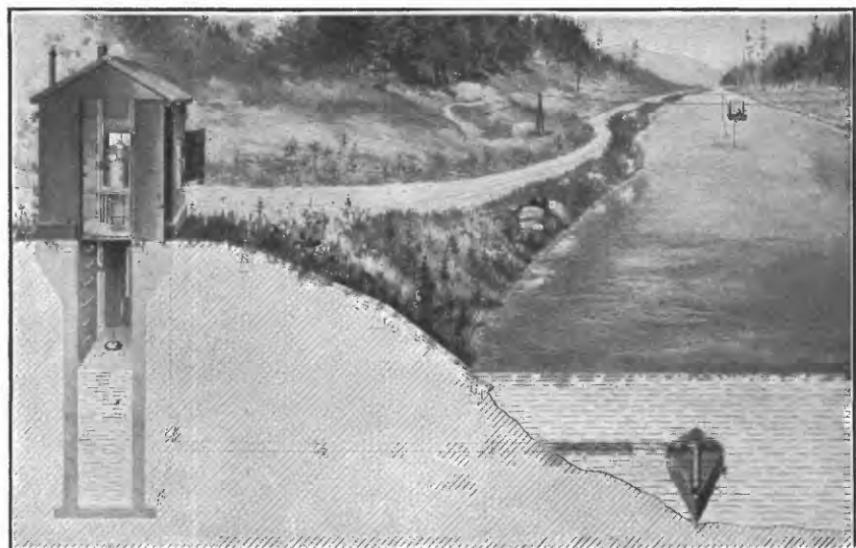
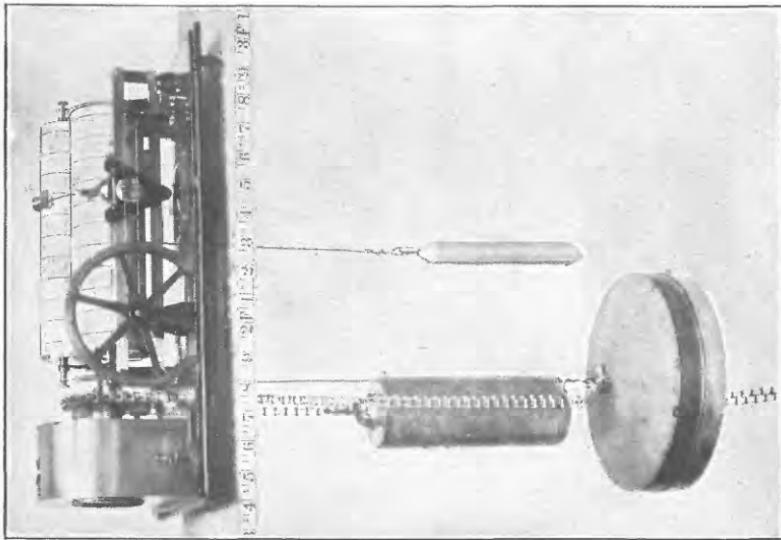


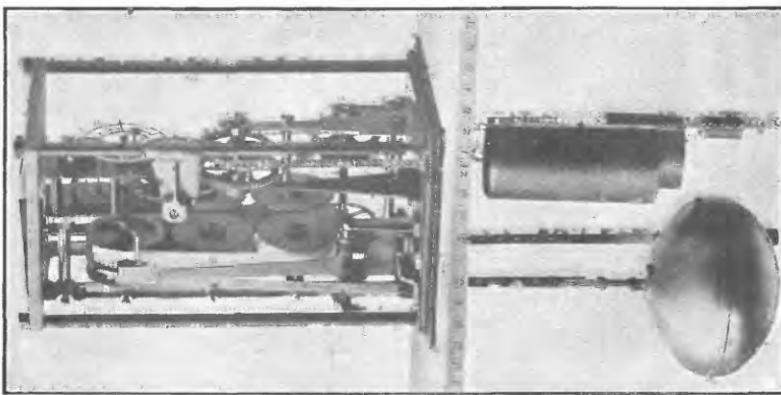
A. PRICE CURRENT METERS.



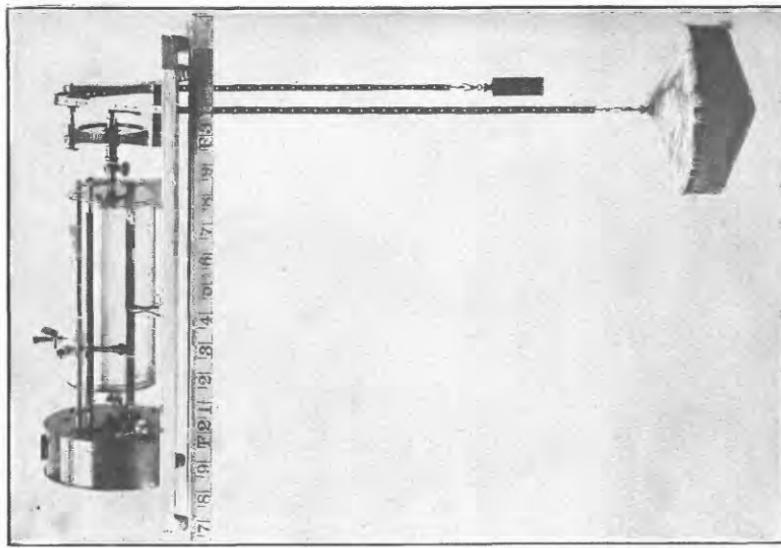
B. TYPICAL GAGING STATION.



4. STEVENS CONTINUED.



B. GIBBLEY PRINTING



C. FREDZ

## WATER-STAGE RECORDERS.









































































































Daily discharge, in second-feet, of Birch Creek near Dupuyer, Mont., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
'1918-19.												
1	26	7.8	8	10	-----	-----	10	154	464	120	49	39
2	20	7.8	8	8	6.4	-----	12	175	450	106	50	39
3	16	7.8	8	6.4	-----	-----	10	177	381	102	48	40
4	16	7.8	8	7	-----	-----	9	179	201	101	49	40
5	15	9.8	7.8	8	-----	-----	9.8	179	422	100	48	41
6	15	9.8	6.8	9	-----	-----	9.8	177	501	96	49	41
7	14	9.8	9.8	9	-----	-----	8.6	183	524	100	48	41
8	13	9.8	13	9	-----	-----	8.6	183	520	96	48	42
9	14	8.6	13	9	-----	-----	7.8	186	528	86	48	43
10	13	8.6	13	9	-----	-----	7.8	183	524	79	48	41
11	13	9	13	9	-----	-----	7.4	183	680	75	48	40
12	14	8.6	13	9	-----	-----	5.4	188	415	74	48	40
13	13	7.8	13	9	-----	-----	7.8	108	453	68	48	40
14	13	7.8	13	9.4	-----	-----	7.8	108	446	68	47	40
15	13	7.8	13	9	-----	-----	6.8	106	422	67	46	40
16	13	7.8	13	9	-----	-----	7.4	106	425	73	45	39
17	13	7.8	13	9	-----	-----	7.4	104	425	60	44	39
18	11	7.8	13	9	-----	-----	7.8	122	658	59	44	38
19	11	9	13	9	-----	-----	7.8	238	559	59	41	38
20	11	11	13	9	-----	-----	8.2	188	572	60	42	39
21	11	7.4	13	9	-----	-----	8.2	218	532	58	41	40
22	11	7.4	13	9	-----	-----	12	300	535	58	42	41
23	10	9.4	13	9	-----	-----	14	321	398	56	42	41
24	9.8	9	13	9	-----	-----	18	336	288	56	41	41
25	9.8	9	115	9	-----	-----	21	391	262	55	41	41
26	9.8	9	35	9	-----	-----	23	482	262	52	41	42
27	9.4	9	25	9	-----	-----	26	494	195	50	40	39
28	9	9	13	9	-----	-----	27	508	184	49	40	15
29	9	9	13	9	-----	-----	127	547	193	49	39	13
30	9	9	13	9	-----	-----	145	482	127	48	39	13
31	9	-----	25	9	-----	-----	490	-----	48	39	-----	-----
1919-20.												
1	12	12	8	8	15	9	17	34	440	368	477	271
2	11	12	8	9	13	10	24	35	418	379	391	271
3	9	11	8	9	15	9	31	35	418	364	333	237
4	17	11	8	9	14	9	38	35	451	347	379	265
5	16	10	8	9	13	9	45	46	510	330	372	237
6	16	9	8	9	13	9	52	46	645	313	372	237
7	15	9	8	9	16	8	60	46	659	296	356	224
8	15	9	8	10	11	8	64	50	747	495	356	196
9	18	9	8	11	6	10	57	149	777	568	356	174
10	14	9	8	12	11	13	60	293	747	568	274	150
11	16	8	8	10	6	10	64	418	695	573	262	150
12	16	8	8	8	6	12	61	483	650	586	259	131
3	16	8	7	6	9	20	57	139	637	508	256	118
4	16	10	7	5	12	25	65	107	709	522	256	94
5	14	10	7	5	6	29	54	105	838	522	253	90
6	14	19	8	5	6	10	43	105	828	518	253	87
7	14	17	10	5	10	7	32	486	797	522	250	87
8	17	12	7	10	5	22	547	738	518	490	85	85
9	14	14	15	7	14	10	25	559	633	513	231	84
10	13	14	20	6	12	14	30	559	577	508	226	82
11	12	12	25	5	22	29	429	550	508	226	81	81
12	16	25	5	11	19	32	136	550	504	224	80	80
13	17	20	5	12	16	34	518	540	504	218	80	80
14	17	20	5	13	32	33	681	481	500	290	80	80
15	13	20	18	6	14	19	32	663	437	495	290	78
16	13	20	16	8	14	9	32	542	375	490	283	78
17	13	14	9	13	29	30	486	356	490	280	77	77
18	12	11	10	11	30	32	522	345	490	274	77	77
19	13	10	20	10	25	34	551	352	490	268	77	77
0	13	10	7	16	29	34	514	356	482	280	74	74
1	13	-----	8	19	22	477	-----	486	271	-----	-----	-----

NOTE.—Stage-discharge relation affected by ice Nov. 24 to Dec. 4, Dec. 9, 1918, to Mar. 31, 1919; Oct. 23 to Nov. 15, Nov. 27 to Dec. 28, Dec. 31, 1919, Jan. 1 to Mar. 21, and Apr. 2-5, 1920; discharge computed from discharge measurements, gage heights, temperature records, and comparison with records of flow at Swift dam. Gage not real Apr. 15-17, July 4-6, Sept. 8-9, 1920; discharge interpolated.

*Monthly discharge of Birch Creek near Dupuyer, Mont., for the years ending Sept. 30, 1919 and 1920.*

Month.	Discharge in second-feet.			Run-off in acre- feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	26	9	12.7	781
November	11	7.4	8.64	514
December	115	6.8	16.7	1,030
January	10	6.4	8.83	543
February			<sup>a</sup> 9	500
March			<sup>a</sup> 9	553
April	145	5.4	19.6	1,170
May	547	104	251	15,400
June	680	127	421	25,100
July	120	48	71.9	4,420
August	50	39	44.6	2,740
September	43	13	37.5	2,230
The year	680	5.4	76	55,000
1919-20.				
October	18	9	13.9	855
November	20	8	12.4	738
December	25	7	11.5	707
January	20	5	8.6	529
February	15	5	11.1	638
March	32	5	15.7	965
April	65	17	40.8	2,430
May	681	34	316	19,400
June	838	345	575	34,200
July	586	296	476	29,300
August	490	218	302	18,600
September	271	74	135	8,030
The year	838	5	318	116,000

<sup>a</sup> Estimated.

#### DUPUYER CREEK NEAR VALIER, MONT.

**LOCATION.**—In NE.  $\frac{1}{4}$  NW.  $\frac{1}{4}$  sec. 33, T. 29 N., R. 6 W., at Cowell ranch, 1,000 feet above diversion dam at head of D canal from Dupuyer Creek to Lake Frances reservoir and outlet of B canal, which diverts water from Birch Creek to Dupuyer Creek, 6 miles below mouth of Sheep Creek, and 11 miles southwest of Valier, Pondera County, nearest railway point.

**DRAINAGE AREA.**—111 square miles (measured by Valier-Montana Land & Water Co.).

**RECORDS AVAILABLE.**—July 17, 1912, to September 30, 1920.

**GAGE.**—Vertical steel staff on right bank, 1,000 feet above diversion dam, used since June 23, 1916; read by Cecil Carey and others.

**DISCHARGE MEASUREMENTS.**—Made by wading at low stages. High-water measurements made from cable 30 feet below gage or from bridge 5 miles below gage.

**CHANNEL AND CONTROL.**—Bed of stream fine gravel; right bank high and steep; left slopes gradually and is overflowed only at flood stage. A bar or ledge that produces a riffle about 400 feet below the gage forms the control at certain stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year ending September 30, 1919, 3.08 feet at 7.45 p. m. April 1 (discharge, 44 second-feet); no flow September 19.

Maximum stage recorded during the year ending September 30, 1920, 5.60 feet at 6 p. m. April 13 (estimated discharge, 1,130 second-feet); minimum discharge, 0.2 second-foot, October 7.

1912-1920: Maximum stage recorded, 6.5 feet on June 21, 1916, determined by level from flood marks (discharge, 2,180 second-feet); no flow September 19, 1919.

**ICE.**—Stage-discharge relation affected by ice. Winter flow computed from current-meter measurements and observer's daily estimate.

**DIVERSIONS.**—A number of small ditches divert water for irrigation from Dupuyer Creek and tributaries; many of the numerous water-right filings have been perfect by use.

**REGULATION.**—None.

























Discharge measurements of Spring Creek near Chouteau, Mont., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.				1920.			
Feb. 21	C. S. Heidel.	Feet.	Sec.-ft.	May 20	W. A. Lamb.	Feet.	Sec.-ft.
May 21	do.	2.08	13.8	Aug. 17	Ellis and Heidel.	2.25	26.2
July 29	W. A. Lamb.	1.95	7.3			2.09	13.1

Daily discharge, in second-feet, of Spring Creek near Chouteau, Mont., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1.	14	14	14	14	14	10	15	10	15	10	7.5	5
2.	14	14	14	14	14	10	15	10	15	9	7.5	5
3.	14	14	14	14	14	10	16	13	15	9	8	5
4.	14	14	14	14	14	10	16	14	15	9	8.5	5
5.	14	14	14	14	14	11	16	14	15	9	10	5
6.	14	14	14	14	14	11	16	14	14	9	10	5
7.	14	14	14	14	14	11	15	13	14	9	10	5
8.	14	15	14	14	14	11	15	14	14	9	10	5
9.	14	15	14	14	14	11	15	14	14	9	7.5	5
10.	14	15	14	14	14	12	15	11	14	9	7	5
11.	14	15	14	14	14	12	15	14	15	9	6.5	5
12.	14	15	14	14	14	11	15	14	14	9	5	5
13.	14	15	14	14	14	11	15	14	14	9	5	5
14.	14	15	14	14	14	11	15	14	14	8	5	5
15.	14	15	14	14	14	11	15	14	14	8	5	5
16.	14	15	14	14	14	11	15	14	14	8	5	5
17.	14	15	14	14	14	11	15	14	14	7	5	5
18.	14	15	14	14	14	14	15	14	14	7	5	5
19.	14	15	14	15	14	15	15	14	14	7	5	5
20.	14	15	14	15	14	18	15	14	14	7.5	5	5
21.	14	15	14	15	14	14	14	14	14	7.5	5	5
22.	14	15	14	15	14	14	11	14	13	7.5	5	5
23.	14	15	14	15	14	14	13	14	13	7.5	5	5
24.	14	15	14	14	12	14	11	14	12	7.5	5	5
25.	14	14	14	14	12	15	11	14	11	7.5	5	5
26.	14	14	14	14	12	15	11	14	10	7.5	5	5
27.	14	14	14	14	11	15	11	14	10	7.5	5	7.5
28.	14	14	14	14	11	15	11	14	10	7.5	5	7.5
29.	14	14	14	14	14	15	11	14	10	7.5	5	7.5
30.	14	14	14	14	14	15	11	15	10	7.5	5	7.5
31.	14	14	14	14	14	15	15	15	15	7.5	5	—
1919-20.												
1.	9	10	12	14	19	18	20	32	18	23	19	13.5
2.	10	10	12	14	19	17	20	32	18	23	19	13.5
3.	10	10	12	14	21	16	19	37	18	23	19	13.5
4.	10	10	11	14	21	15	20	41	18	23	19	13.5
5.	10	10	11	14	21	14	20	41	18	23	19	13.5
6.	9	10	10	14	21	14	20	41	18	23	19	13.5
7.	9	10	10	13	19	14	21	41	18	23	18	13.5
8.	10	10	10	13	18	14	21	41	18	23	18	13.5
9.	10	10	10	13	18	13	21	41	22	23	18	13.5
10.	10	10	10	13	16	12	21	41	22	23	18	13.5
11.	10	10	10	14	16	12	21	41	22	23	19	13.5
12.	10	10	10	14	15	13	34	45	24	21	18	13.5
13.	10	10	9	15	15	14	101	50	26	21	18	13.5
14.	11	12	9	15	16	15	49	45	26	21	16	13.5
15.	10	12	10	15	18	14	79	45	26	23	16	13.5
16.	10	13	11	14	18	14	40	42	26	23	16	13.5
17.	10	14	12	16	18	13	36	42	26	23	15	13.5
18.	10	14	13	15	21	12	33	41	26	23	13.5	13.5
19.	10	14	14	16	21	13	35	36	24	25	13.5	13.5
20.	10	15	15	18	21	12	40	36	24	26	13.5	13.5
21.	10	15	18	17	21	14	38	36	25	26	13.5	13.5
22.	10	15	16	16	19	14	36	36	23	23	13.5	13.5
23.	10	14	16	16	19	16	33	36	23	23	13.5	13.5
24.	10	14	16	16	21	16	28	32	23	21	13.5	13.5
25.	10	14	16	16	21	16	27	28	22	21	13.5	13.5
26.	10	14	16	16	22	16	27	21	22	21	13.5	13.5
27.	10	14	16	16	22	17	24	21	20	19	13.5	13.5
28.	10	14	16	18	21	17	27	18	18	18	13.5	13.5
29.	10	13	15	19	19	18	31	18	18	18	13.5	13.5
30.	10	12	13	21	—	18	31	18	18	18	13.5	13.5
31.	10	—	12	21	—	19	—	18	—	18	13.5	—

*Monthly discharge of Spring Creek near Chouteau, Mont., for the years ending Sept. 30, 1919 and 1920.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October.	14	14	14.0	861
November.	15	14	14.6	869
December.	14	14	14.0	865
January.	15	14	14.2	873
February.	14	11	13.6	755
March.	18	10	12.7	781
April.	16	11	14.1	839
May.	15	10	13.7	842
June.	15	10	13.3	791
July.	10	7.0	8.16	502
August.	10	5.0	6.21	382
September.	7.5	5.0	5.33	317
The year.	18	5.0	12.0	8,670
1919-20.				
October.	11	9.0	9.91	611
November.	15	10	12.1	720
December.	18	9.0	12.6	775
January.	21	13	15.5	955
February.	22	15	19.2	1,100
March.	19	12	14.8	910
April.	101	19	32.4	1,930
May.	50	18	35.3	2,170
June.	26	18	21.7	1,290
July.	26	18	22.1	1,360
August.	19	13.5	15.9	978
September.	13.5	13.5	13.5	803
The year.	101	9.0	18.7	13,600

#### DEEP CREEK NEAR CHOUTEAU, MONT.

**LOCATION.**—In SW.  $\frac{1}{4}$  NW.  $\frac{1}{4}$  sec. 15, T. 23 N., R. 5 W., at Hugh Robinson's ranch, 5 miles southwest of Chouteau, Teton County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—March 24, 1911, to September 30, 1920.

**GAGE.**—Chain on right bank, 400 feet above ranch house; read by Hugh Robinson.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel; fairly permanent. Control at gravel bar 50 feet downstream; shifting at intervals.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year ending September 30, 1919, 5.93 feet March 23 (discharge, 84 second-feet); minimum stage, 4.90 feet July 23-27 (discharge, 3.0 second-feet).

Maximum stage recorded during year ending September 30, 1920, 8.35 feet April 13 (discharge, 1,170 second-feet); minimum stage, 5.0 feet October 24 (discharge, 6.0 second-feet).

1911-1920: Maximum stage recorded, 10.5 feet at 7 a. m. June 21, 1912 (discharge, determined from extension of rating curve, 3,050 second-feet); minimum stage in 1919.

**ICE.**—Stage-discharge relation affected by ice.

**DIVERSIONS.**—A few small ditches divert water above gage.

**REGULATION.**—None.

























































































































































































































































































































































































































































































































































































































































































