The total load applied was 33.1 tons, which, if we take 7.6 as the length of the pipe and 5.62 ft. as the width, gives us a load of 618 lbs. per inch run of pipe. Now the maximum possible load to which the syphon pipes could be subjected would be due to the filling just east of the retaining wall where there is a depth of 22.5 ft. of earth over the pipe. Taking this as weighing 120 lbs. per cu. ft., we have for the 66-inch pipe 5.62 × 1-12 × 22.5 × 120 = 1,264 lbs. per inch run, which, although obtained by approximate methods, gives an idea of the relationship between the actual applied load and the possible maximum load. From Talbot's * formula; for a distributed vertical load—

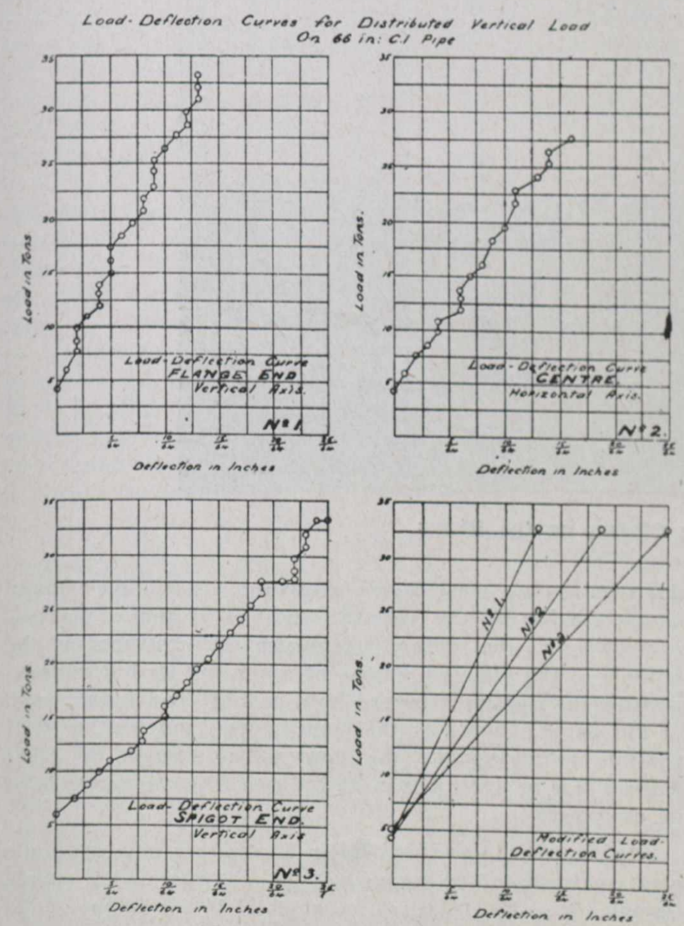
$$f = \frac{1 \quad w.d.}{16\frac{1}{6} + {}^{2}}$$

where f—stress in remote fibre
w = applied load per in. run.
d = mean dia. of ring.
t = thickness metal in ring.

Considering the spigot end of the pipe and making the proper substitution, we have—

$$f = \frac{67\frac{1}{2} \times 618 \quad 1}{16\frac{1}{6} \times 1.5 \times 1.5}$$

$= 6\,953$ lbs. per sq. in.



Load Deflection Curves on Pipe.

This under a load of 618 lbs. per inch run, which is about one-half the actual loading and using, as we may safely do, considering the quality of the casting, an ultimate strength of 30,000 lbs. per sq. in., we find that the pipe would stand with a factor of safety of 4.3 for the actual applied load, and 2.1 for the maximum possible load as described above.

We have also for a distributed vertical load,

$$E = \frac{w.d^3}{96.y.I}$$

where w—load applied per lin. in.
d = mean dia.
I = mom. of inertia of section.
y = deflection.

$$= \frac{618 \times 12 \times (67\frac{1}{2})^3 \times 64}{96 \times 25 \times 3\frac{3}{8}}$$

—18,020,000 lbs. per sq. in.

This result checks approximately the investigation and results of Mr. Talbot in his experiments above noted.

Owing, however, to the way in which the pipe was supported (described above), the conditions were more severe than those for which the above equation was intended, and would be accountable for the high value of the modulus of elasticity.

Table of Loading.

Load: Pounds	Load: Tons	Deflection: Spigot End	Deflection: Flange End	Deflection: Centre Horizontal	Remarks.
8 468	4.2	0	0	0	Gauges set at this initial load.
11,841	5.9	0	1-64	1-64	
14,986	7.5	2-64	2-64	2-64	
16,998	8.5	3-64	2-64	3-64	
19,526	9.7	4-64	2-64	4-64	
21,621	10.8	5-64	3-64	4-64	
23,838	11.9	7-64	4-64	6-64	
25,947	12.9	8-64	4-64	6-64	
27,315	13.6	8-64	4-64	6-64	
29,969	14.9	10-64	3-64	7-64	
32,126	16.0	10-64	5-64	8-64	
34,288	17.1	11-64	5-64	8-64	
36,531	18.2	12-64	6-64	9-64	
38,896	19.4	13-64	7-64	10-64	
41,177	20.5	14-64	8-64	10-64	
43,545	21.7	15-64	8-64	11-64	
45,857	22.9	16-64	9-64	11-64	
48,209	24.1	17-64	9-64	13-64	
50,469	25.2	18-64	9-64	14-64	
52,655	26.3	19-64	10-64	14-64	
54,867	27.4	19-64	10-64	15-64	
		21-64	11-64	16-64	At 5 p.m. November 2, 1910.
		22-64	12-64	16-64	At 9 a.m., November 3, 1910.
57,118	28.5	22-64	12-64	.....	Gauge on horizontal diameter broken.
59,395	29.6	22-64	12-64	.....	
61,707	30.8	23-64	13-64	.....	
63,922	31.9	23-64	13-64	.....	
66,265	33.1	24-64	13-64	.....	Total load.
		25-64	13-64	.....	Lapse of one day.
	31.1	24-64	12-64	.....	Two tiers removed.
		6-64	3-64	.....	No load.
		0	0	.....	Filling removed.

* Bulletin No. 22 of the University of Illinois.