 in.; dam after rain 39.5% Above. 9 6 in. crust retarding run-off probably equal that of pasture 56% *

(micro-station map.)

Present snow cover 9.8 in. Last measured 9.48 in. Lapse rain 9.48 in. 11.07 in. (Evening Nov 12) by 3 obs. Melting? Probably. Cast 56%; Bare Loam only 37.5. Will later 30%. Did Emily, 2 on table top make this last snow fall?

Above from an older melting This (Nov 12) afternoon. Ice dam broke 9 Have tilted forward the dam crest ~~and opened~~ to form notch ~~water~~ Snow channelling from crest - Snow pounded down Have down to Pasture.

Report: melt not to point stated.
Test cylinder used among observers
Should use cubic and another
first rotation. was
Top 2 - 3 in form ice
observer edge
then 3 more faster with
ice mushroom.
Also 2 more for Dennis Bros. + ~~Hayes~~
another to make sure
Hayes

* Brook: Lapse hourly rain 4.49 in. } Brook runs
Hourly Rain 4.08 } Rain 6.0 in.
Total 8.57 in. Run 3.97 in.

Rain 4.08; Rain start 2.8 in. Rain passed thru.



Sunday

## Snow Studies. Nov. 22. Pasture

| | D. | Core | Spg. bal. | Total | Net | (inches) | Dens. |
|---|---|---|---|---|---|---|---|
| Top layer | 12 | — | 50 | 53.6 | 3.6 | | 30% |
| Bottom layer from crust down | 15.2 | 14.2 | 50 | 56.0 | 6.0 | | 39.5 |
| Total | 27.2 | | | | 9.6 | | 35.3% |
| Meas. total cover | 28.0 | 25.5 | 50 | 59.8 | 9.8 | | 35% |

Water dripping from platform.

Crust only (caused by rain 4.08 in.) Still frozen.

5 5 50 52.8 2.8 56%

→ Cylinder balance consistent when tapped. Other wise varies 2 to 3 in., if merely pulled or pushed up + down.
Get another cutter filed sharp.

Layer beneath crust:

12 11.3 50 54.5 4.5 37.5

Snow packs dry. Slightly coarse. Ground moist but not more than when building the towers

Core Study:

Crust layer (5 in.) and bottom layer (12 in.) almost equally coarse to the eye. Top layer (12 in.) dryer and much finer.

# Get mesh or mesh lines to measure coarseness of grains.

# Temp. of rain 44 to 31° F. (Max - min.).
Probable temp. of wet bulb?
25 in. of snow to catch it; snow settled to 22½

Generalization: "Count underlined 50% of drainage & high ridges (4 days after storm) if none dead not good until it. Need 8 times the rainfall velocity. No rainless fall.

Capital gain ~~—~~ does not indicate density. Gain only true in 25 yrs 37.5% density. Top country, contributing factor steep and pressed early.

Snow meeting plot (Montreal. Nov 23 at Majestic Theatre. See book that's nice and little like a mouse Poet - moved by optimist ⊙ though Water in cattle this winter Count, even. Same humidity as Cattleman dog, but can attack? Similar 8 mo of 9 feet for reference material 9 inches. Middle continuous and Vancouver.



Nov. 29 - Trip to Tahoe.

Some snow in timber - Ground soaked from heavy rain about Nov. 19. Slight evidence of erosion and wind.

Houses put in final shape for winter. Outside water pipes packed with salt and pine needles by Alex Charles. But pit too small for wrench. Change ⊔ to ⊔ side plug. Also put drain beneath kitchen sink and in water pipes to wash bowl and toilet.

Project: Place two more precipgages in more open locations at Tahoe outlet to determine effect and range of snow blown from trees during or immediately after storms.

Offer Mr Simmonds $5.00 monthly, thru april.

16)

Soda Springs, Nov. 30.

Anchor clouds in Truckee Canyon and in Sumpter Valley. at top of 11 3/4 hrs.

Evidences of rain. Snow water washed. Road entire clear of snow. Snow shrunk and frozen - at 9:30 a.m. ice and snow melting.

Platform wet but Mac Laughlin has painted the railings and other dry portions

Seasonal gage running. Very sensitive. Started when I closed the door and stopped when I lifted it open. Day clear. Evaporation ? Replaced the half of the wind shield taken to Reno for repairs.

Snowshoes and toboggan here. But shield has not yet arrived from Portland

| | | | Precipitation Precip. | Su. on grd 30th | Sky | Wind |
|---|---|---|---|---|---|---|
| | °F | °F | in. ( ) | | | |
| Nov. 23 | 53 | 20 | | 26 | Pt cldy | LE |
| 24 | 57 | 21 | | 23 | cldy | LW |
| 25 | 45 | 22 | .13 | 21 | cl | Calm |
| 26 | 53 | 19 | | 24 | cldy | L SW |
| 27 | 52 | 23 | 1.28 (Sn. 5 in) | 22 | cldy | L W |
| 28 | 41 | 20 | .21 (" 1 in) | 19 | Pt. cldy | L SW |
| 29 | 46 | 27 | .06 | 18 | cldy | Clm |
| 30 | 47 | 32 | .08 Total 1.76 | | | |

NB:- Min. temp. 32° but ice and snow frozen hard. Melting beginning only at 9:30 a.m. Radiation.

17)

Precip. by 30-day Recorder - Nov. 22-30 noon till noon.

0.29
1.20
.03
1.52 in.

Compare sheet with dif. record of standard gage.

Pumping 1/10 to 2/10 in. on sheet.
Find a damping well. Replace present oil with heavier.

Fuess Recorder

0.10
1.00
.35
1.45 in.

Usual
Max. pumping 1/4 in. Usual 1/10 to 3/10.

Both standard and Fuess without shields.

Snow Cover.

| | Dpth | Core | Bal. wt. | Total wt. | Net in. water equiv. | |
|---|---|---|---|---|---|---|
| 1. | 19.5 | 18.3 | 50 | 58 | 8 | Ave. 41.0% |
| 2. | 19.0 | 18.8 | 50 | 58 | 8 | 42.1 |

To apparent crust -

| | | | | | |
|---|---|---|---|---|---|
| 4.2 | 4.2 | 50 | 52 | 2 | 47.6 |

Beneath apparent crust (ind. crust)

| | | | | | |
|---|---|---|---|---|---|
| 13.5 | 13.5 | 50 | 56.3 | 6.3 | 46.7 |
| 17.7 | | | | 8.3 | 46.9 |

18

Snow density homogeneous; likewise crystal size and shape. Old stratum of 5 in. (bamboo) of 52% dens. has melted and drained down. The layer beneath 12 in. of 37.5% dens. has compacted to 46.7%. Min. density of all mass. 41%.

Despite precip. of 1.52 in., snow cover has lost 1.8 in during week, or a total (1.52+1.8) of 3.32 in. by melting.

Density by melting lower than by gauging.

Grain size. Practically uniform for depth. ½ mm to 2 mm. Top melting. Some coalesion of crystals, tiny with large.

Metric sheet and rule and magnifying glass work well.

Weathering.

Sun Ripples on west face of dam. Also on level fracture. Ripples rather than cups. Ice sheet covering of cups creates a hothouse effect. Melting at low altitude, evap. at high.

Seasonal Gage. Yes, motor runs when door was opened. Delicate balance. Rel of water enters from top of door.

19)

Present: snowshoes, toboggan.

Missing: markers. Later, Pierson found that tubes had failed to unload. Will do so.

Need: Tapeline, test balances

Sheets for Friez Hygrothermograph - U.S.W.B. No 263. Size sheet 5×12 in. 1 week.

Recent Storms:

Snow above 8,500 ft. Mt Rose range looks like plenty on tops. Lower rain.

Tahoe too high. Must be drained early. a delicate problem.

Boca spillway loses not.

Entire slope (facing south) from Donner pass is running tiny rills and cascades beneath the snow.

Dec. 3. Harry Dukes is being sent by Fallon to S.F. to obtain authority from U.S. Court to open gates whenever necessary to control Tahoe in present emergency. Under 1915 agreement authority of Court must be obtained, but delay may be serious

Friday
Dec. 4 Trip to Soda Springs Dec. 4.

Delayed from Thursday till Friday by presentation of portrait. Ashton Cobb and Bill Siedentopf coming with equipment.

Snowstorm at Reno at noon but clouds opened. Road to Soda Springs

20) merely wet. Three Budington bosses, sufficient room.

Gages W (seasonal) and 30-day (Q) running smoothly - But water still collects on inner case of W.

Oscillation of pens not bad. But keys still tend to freeze or stick in locks.

Mc Laughlin has painted the floor of large platform.

Gloves left in shelter. Blown onto snow. Cuddy found them. Needed only drying.

Snow frozen hard. Good test for sharpened cutter.

At evening Codd and Sisdatopf arrived with equipment. Not so bad as Barnes' letter indicated. Will know details tomorrow.

Crater Lake Horizontal Snow Sampler.

Letter to Codd from Arch Work.

Crater Lake Natl Park closed up tight. Work's project ceases, for no resident observer obtainable to read instruments weekly, nor road kept open.

But Work offers his snow sampler for use at Soda Springs. Write description for Salt Lake meeting. Use it at Corvallis.

Proposed to Codd a paper on the mechanical character and excellence

of all gages now under test. Such a paper would become a standard.

Copying Records. Banks does not approve of Curly copying the sheets for me for fear that there will be diversity of records from same instrument. W. B. is determining hourly values. These can be used also in our studies but we need to study behavior of instruments while circumstances are still fresh in mind.

Dec. 5 - Saturday.

Dormitory beds still as soft and warm as squirrel's nests.

In early morning, the valley is a picture of saffron, translucent vapor in the hollows and anchor clouds.

Loaded munitions trains eagerly ply their task.

Slept soundly but S. and C. troubled by trains and sleepers.

If only electric poles did not break up the view.

Today, Army Lapse and monthly W. B. gage erected on platform near hotel. Both shielded. Contents will be weighed.

Day raw, cloudy, snowfall in late afternoon. Max 40°F; at 4 pm 26°F

Precip. Nov 30 - Dec. 15 (morning)

Standard 0.33 in. - unshielded.

30-day Q - 0.40 in. - with shield.

Trieze 0.35 in. unshielded (shield down)

22
Dec 5

Shield on Troy gage a quarter shield without the clasp  whose clamp had become lost, thus permitting the quarters to swing open and break the hinge block.

Shields are now made in halves with short angle  at one end but enough to hold short end tight

Shield from Portland has now arrived. Will be installed on seasonal gage W on Monday.

Black Paint:

Ashton has tried black paint on one of five of his battery of gages with striking improvement from insolation.

No difference to be expected during clouds and storm, but during sunshine the black gage should clear itself more readily and quickly.

Try black on the Stevens gages.

Army gage has rattling orifice to help shake new snow loose. Metal also somewhat dark. Should also be black but doubt the efficacy of its shaking.

23/
Dec 5

Evaporation Lag in Trace.

Probably not due particularly to evaporation but to other reactions.

"1. Cellophane over Stevens bucket caused counter suction, which ceased when cellophane was removed". - Ashton Add.

2. Snow accumulation on semi-liquid contents may cling to bottom of orifice and absorb some of the liquid, thus holding it in suspension and reducing the load in the can. Finally when the snow breaks loose and falls into the can, the apparent loss in evaporation is counter restored and a belated record of precipitation is made.

How great ~~is~~ this lag is and the amount of hold-back could be quickly determined if instrument were of glass. It might be determined by frequent measuring of adjacent standard gage.

The gyrations of storage W gage are mainly caused by sagging of platform under stresses by wind and weight of moving observer. Almost a seismograph. Should be set on a concrete base. or the weighing beam be made less sensitive.

Damper Cup:

Heavier oil has been suggested for

24)
Dec 5

the damper cup and very heavy oil is being used by Stevens at Bonneville where wind is strong.

But Seidentopf fears that the pen will fail to record until a heavy overload is collected - Thus only totals rather than hourly values will be recorded; like the dampened curve of temperature on Mount Rose in snowstorms and under a blanket of snow.

Friez Gage - Clock appears to be running well and keeping close time - Seidentopf. If it stops, remove cylinder and send to S.F. for a substitute.

When clock stops, daily record can be obtained by turning cylinder each day and noting rise of pen vertically. If not turned, only total precipitation for period can be determined.

Cavallie Papers:

Ashton reports that only first year's data of 3- and 5- gage batteries have been analyzed (Bernard's paper at Paris). There remain data for two more years.

He has precip. data for Greenland Alaska in connection with his seasonal gages, but the rain prevailing along the Alaska coast and sweep of the wind above timberline make snow-survey checks highly uncertain.

Radiation & Sage-brush Plots & Planting

25

Dec 5

Have suggested a detailed study of Precipitation (snow) gages and their relative efficiency. Could be almost a handbook. If Ashton does not take it, he wants at least to discuss it.

Snow cutter now cuts frozen snow easily. Extra face removed and teeth made sharper. Temper likewise made softer.

Try removing face only but leaving teeth as before. Jack feels that the extra face merely fills the grooves with snow and makes a smooth chisel of the cutter.

Cylindrical Balance:

If satisfactorily accurate if tapped until marker is stationary. But shall we put a vibrator on every instrument?

Duraluminum Snow Sampler:

One need only carry tube in hand from room temperature into afternoon autumn air to realize how quickly and intensely cold it can become. Such was experience at Reno. City plastic could not be used on a plastic overlay.

Web. Snowshoes -

a second pair has been provided thru purchase by the Calif. Div. of Water Resources. Fine of Fred Paget.

Toboggan.

Bottom shellacked by Ashton thru kindness of Herbert Beigg of Hotel.

Sunday, Dec 6.

The cold northeast wind and incipient snow of yesterday has become a heavy dry snow this morning.

Min temp 19°F. Max (yesterday) 46°F. Precip. .07" (7 am). 1" in snow. On ground 17 in.

But autos now looking white.

The hotel is filled with skiers trying to share the ski hill and the inside warmth.

The men are trying to work.

The extra thermometer shelter will probably be set on the south end of the pasture trestle with the unshielded standard gage adjacent (possibly on its roof). The 5-ft tower with shielded gage will be placed at the north end — both gages on a level with the Q (in the center).

Sectional Ski.

James McLaughlin down last night. New plans curved dovetail connecting plate for ski. Old 18-in plate being reduced to 6 inches for test. Must write Jack Ryan.

Invited (all ours) to Sunday dinner at Sierra Ski Hut at 4:30 pm.

Fries Records:

Copying all sheets but must finally use only hourly values computed by Hydro-climat. service. Thus only one interpretation of an individual gage.

27

Dec 6

Vibration of fan seems to be due to wind on rather shaky tower. Joints too loose. Seidentopf believes that long leaning ladder accentuates vibration.

Will braces between ladder and tower increase rigidity?

Compare vibrations of Twig and Stevens 30-day recorders. Does Twig have damper?

Wind Tunnel Tests

Why not test long intake necks, short ones like top of milk can in wind tunnel?

Ashton suggests ventilator holes in neck to cut down intensity of air eddies. His illustration is: You can't catch fish with a bucket but you can with a net.

The holes, however should not be so direct as to blow the snow flakes up and out. Could there be hoods over the holes?

The Australia tests by Guy were inconclusive.

Why not use glass gage & and flour dust to show eddies?

Graphite as Lubricant

Mixed with vaseline to give it cohesion, graphite noticeably reduces the friction in the duraluminum cylindrical spring balances. Tapping will still probably be necessary.

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Dec 6

Trestle

Working in Driving Snow.

Cadd and Sleedentopf erected the 5-post tower at north end of trestle in pasture. Extra legs fitted to raise tower to height of 30-day wagge Q. Should have used tarpaulin. New snow knee deep. I returned a washer and bolt. Bed sank to the crust, so light is the density of the snow.

An holiday and in blizzard! I wish that Major Barrie were here. The others suggested Barnes. Feel that B. will come only to see the finished work.

Wind and flakes when they struck directly numbed the nose and cheeks. The upturned face was punished.

Max for day, only 25°F; Min: 22°F.

Came in at 4 p.m. Decided not to face the storm and hike to Sierra Club Hut for Sunday dinner as invited by Mrs L. Have promised ourselves to go up when weather fairer.

Snow Crystals. (Evening - 6:00 p.m).

Pellets - some 1 mm in diam; most 2 mm. Drops of water seem to be of corresponding size. Some cohesion into larger units. Clears down quickly in warmth of room.

Barometer seems to be nearly normal or 6710 ft. (U.S.W.B. 6767 ft) or 23,48 in.

29

Monday Dec 7 – Pearl Harbor Anniversary.

aneroid . . . . 23.58 in. Thin clouds.

Snowfall. Dec 5-7 ^ Standard gage 1.01 in. 1.11?

30-day ℄ 1.05 (Shielded)

New snow (since crust) 1.20*

[Dec. 2 – 0.30; Dec. 5, 0.03
Dec. 6 · 0.07 = 0.40
or Dec. 5-6 = 0.10 in.]

Friez Gage . . . . . 1.20 (Shielded)

* 0.10 fell Dec. 5-6 (really 4-5). So snow cover for Dec. 6-7 = 1.10 in.

Snow Cover: –

| | New snow | Cover | Wt above | Wt with snow | Net | Water |
|---|---|---|---|---|---|---|
| 1. | 11.8 in | 11.5 | 49.8 | 51.0 | 1.2 | 10.2% |
| 2. | 11.0 | 11.0 | 49.8 | 51.0 | 1.2 | 10.9% |
| New and old | | 26.5 | 25.2 | 49.8 | 57.0 | 7.2 | 27.2% |
| Old (est) | | 15.5 | . . . . . | | | 6.0 | 38.7% |

Evaporation?

30-day gage shows ~~~ during storm just ended, but column of snow has built up in the bucket until it has come into contact with collar. Evidently adhered and then came loose. Could adhesion lift snow by shrinkage or did it suck up water from the reservoir?

Calcium ~~chloride~~ sulphate? CaCl.

Evidently one canton insufficient to liquify 13 inches of precipitation. How much was snow? See Weather Report Nov 11 th date. at least 4 in. rain and some melting.

→ Recharge ℄ twice monthly during winter.

30/
Dec 7

Storage Gage

Snow dust has entered case. Water freezing on inner case.

Balance has tripped twice this morning from sweeping snow and reaching up inside.

Standard Gage fitted with handle for weighing. Daybook required to record the initial weight, otherwise no initial weight. Could not adjustment to 0 be perfected?

Weather, December 1 —

| | Max | Min | Precip. W. Equiv. | Precip. Snow | Snow on grd. | Wind | Clds |
|---|---|---|---|---|---|---|---|
| Dec. 1 | 50°F | 23°F | | | 17 in | L SW | Cl |
| " 2 | 43 | 24 | 0.30 | | 16 | L SE | Cldy |
| " 3 | 42 | 17 | | | 15 | L W | Pt Cldy |
| " 4 | 49 | 18 | | | 14 | Calm | Pt Cldy |
| " 5 | 43 | 13 | 0.03 | | 14 | L W | Pt Cldy |
| " 6 | 40 | 19 | 0.07 | 1 in | 15 | L W | Cldy |
| " 7 | 38 | 16 | 1.01 | 15 | 27 | L W | Cldy |

Bar Dec 6 (eve) 23.48 in; Dec 7 (morn.) 23.58, (eve) 23.68.

5 pm. 23°F, Thin clouds, feet cold, snow soft and dry, powdery. 10% density.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| " 8 | 35 | 9 | | | 26 | L SW | Pt Cldy |
| " 9 | 37 | 11 | 0.21* | 3 in | 28 | L W | Cldy. |

Pressure morning of Dec. 8 . . . fell to 23.60 approx.

Light snow fall during 9 . . . 23.70 in.; 4 pm. 23.78 afternoon and evening Dec 8.

Power snow. 1 mm. grain size. Moist. Coheres. Temp. approx 35°F.

* Stevens Q 0.28 in.

Frizz - Dec. 8 . . . . 0.20 in.
Dec. 9 (mid. to noon) 0.15 in. } . . . 0.35 in.

Only water, no snow in pail.

Snow —

Dec. 7 (cont.) Air movements:

Snow snow comes, white castles appear above tree tops
Smoke. White mist, human snow! Castle Peak? Probably.
Forest an mass of the fuba white & below it valley.

Air warps:

Snow sliding from warps. The hotel roof & shingle last done.
Next basement ½. The barn, bunkhouse, garbage roof, addl below.
Snow large from eaves of below line & curtain.

For purposes of Survey
Omit 1-4-5-14
Rear Barn 1 hwy. near pole

(31) Dec 7

Dec. 7 (cont.)

Key Snow Courses laid out. Dec 7
Center base door to pole.
Every 25 ft; 14 meas.; 3.4 ft to pole.

| | D. | Core | Wt Sampler | Sampler + Snow | Snow | Density |
|---|---|---|---|---|---|---|
| No. 1. Ice below | 14.7 | 14.7 | 49.6 | 52.6 | 3.0 | |
| No. 2 Ice below | 24.7 | 24.4 | " | 56.4 | 6.8 | |
| " 3 | 22.5 | 22.5 | " | 56.4 | 6.8 | |
| " 4 | 17.5 | 17.5 | " | 55.2 | 5.6 | |
| " 5 | 16.0 | 15.8 | " | 53.5 | 3.9 | |
| " 6 | 24.5 | 24.5 | " | 57.6 | 8.0 | |
| " 7 | 23.5 | 23.5 | " | 57.5 | 7.9 | 6.86 in |
| " 8 | 26.5 | 26.2 | " | 58.0 | 8.4 | |
| " 9 | 21.3 | 21.3 | " | 56.0 | 6.4 | |
| " 10 | 20.7 | 20.6 | " | 58.0 | 8.4 | |
| " 11 | 22.0 | 22.0 | " | 56.0 | 6.4 | |
| " 12 | 31.0 | 31.0 | " | 60.9 | 11.3 | |
| " 13 | 32.8 | 32.8 | " | 59.8 | 10.2 | |
| " 14 | 29.5 | 23.0 | " | 57.0 | 7.4 | |
| av. | 23.4 | | | 7.18 | | 30.7% |

Query: Which 10 stations did Blaine Eddy use? Write him.

Instrumental Equipment

Trestle in pasture complete except paint.
Thermometer shelter installed with max., min. and current thermos.
Canvas survey marker poles should have tops painted for identification.
Dark goggles good for snow but poor for reading numbers on sampler. Numbers should be painted for visibility. Amber far better for visibility for

Aneroid Barometer at Reno (Univ. Physics)

Corr. for thermom.

−3.8 °F.

Deviation of Compass

17° E.

Corner Morrill Hall

Elev. λ 4557.402

Pres. bar. 25.8 in. (Corrected)

Elev. Soda Spgs. 6,767 ft.

Sea-level pressure (Normal) 29.92 in.

32)

Dec 7

skiers as for snow surveyors.

Photographed pine needles holding snow.

Faint sun: 1/100 with A 16 and also 8 for test.

Noon.

Weighing Can: Capacity.

Because tray pan easily springs below the flange, the pan is set 1 in. high, leaving only 5 in. capacity in shut for a storm or over.

The Stevens has 24 in. capacity on sheet but double soda solution must be used for period thus reducing the capacity of the can.

→ Photographed overloaded can with 3-week load.

Tuesday, Dec. 8.

Barometer 23.68 in. Min. 9 °F. Overcast. Fell during day with light snowfall.

Seasonal Gage -

Installing larger wind shield.

Try heavier oil to steady weighing beam.

Hunt leaks in case. Is there a downdraft between intake and weighing tank? Light snow found on mechanism.

Try packing around door.

Anemometer and vane erected.

Visit: Smith and Prof. George Grieves of Telephone company brought down from Nearden. S. an old Univ. Electrical student and G. formerly from Univ. of Calif.

by McL.

They will try to get us 2500 feet of wire somewhere in the system.

Dec 8

Mr Brecht, Supt of Construction will string the wires as a favor.

"Even barb wire will do if strands are kept apart" - Grimes. Barb wire was used to ~~skirt~~ station at Norden and was strung on smart-leaden trees.

A tricycle charger can readily be made by any radio firm

They are on their way to Utah border testing trans continental cable. Church Bayd is near Elko.

Direct line to Filling Station 300 ft; via walls of Hotel 325 feet (or better 350 ft.)

Can we get the wire?

Norden:

To Norden at 5 pm. with McL and Ashton to dinner.

Winter fast piling up. Snow falling softly. Young trees white.

Peter Lubb ski hut 5 miles south in a natural amphitheatre at base of Castle Peak. "Most perfect bowl in America" - McL.

Home with flash-light toward the sky glow at Soda Springs. Trains cough in the valley below.

Afternoon:

Ashton had spent afternoon unlearning telemarks.

I put the workshop corner in order.

34

Wed. Dec. 9/42

No. 1 – Standard

2 – Unfrozen.

3 – Army "

4. Shielded Charged 2.19 gms
How much Dela?

5. Freq

Posture. 6 – 3.76 in grams

7 – 2 cartons
Started pan 1/2 in above bottom.

8 – 4.63 grams

Wed. Dec. 16.

No 9. 4.48 gms (North of bottle)

10 – 4.58 (South " ")

2 Cans?

But final determin… be made by weighing. Use platforms from below for filling and weighing can.

Get :– Yard stick, small shovel, and broom.

Wind shield from Seas. Gage will be left here for possible use at Denver

→ Get Codd's chart of Calcium chloride charges.

34

Wednesday - Dec. 9-

Mackerel clouds this morning
Barom. up. 23.70 in. Calm.

Sunshine Recorder installed.

Batteries -
A bit of snow near top of orifice on shady side. Bare elsewhere.
Is heater working?

Army Gage
1, Since the calcium - tends to stratify and snow can sink beneath the oil and form a fresh-water layer with danger of freezing, Ashton suggests extending a paddle from the present flip-flop collar into the liquid to keep it stirring - The paddle should be ~ turned to cause the liquid to circulate.

2. There is a scale of volume with depth for measuring contents with graduated stick.
But final determination will be made by weighing. Use platform from below for filling and weighing can.

Get :- Yard stick, small shovel, and broom.
Wind shield from Seas Gage will be left here for possible use at Dawes
→ Get Coddi's chart of ~~calcium~~ chloride charges.

35) Brought up originally by Rupp.

* Get day book for recording starting

Dec 9

of a

rea

Mo

Anemometer oil
from Rucha
(Fish oil)

Telephone officials —
George Green
formerly Prof. of
elect. engineering
at Berkeley —
Smith

Safety for batteries
use thermostat &
stop constant increase
in runaway battery

Pawpaw fired —

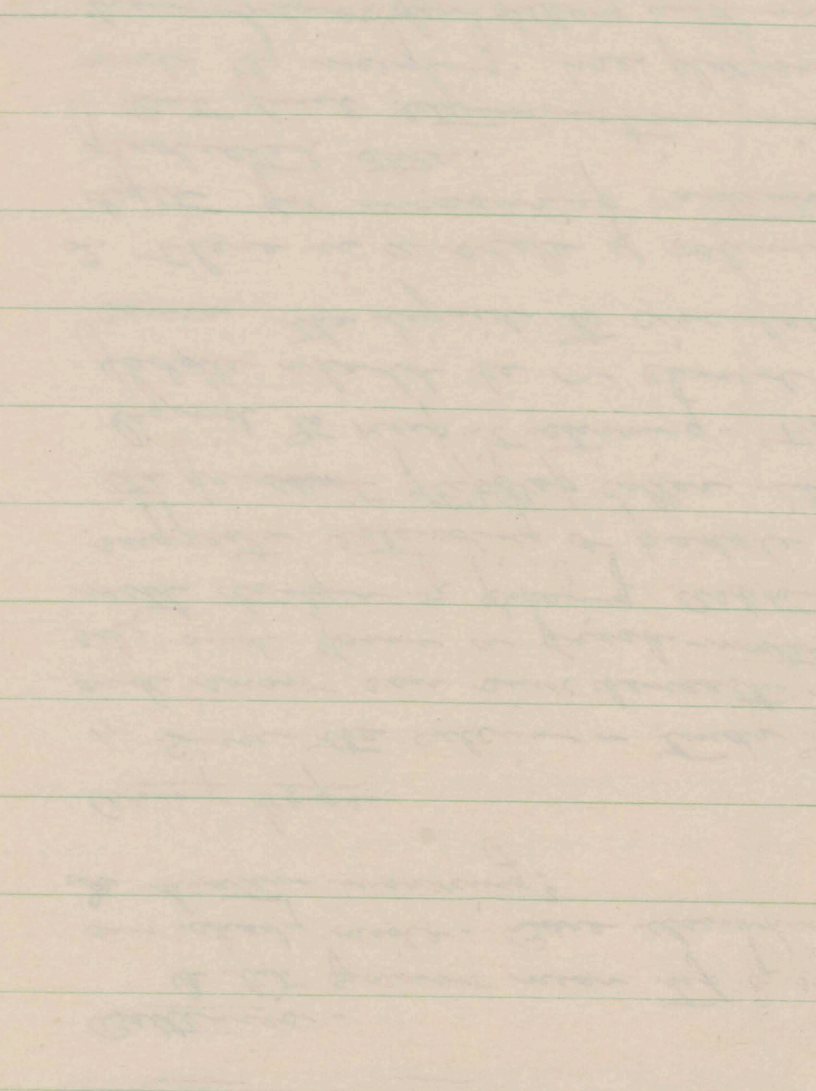
of wind shields.

Study snowfall and pressure at Soda Springs. Bar. fell .10 in. yesterday with 0.21 in. precip. Practically calm.

35) Brought up originally by Ruff.

* Get day book for recording starting of all instruments and subsequent readings.

Dec 9

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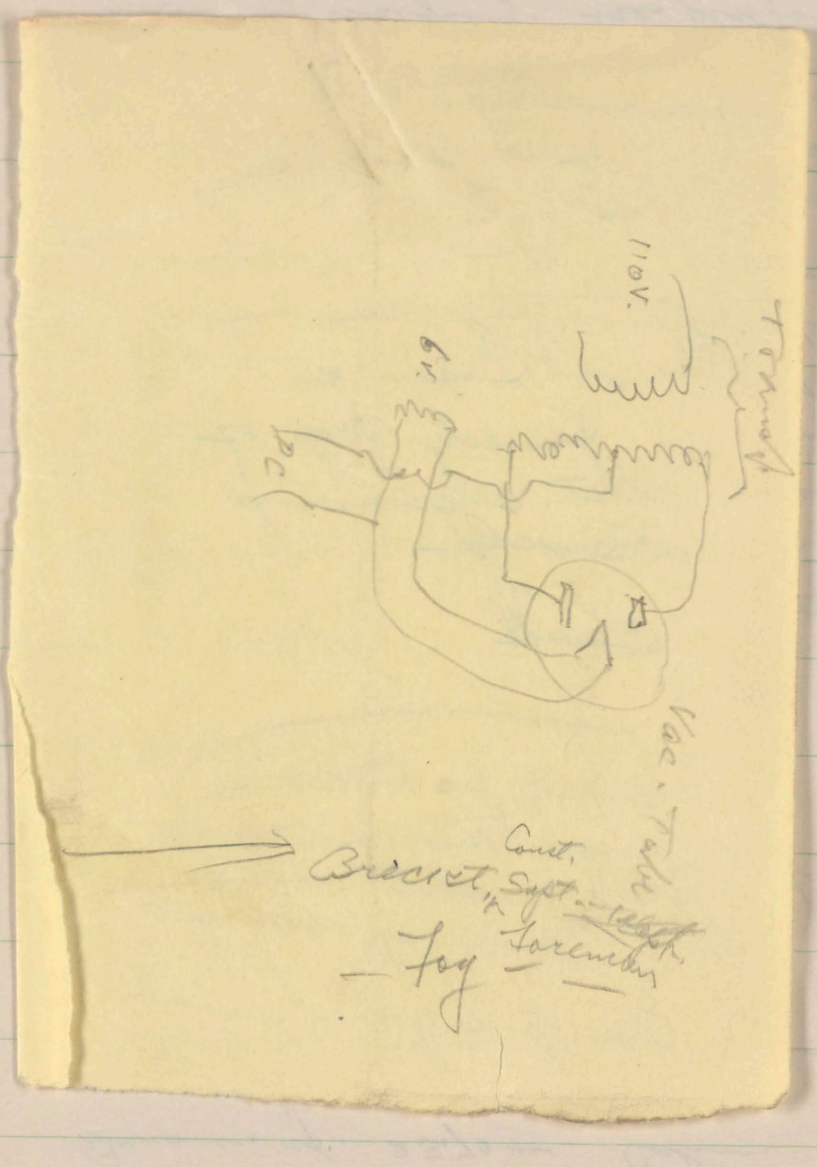
Soda Springs. Bar. fell .10 in. yesterday with 0.21 in. precip. Practically calm.




35) Brought up originally by Ruff.

* Get log book for recording starting of all instruments and subsequent readings.

Dec 9

More Papers:

Cadd: To paraffin sampler rough smear it with paraffin, then up-end it in a catch gage over a flame. a flame will rise thru the sampler and leave only the residue deep set and smooth in the pores.

Paraffin also is a slower conductor of cold and heat.

Safety for Batteries

If heating units increase not in intensity with time, why not have a thermostat that will shut current off at a predetermined intensity?

ask Barnes for paper on his test of wind shields?

Study snowfall and pressure at Soda Springs. Bar. fell .10 in. yesterday with 0.21 in. precip. Practically calm.

36)

Dec 9

Wate

at Sierra Hut.

at Norden.

— Dyes —

No. 6.
~~Crimson~~ Red (purplish cast) (Fuchsine)
Fuchsia
Fine crystals

No. 2.
Indigo (Victoria Green)

Crimson
deep red very slightly tinged with blue.

$$C = \frac{2.45 + M_W}{M_S}\left(t_H - t_F\right) - t_F$$

or Calories $= \frac{2.45 + \text{Water oz}}{\text{Snow oz}}\left(\text{temp. Hot °C} - \text{temp Final °C}\right) - \text{temp Final °C}$

36) Haven Jorgensen

Motor Toboggan — Told by Jorgensen at Sierra Hut.

Dec 9

Tested two winters ago at Norden.

Threw snow out behind; vibrated so as to shake parts off; required three men to hold it down, force belt into snow, and steer.

Left for a week stranded. Snow melted away leaving it on a pedestal like a statue.

Pictures of Snow at Norden.

See Sierra Club Bulletin for Jorgensen's pictures as good as Ernie Mack's. He is Mc L's companion and cross country mate in skiing. J. wants to ski along the crest from Donner Summit to Echo Lake. Believes in straight hikes.

Mc L. promises me a copy of Sierra Club Handbook on Winter Mountaineering. "Not so good." David Brower is with ski troops at Aspen Colorado preparing the Army Skiers Manual.

J. offers to help at snow surveying if men are needed. Only moderate attendance at Ski Hut expected this winter.

But applications at Soda Springs for Christmas are numerous.

37)

A Case History

Dec 9

Snow Falling from Pine Needles; Melting.

Temp. last night 27 ths 11°F. just after min. of 9°F. Dec. 8 was recorded. Snow therefore not very cold.

New snow 3 in., 1 m.m. diam., coheres. at noon baron. 23.76; 1:50 pm 23.78 in. Crystal size 1 mm or smaller, Shrinking because of melting? Some cohesion.

On pine needles, snow consone and retracted from needles. Some drip and cohesion of trailing snow.

In evening snow largely disappeared from trees exposed to sun.

But this evening (5pm) at 4:30pm Temp 38.8°F, very thinly overcast, or broken, snow was freezing. Crust 0.35 in., the amount of melting during day. Snow below dry.

5pm. fog forming over valley. Rel. humid. 98%?

4:30 - Temp. in hotel shelter 35°F; 3/10 in. above snow 31°F. Radiation despite humidity. Tell Wilson.

Place thermom. among pine needles under snow and in free air (shaded) close by.

End

38)
Dec. 9

More Papers by Codd -

1, Comparison of common salt and calcium chloride in beakers in vacuum chamber cooled by dry ice at −65° F. (Salt Lake City project).
Had to use alcohol thermometers; ice rattled in beaker; calcium deposited some crystals.

2. A siphon to draw off excess catch water quickly to avoid flooding of catch basin and prepare basin for further catch. The straight drop line made by the pen indicates the event. a wearable plug in top of siphon to open vent automatically if siphon surges upward and cannot siphon to operate.

3, Rope mesh as sacks for rain, light, simple and effective. Cost 1/10 that of hair-seal stocking.

Relative Humidity Slide Rule by Sleicenkoff.

Cut slips and mount slips on cardboard so that central slip can slide between the other two.

But need 23 in. altitude scale.

Hygro-thermograph adjusted and installed. Test in fog (100%) and clear weather to get max. diff. between wet and dry bulb temps.
Query: How low can humidity be while still raining?

Calcium Chloride Conversion Table.

A graph for charging precipitation cans has been prepared by Ashton Codd and left for us.

39
per 9

## Setting all Gages

Wed. Dec. 9 – Noon.

Numbers begin at natural approach of observer. All gages have number painted on them.

Back of Hotel:

No. 1 – Standard Unshielded Gage
No calcium chloride.
Can be weighed, but contents melted at present.

No. 2 Stevens Type W. Seasonal.
Present advance of pen 13.8
– 0.4*
13.4 in.

* Correction if meas. from base line – 0.4 in.

But minor oscillations frequent and pronounced. Load on platform and perhaps wind throw weighing bar into action.

Recharged. 4 cartons of calcium already in tank; 6 more with equal volume of water added. No freezing had occured but lack of stirring and further dilution might permit excess of fresh water and attendant freezing.

Waited overnight for oscillation from recharging to cease before marking the new position of the pen. **

Evidence of heat at orifice of can felt by the hand at 2 pm. So batteries active.
→ But they will be tested.

**. Startled because weighing beam did not immediately record when new solution was poured into can. Did not realize that clock had broken

40)
Dec 9

the circuit. Pan oscillated abundantly later.

No. 3. Army Gage (U.S.E.E.)
Capacity approximately 67 in.
→ Solution prepared from Cook's graph.

Calcium chloride (net weight) 12.7 in.
by U.S.W.B. scale for 8-in cans

| | |
|---|---|
| Water . . . . . | 17.2 |
| Oil . . . . . | 0.5 |
| | 30.4 |

Present water drained from gage thru valve at edge of platform floor. Water residue not drawn off is datum level for measuring seasonal catch.

Charge sufficient for the season. Measure with stick monthly and stir thoroly to break up stratification.

Net weight of solution as remeighed in 8-inch can and poured into gage:

13.00 in
15.65 in (incl. oil)
Total 28.65 in (net) Residual capacity 38 in. approx.

Rather unfull for Soda Springs ?

Depth from rim to solution (Point of brass marker on outside of rim)
depth of can 59 3/8 in.
Depth to surface of solution 55 3/8 in.
Depth of solution 4 in.
→ Ask Engineers for table of contents at various depths.

41 Dec 9

Seiches test.

No. 4. Shielded Standard Gage for checking No. 3. Monthly capacity only.

Charged 2.19 in.* (gross)

* Dec. 13 (eve) 2.22 in. Condensation due to frost ~~two nights~~ or so ago. Possibly due to light rain this evening.

No. 5. Friez Reconnaissance (4 day chart; clock 7 day, but should be wound more frequently. **

Pasture Lot

No. 6 Shielded Monthly Standard (north end of trestle)

Charged 3.76 in. (gross)

No. 7 Stevens Shielded Monthly Type Q Recorder

Total catch 14.4 in.

[Seasonal Type W. 13.4 in.]

Snow core at last observation projected into chimney orifice, but has now shrunk into bucket, due apparently to heat today.

However contents of bucket are still half snow. Only a trace of oil on water surface. Ice free from sides and bottom of bucket. Depth 3 3/4 in but pocket in bottom of ice is filled with petal-like crystals of ice.

→ In place of 1 carton, substituted 2 cartons of calcium chloride and 1 1/2 carton-lids of oil.

Started pen on new sheet at 1.2 in. above bottom. Recharged at 4 pm

* Only water in the pail, most entirely melted. ** Tamers too frail. Alter shell of recorder to lower and rattles. Boarding over tamers obstructs wind. Also produces vibration, damping only a single limb for which purpose it is usually used. Substitute simple tripod mast for cage here. Clinometer baffle.

42)
Dec 9

Dash Pot

Changed Transit Oil to Tydol (SAE 10) in splash pot. Watch results.

Stopping of Clock?

Stoppage only apparent. Really due to accumulation and sudden fall of snow down orifice tube.

This explains action of Friez recorder also and extreme upward and downward movement of pen. Nothing else could have done it. Ashton Codd has actually seen such happen. — climbed tower

See trace of Dec. 7 p.m. when snow was seen reaching into orifice and evidently by our shaking the tower caused the snow to break free. Later it melted down.

But trace Nov 11 - Dec 9 is 3 days short! However, Friez recorder lost no time and has been running accurately.

→ Check time of Stevens Q. Regulate clock if possible. Later: Clock ~~only~~ did stop for a total of 2 days. Which days?

Overflow pipe

Planned to carry excess catch past the clock and discharge it below. Codd has invented a siphon to perform the same service but likewise record the amount of spilled water and thus keep the record accurate even during torrential rains. [See earlier details]

→ The overflow pipe gives down drafts but no snow found inside

43/ Dec 9

Record Sheets

"Better keep inside case so as to have the same moisture content as the air. Indoor sheets may be too dry and so may expand unevenly" – Seidentopf.

No. 8. ~~near~~ south end of trestle.
Unshielded standard gage (Monthly).
Charge 4.03 in. (gross)
→ Need footstool to remove it.

Paint

Quigley's AAA (aqua, acid, alkaline resistant) Black Paint for inside and outside of gages.

White or gray paint best in hot locations to reduce evaporation. But where cold, the original copper metal or galvanized metal painted black is essential to melting adhering snow or ice.

NB:– Galvanized iron should be cleaned with vinegar to assure adhesion of paint.

Likewise grooves in numbers on snow samplers should be cleaned before filling with red pigment.

Get: knapsack for tools.

44)

Rec. 9

Thermo
Hygrograph.

Clock No. 291412

Can brass mesh be placed around case to prevent snow clinging to hairs and distorting record? Ashton Codd has placed mosquito mesh entirely around the inside of the thermometer shelter.

Psychrometer Dry 39°F Wet 35°F

Snow Melting

Wind 24 hrs - 35 mi. total.

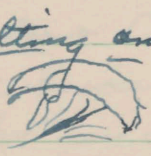
Overcast, calm

Baron. 23.76 in; at 1:50 pm 23.78 in

at 35°F ~~snow melting~~.

[Note. - If sky clear, snow freezes at 35°F. Crystal size 1 mm or smaller. Shrinking because of melting? Some cohesion.

→ Melting on Needles of Pines



Snow dripping, cohesive.
Rests on top of needles, loose.
Retracted or melted above needles.
Warmth of needles? Try thermometer bulb in green foliage and under snow, then in sun or shade free from insolation effects.

Thurs. Dec 10 (cont.)

Twig Universal Recanalization Recorder (Claim No. 2665513)

Dec. 8. 0.20 in. } 0.35 in.
Dec 9 (midnight to noon) 0.15 in. }

No snow, only water in pail

"Twig tower too frail. Alternate shall be recorder too heavy and flattie. Bodies on tower obstruct wind, causing below produces vibration, (shutter) cups too heavy a right dare liquid must pan bottled cup is ready for test."
Seidentopf.

Cross braces too long and made of flat strips instead of angle iron. The two inch (guy) cables are too heavy tightened they mould draw the ☐ into a ▽. Twig neglected to provide a second set of cables for the other compass. Cobb

See effect of vibration in attachable graphs.

Dec. 15

Can was probably thrown because during climbing up the tower Soldier at that time took a picture with instantaneous type of camera.

Mount drawn because its tension by stretching of No. 9 wire and place supporting legs of 2"x4"s under bolts. Thus

Twig. Tower designed originally for storage cans only, unaffected by vibration.
Some object to the board sheath, but a similar tower without sheath was torn to pieces by settling snow at Donner summit about 1914 or earlier. Noticed even by passengers on trains.

Photos of installation taken afternoon of Dec. 10th.

Dec 10 (cont.)

(46)

Thursday Dec. 10 -

Ice windcones in wind cups.
Ice sheets found in hollows yesterday.
Causes acceleration like glass of greenhouse.

Snowballs

Wet powder - snow balls numerous on south (sunny) exposure of road cuts. Found only on sunny slopes; none on shaded slopes east of Donner Pass.

Barometer 3pm 23.80 in.

Searching in the Unknown for Wire

No word from the Bell Telephone Co. So turned at Seidentopf's urging to Forest Service that has often cooperated with the Weather Bureau.

So called Hodgson of Big Bend.
It opened a chain of friendships with ultimate success.
Called up "Smithie" of Nevada City and he called Gurdon Ellis. Only bare wire
Jack Eddy of PG&E could send abundant No 9 bare wire, but would search.
Snider of Truckee gone us coils of salvaged insulated wire and insulators.
Ashton took me in Bureau truck to Reno to continue the search, while I prepared for the Dec. 12 meeting of the Regents.

No word yet regarding towers shipped from Redding except shipment on previous Monday.

48)

construction. But the Colonel?

Dec 11

at my urging Ernie Mack procured the only trickle charger in Reno - of course second hand. ($5.50)

Meantime I was phoning University officials and spend the afternoon with Raglut Williams and Walter Harris regarding acceptance of Nevada Art Gallery by the University.

Wrote a letter of appreciation for 50-years progress of the University.

Saturday, Dec. 12.

Phone conversation last evening with Bill Seibenthapf. Wire (insulated) from Jack Eddy.

Foundations laid for new towers in Pasture in 3feet of snow. Trestle there also painted.

Colonel cannot provide wire but will lend men at 1:30 pm to replace cable at airport and then come on Monday to Soda Springs to connect up triple charger.

A day of happiness, for the Regents at 5pm. accepted the Gallery. Ike Harris and I were requested to be present.

Wrote a letter

Returned to Soda Springs with another hygro-thermograph (Serial No. 1587) and drawing materials for Mc Laughlin. Returned his $3.50 He had inspired our successful search and had far too little cash. Jack Ryan will send up his dove-tail saw plates on Tuesday. Difficult to cut because of breakage of sharp edges of chisel.

But Mac will complete the painting of

→ Optimist room with hand plan ariane but late ope and satisfactory. The resting day in attica brief. Absence length carefully. Seemed 8 hours

the platforms of the hotels. Dec 49

Both Jack and Blair Eddy had been here. Blair wondered at 14 instead of 10 meaning points on the Key Canvas. Which shall be omitted.

W. N. Simmonds

Snow Gage at Tahoe.

Mrs Simmonds writes that no snow falls from the trees into the gage. Gages can not be set in the open near the highway and across the bridge because of filling by snow flow or mishandling by passersby.

Ask him to note any filling of gage after storm is over, i.e. from snow blown from tops of trees. It is of course difficult to separate ~~storm~~ sky snow from tree-flown snow during the progress of the storm.

Sunday, Dec. 13.

Ashton and Bill returned to Truckee to obtain bare No 9 supporting wire and insulators from Mr Snider of Forest Service, to carry cable over the long stretch between poles.

I did not rise until 10 am. Coffee only.

Crusts: Temp. at 12 Noon 40.4°F (H-T. 42°) Snow soft, crust gone. Melting where trodden or soiled.

5 pm. 38°F. Snow in front of hotel congealing. Traces of congealing in pockets of snow behind hotel but none on the

Sola Stge 8 pm., Temp. 34.8°F (Myers-Thom 36°F at Plum
Adults 5. Temp. at surface of snow 2
Crust just forming, about ¼" thick; at north entrance snow
is plastered, but not yet compacted.
Temp. during day mainly +46° to 48° in lanes 50° —

higher snow-faces still soft.

Dec 13) Batteries cleaned and installed beneath filling station. Seepage water beneath the house as beneath the weather-station platform. Plainly the ground never freezes and the batteries are safe.

Barograph.

On Saturday Dr Leipson and Baldtdof checked our aneroid and the barograph.

Sea-level pressure (English) 29.92 in.;
the metric (French) is slightly different.

Correction of therm. in aneroid −3.8° F.

Elev. of campus (at Morrill Hall) 4557.4 ft.*

Pres. pressure of barometer (corrected) 25.8 in.

Elev. of Soda Springs 6,767 ft.

Deviation of compass at Pond 17° E.

Barograph adjusted and installed at post-office (in filling station). Much above normal (23.65 in.).

A Visitor.

Mr Webber, electrical engineer keenly interested in the snow-survey at Lake Helen on Mount Lassen has been here to enquire and visit. Ashton took him over the project. I suggested that he install our triple register but he was hastening on. As a Sierra Club member and devotee he was obtaining measurements at the Lodge for a stone pipe.

* Elevation 4557.402 ft. as a mark on metal U.S.G.S. Bench mark 7 to 8 ft. above foundation stone N.E. corner Morrill Hall U. Nev. Reno
Elevation from 4550 U. Nev. Quad varies 5' Mackay

3-1 Monday, Dec. 14.

Erecting the cable.

Had planned to erect poles in a direct line from platform to postoffice.

Boys from Lemmon Valley arrived in midst open jeeps but eager. Two jeeps, six men. Valley clothes for mountain work. No rubbers.

Given two discarded telephone poles and equipped cross-arm by Telephone crew. Snaked out over the snow like yule logs at end of rope and dragged up the road from the tail of a jeep.

Jeep even climbed over the snow crust. I had a two or more mile ride down the road seeking the location of the first jeep. Jeeps are very smooth on a paved road.

But Elisha did not like additional poles in the hotel yard — already looking like a ship harbor — and Sergeant Clark had experienced the irritation of house dwellers at having insulators nailed to their walls.

Only a detour by poles already in place was left and our cable and available wire were insufficient. So the Colonel's insulated wire was "lost" for the cause.

A search down the highway found the supply wagon of the Telephone crew and pulleys for stretching the long cable into place. Since the phone truck was mired in the snow, the appearance of the jeep was thrice welcome. Like a tug, it soon had its larger companion on its wheels.

5.21 The soldier boys were our guests at
[redacted] get them a
ed to promise
gs for a meet.

T. 42°F)
arden in shade.
lace in pocket 34°F.
½ hour.

6°F
2 - 33.8°F
[redacted] in shade (sun behind Beacon Hill)
Radiation effects? Chills like a porous radiator.

Cable unfinished. So boys will stay with M.P. Battalion tonight at Valdenford Camp. "Soldiers do not wear pajamas". But they can have eiderdown sleeping bags here in the snow.

A Night Rescue.

Mr. — started on snowshoes 5 miles for his home but failed to phone his arrival. Then Mrs. —, his wife, started after him. Late in the evening three men started out to cover both road and trail. Two preferred webs and one clung to his skis.

Next morning husband and wife returned. The telephone line was down. Hence the failure to phone in. The rescuers were given coffee and soup and were assured by the "rescued" that they should have remained at home in bed.

5.2 The soldier boys were our guests at luncheon but in order to get them a second cup of coffee I had to promise to drink fastum mornings for a week.

Dec 14

Freezing and Melting.*

4:15 pm. 39.8 - 41°F. (H-T. 42°F)
Crust soft in sun but harder in shade.
Temp. 1/8 in. from snow surface in pocket 34°F.
Exposure of thermometer 1/2 hour.

4:50 pm 38.2°F (H-T. 40°F)
1/4 in. above snow 34.6°F
37°F (H-T. 38°) 1/8 in. " " 33.2 - 33.8°F

* on spot just in shade (sun behind Beacon Hill)
Radiation effects? Chills like a porous radiator.

Cable unfinished. So boys will stay with M.P. Battalion tonight at Valdenford Camp. "Soldiers do not wear pajamas". But they can have eiderdown sleeping bags here in the snow.

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5-3

Tuesday, Dec. 15

A large coil of insulated wire sent up from Big Bald Ranger Station: ~~It~~ "Wire for Dr Church". Bless them.

At noon the towers from Redding arrived. One canton missing but Bill had assembled substitutes for the missing parts.

By mid afternoon wire connections all completed but the triple register did not fully respond. Sergeant Clark left further adjustments to Ashton and Bill.

We pledged a letter of appreciation to their Colonel. Their coming had been manna from Heaven.

But their names? They were faces Dos.

929 Signal Battalion

Commandant ... Lieut. Col. Church
M. Sarg. G. D. Clark
S. Sarg. R. R. Rogers
Privt. R. Carpenter
Privt. R. Sharp
Privt. R. J. Meaux ("Rabpaly")
Privt. N. Bumbaugh

Tests -

Ashton with the soldiers tested the Stevens W.

Batteries . . 10 volts 17 amperes

Changed oil in damping cup to heavy but the balance bar is now stiff.

Pen after recharging has gone to right. Trickle charge and reversed. Position now is 16.4 units (by No. 20 scale) to right of left-hand base line.

Towers

54

Dec 15

Trickle Charger

Bill Siedentopf has learned that self-consuming batteries are not benefitted by outside charges of electricity and that the trickle charger must be used exclusively with storage batteries that depend wholly upon outside power.

It may be well, however, to retain the charger until others want it or a storage battery is substituted for the present primary cells.

Towers

The towers have arrived and were assembled in a night session in the garage.

Stevens Type Q

Heavy oil was substituted for light oil in the damping cup.

The clock appears to be running slow perhaps ½ hour in 5 days.

Need step for lifting standard gage.

Begin → Temperature and Snow Crusts

9 am. 40°F in shelter. Snow crisp and hard.

10:15 Sunshine thin - 47°F in shelter.

¼ in pore snow in shadow 39 - 38.6°F.

Snow slightly damp. Tiny breeze.

Sunshine Recorder has arrived.

Ordered by Bill. Other (the original) was defective.

Over

6-5-
Dec 15

11:10 am ... 51°F
2in shade 1/4 in. above snow 41°F
Top of snow granules moist.
Hand even becoming wet.
11:30 am ... 47.5°F
With sun within 2 in., at 1/4 in. above
* the snow ... 40.4°F. Moist as above.
at Hotel 5:30 pm ... 43.6°F Rel. humid 45%
1/16 in. from snow 35.2°F
Crust now 1/2 in. thick.
Ice forming where water is extremely thin.
6:50 pm Surface of pools 1/4 in. deep freezing.
Radiation effects.
Obtain sizes of crystals of ice, old coarse and new snow.

* In Pasture 12:15 pm ... 46.5°F
Earlier crust 1 1/2 in.
Surface melt already today 1/2 in.
Found Ashton's lost pipe bowl in the snow on the road. He need not now wait for the disappearance of the snow.

End

~~Ice~~ ~~Lakes~~
a lilting snow Lizzie came in today from Ice Lakes. The resort has reopened for the winter.

Wednesday, Dec. 16

Completing Installation of Towers #9 and #10

Bill had obtained from the Railway 4"x12" planks as foundations for the additional 10 foot towers. How did he haul them? He admits: "I was a fool." A bottom section should be added to raise the towers to 15 feet.

The braces were stiffened by twisted wire loops across the towers at right angles.

The shields were shortened to prevent being blown up by the wind and caught on the lip of the can.

→ Central wire guys were attached to the shield of one (No 9 near fence) and omitted from the shield of the other (No 10) to determine relative results.

10:45 am - Cans loaded with soda.
No. 9 . . . 4:48 in. (North of trestle)
No 10 . . . 4:58 in. (South of trestle)

Bails left off to prevent possible obstruction to entry of snow.

Snow Pole 1, 2, 3

Bill has painted the foot scale red, but the tens of inches 10, 20, 30 . . . black. This will prevent further confusion but still retain the dual system.

At 4:30 pm Reset both Hygro-thermographs - for comparison and adjustment. Reading of sling psychrometer: Dry bulb 42.1°F Wet bulb 35°F. Observe N running again.

Nail sand for blotting ink graphs.

→ U.S.W.B. Precipitation Can Lifter

5-7
Dec 16

is provided with spring balance.
It is a circular spring weighing clamp constructed to clasp the tops of 8-in cans by friction. It may slip. So holes for bail safer.
Discuss at Snow Conference.

Wind Shield for Donner Pass

1 half and 2 quarters left me by Bill. Brackets included, but supports must be provided.
Last cantan to be held at Soda Springs until picked up by Bureau.

Frig Tower.

Ashton proposes stiffening the frig tower by twisted wire braces as in Towers No 9 and 10. The braces are too flat and too long and the inner guys useless unless balanced against each other.
Yesterday a soldier climbing the tower evidently caused the pen to jump below the flange. This occurs too often and does so readily if the pen is reset lower than 1 in (water) above the flange.

Stevens Seasonal W

At 3:15 pm motor running twice — 2 minutes each time or longer! Yes, three times. Was the latter a reverse when the door was lifted? And even

5-8 a fourth time when no one was
Dec. 16 on platform. I heard it from the
Trig tower.

Comparison
Temperature and Snow — all Day.

Hotel —

9:30 am. 25°F

1/4 in above snow 20°F

Crust 1 1/2 in deep

" 1 in deep

Crystals loose tho coarse below.

Size both of snow crust and loose crystals
1-3 mm.

Difference merely in water suspended
in crust. Not moisture enough
for coherence.

Pasture —

10:10 am . . . 28°F

Crust 1 in deep - Powdery but coarse
beneath. No cohesion even under pressure
in hands.

Query: Did frost penetrate no farther or
is snow too dry to cohere?
Take snow-temp. measurements.

12:15 Noon Calm. Rel. humid. 15%.

Only upper grains of snow cover moist
but snow beneath crust packs slightly in hand.

Hotel —

12:30 Noon

Crust has mellowed i.e. disappeared.
Snow beneath next crust packs moistly.
~~poor in moisture~~.
But Snow tilled slightly toward sun and
slightly dirty. But in shade crust remnant
of 1/4 in. (quite coarse) and moist snow below (packable).
→ Get battery of thermometers and dyes
to test movement of heat and water in snow.

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Pasture —

NB — Shadow Ridges on Snow. Dissolation.

Noticed first by Bill on Dec. 11-12 but a few still visible. ↙ . Evidently caused by snow markers about 3 pm i.e. the hottest part of the day when the snow melting most actively but the shadows of the sticks protected the snow from melting. They might be called "white shadows."

2:15 pm 61°F

Crust from 1/4 to 1 in. thick but disintegrating. Snow directly below packs in hand but remains dry.

8 in below surface of snow, the snow packs but readily crushes in hand.

Hotel

5 pm . . . 37.2°F

Crust recongealing 3/4 in. thick. Surface still slightly moist to the hand. Below crust snow still packs firmly with trace of extruded moisture.

Soon afterwards the ice before the hotel was dry.

The Old 5 in. Crust

Bay working on the T-bar on Beacon Hill reports a thick crust deep down under drifts on Beacon Hill. Must be our old 5-in. crust of the Pasture that now melted and disappeared with lower snow into the ground.

60
Dec 16

New Sunshine Recorder

The sunshine recorder has remained black and empty all day. So have read directions for readjusting it. Merely an upsidedown whirl and quick imprisonment of air in the black (lower) bulb necessary to hold the mercury column higher. Ashton soon put it to rights.

Marvel

After a half day of charts in triple register, Bill decided to examine its interior. A miscannected wire was found from clock just out. yet the register had a certificate of examination and approval from Washington. Of course a used instrument for the cover has been reversed to open it wide.

All elements set to recording.

Thursday, Dec. 17.

Bill is planning to draw a flow of the two experimental units. Ashton will reproduce it for distribution, esp. to Merrill Bernard and cooperators.

Ashton listed the probable duties of the observer "Curley" for report to Merrill Bernard and the Regional Offices. The daily observations will be made by him but the weekly usually by me. The hygro-thermographs may be reset by him in my absence.

But all records and record sheets

61
Dec 17

except the Friz are to be retained by me for study and inclusion in the formal reports. This was emphasized strongly. Copies of the Friz record should immediatly be traced before original is sent to San Francisco but such copy will be used only as provisional until detail hourly data are ~~provided~~ published. The latter with their totals will then be substituted for the provisional in all reports.

Photos

Wednesday, Dec. 16. Photos of platform from Friz tower, Andy and his dog Butch, and Pasture canvas and trestle from west on road to Ice Lakes.

Thursday, Dec. 17 1:15 pm. Moore pasture installation from the east.

Departure.

At 12 Noon, after putting everything in shape, Ashton and Bill started for home. The only thing left undone was stiffening the Friz tower by cross wires.

Bill was homesick every time a plane passed west. His wife was a nervous wreck at the post arrival. He confessed that his bark was worse than his bite, and that his only objection to the snow was wanting bare handed in it.

62
Dec 17 I had planned to depart the same afternoon but Cudby had promised to go to Rano on Friday and the triple register would be left unattended. So I agreed to remain an extra day. The extra time proved both necessary and valuable.

Snow Crust

Hotel - 1 pm. crust melted.

Pasture - In shelter 52.4°F. Crust last night 1 in. deep. Now soft. ~~But~~ Snow immediately below passes, but 5 in. below crust packs dry.

Dining Room -
air temp. 50°F but sun hot thru glass door - Greenhouse effect?

Snow Survey (Dec. 17, 1942).

Key Canvas

| No. | Depth | Core | Wt of Tube | Total with snow | net wt | |
|---|---|---|---|---|---|---|
| *1 | 10.6 | 8.5 | 49.8 | 52.9 | 3.1 | |
| | 10.3 | 10.3 | " | 53.3 | 3.5 | |
| *2. | 19.7 | 17.3 | 49.8 | 56.7 | 6.9 | Ground wet Crust wet |
| | 17.2 -2.5 | -2.5 | | | | |
| *3. | 17.5+ | 18 | 50 | 57 | 7.0 | Ground soaked |
| | 14.5 -3.0 | -3.0 | | | | |
| *4. | 9.5 | 8.5 | 49.8 | 53.6 | 3.8 | |

62 Dec 17

| | | | | | | |
|---|---|---|---|---|---|---|
| #5 | 8 | 6.7 | 49.8 | 52.8 | 3.0 | Clear ice at bottom |
| #6 | 19.5 ~~18.7~~ −0.8 | 17.8 −0.8 | 49.8 | 57.0 | 7.2 | |
| #7 | 20.5 ~~21.1~~ −0.4 | 18.5 −0.4 | 49.8 | 57.9 | 8.1 | Wet manure |
| #8 | 21.2 | 20.2 | 49.8 | 57.8 | 8.0 | Snow dry; loose crystals |
| #9 | 18.2 ~~15.2~~ −3.0 | 17.5 −3.0 | 49.8 | 56.2 | 6.4 | No crust |

~~Late~~ afternoon - The crust has reformed
4:30 pm (?) The ground is still soft.

## Sunshine Recorder

Adjusted mell, for mercury column fell promptly below contacts as sun went behind Beacon Hill.

Hammer, clock of triple register stop. Lost 1/2 hour.

Dec 17

## Crust

5:15 pm. In Pasture crust has already reformed. 1 in. thick. Temp. in shelter --1-31.8°F
H-T. 36°F.

End

Friday, Dec. 18

## Sunshine Recorder

This morning mercury column started upward as soon as sun appeared and contact with posts of electric circuit was attained when the sun was only 6-diameters high above the horizon.

63)
Dec 18)

Fog in Truckee and Sacramento Basins

a boy came to breakfast from Reno. Reported that the barometer was the highest ever recorded at Reno. Fog for several days at Reno and in Sacramento Valley. Ceiling 0. Mr Rucka forecasted improvement this afternoon. Some ice on airplane wings.

Our barometer is steady again — above normal as based on sea-level normal pressure.

## Snow Survey (Continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| *9 (Remeasured) | 18 | 17 | 49.8 | 56.4 | 6.6 | Snow moist, ground soft. |
| *10. | 22.0 −0.5 = 21.5 | 21.2 −0.5 | 49.8 | 59.1 | 9.3 | Ground soft. Moss. |
| *11 | 18.5 −1.3 = 17.2 | 16.5 −1.3 | 49.8 | 56.2 | 6.4 | Ground soft. |
| *12 | 24.6 −0.3 = 24.3 | 22.2 −0.3 | 49.8 | 58.5 | 8.7 | |
| *13 | 31.2 −1.3 = 29.9 | 21.6 −1.3 | 49.8 | 58.0 | 8.2 | Brush. Ground ~~soft~~ moist. |
| *14 | 22.5 −0.3 = 22.2 | 17.5 −0.3 | 48.5 | 57.0 | 8.5 | |
| Total | 253.6 | | | | 95.20 | |
| Av. 14 meas. | 18.1 in. | | | Av. | 6.80 | Dens. 37.6% |
| Av. 6-11 only | 19.6 in. | | | Av. | 7.60 | Dens. 38.8% |

64/
Dec 18

# Weather at Soda Springs

| Date | Max. | Min. | Precip. | Snowfall | Snow on Ground | Wind | Clouds |
|---|---|---|---|---|---|---|---|
| Dec. 7 | 38 | 16 | 1.01 | 15 | 27 | LW | Cldy |
| 8 | 35 | 9 | | | 26 | LSW | Pt Cldy |
| 9 | 37 | 11 | 0.21 | 3 | 28 | LW | Cldy |
| 10 | 49 | 18 | | | 26 | Clear | Pt Cldy |
| 11 | 45 | 18 | | | 24 | LSE | Clr |
| 12 | 50 | 9 | | | 22 | LSW | Clr |
| 13 | 54 | 11 | | | 21 | LW | Pt Cldy |
| 14 | 52 | 18 | | | 20 | LSE | Clr |
| 15 | 45 | 18 | | | 19 | LW | Clr |
| 16 | 58 | 19 | | | 18 | Clear | Clr |
| 17 | 66 | 18 | | | 18 | LSE | Clr |
| 18 | 56 | 14 | | | 17 | LSE | Clr |

Pressure high

Stx

65/12/18 Crust

Crust reformed 1½ in. deep

Dec 18

Snow below dry and loose as granulated sugar.

Min. temp. in shelter 14.7°F. (H-T. 18°F).
Humid 100%
at 10:45 am 41.0°F

Hygro-thermograph:
Min. for night 18°F, rel. humid. 100%.
at 10:45 am 43°F, rel. humid. 40%.

Frost feathers on snow at 11 a.m. melting only on wood.

Cross Section of Snow east of trestle.

1. Cohered crust
2. Loose dry grains
3. Cohered (crust) rounded crystals
4. Cohered crystals that separate into separate grains when crushed in hand.
5. Sod and soil, moist but does not pack in hand.

Melting Day

Frost still on snow at 11 am, is only slightly moist & hard. Melting day therefore short.

But snow where dirty is already melting.*

Determine hours of melting in forenoon and afternoon. Which period is more effective? How much warming (latent heat) is necessary to start the melting

End

* Next Experiment: Expose underlay (beneath surface crust) to night radiation to see if it is moist enough to freeze.

Thursday
* Mc L dumped in oneralls and pranced.
Walter Lyles and guests at Sunset Club Hut
have given him no time during Khia
Long stay Hitherto, So released him from
any present obligation

66

Dec 18 process?

Triple register reset at noon.
Clock had stopped again (2) Reround.
Trouble probably in friction at electrical
contact points. Sunshine record perfect.

→ Metal clasp band for record sheet broken.
Will take to Reno for repairs.

*

– Needs –

Reno Kettle Co. ✓ (1) 2 gals white paint for Mc L. to finish painting platforms. Most of supply used for previous painting by Max and Bill.
1 gt turpentine.

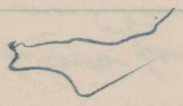
Herz ✓ (2) Keys for small thermograph for winding and adjustment.

Barnes (3.) More Super XX films for camera. None available in Reno. Very fast. only a few used. Verichrome film too slow without tripod.

(4.) Next time paint cones of Stone's gages black. Paint already on hand.

(5.) Screw-hook ~~wo~~ for sling psychrometer.

(6) 2 - 2×4" × 10' timber for braces to Friz-tower ladder. Bottom ends should be set on ground rather than nailed to tower.
also coil of No. 9 wire to increase tension on braces of Friz tower.



67/
Dec 18

(7) Lock box for camera, field glass, books, etc left at hotel.

Phil Church (8) Dyes, powders, seales, thermometers, complete outfit for determining latent heat of snow.

Bill Siedentopf (9) Ware inks (in law bottles ⬡) and abundant triple-register sheets. Only one-month supply on hand.
Psychrometric Slide Rule for Pressure 23". The one provided is 25".

10. Note book to keep records in proper sequence by date.
Snow-survey blanks.

11. Mount Lundquist's "Classification of Snow Forms" in cellophane book. Prepare Journal for daily reports of snow forms. Supply a metric cross-section sheet for grain size.

Barometer still steady and high.
Watch found 15 min. slow! But still time for bus that arrived at 2:30 pm exactly on schedule.

Melting far progressed on north side of highway.

Elevation Donner Pass 7,135 feet.

8" diam

16

3.1416

4

12,566

4

50.2654

50.2654 □"
= 8" circle

Sf. Gr.
Bot
Residue

army
Gage
#3

50.2654

20

1005.308

2.7 | 111.1.701

.3 | 372.34

.7854) 37234 ( 474 +
31416
5818
5497
321

20" precip in 8" diam
= 20 × 50.2654 = 1005.308 cu in.

On graph. 20" precip indicates
about 2.7" depth (in bottom of Gage)

1005.308 / 3.7 = avg area = 271.7 □"

22) 474
2) 4309
21,545
22
2) 43545
2177

avg diam circle of 271.7 □"

= √(271.7 / .7854) = √345.9 = 19.22

Bottom about 20" diam

.7854) 271.70 ( 345.9
23562
36080
31416
46640
39270
7370

(8) 345.9
3) 57.65
19.22

1005.308 ( 717
7
265
259
63
37
260
259

64
8
51.2

20
8
12

6