with any of the engines tried. The "Neponset" was then running with exhaust pipes of 2½ in. diameter, which are now worn or expanded to 2⅝ inch, something like ⅝ inch more than is usually maintained on engines of that class. As to their speed, Mr. Griggs' engines show the attainment of 50 miles per hour with the steamboat trains over the level parts of the road.

As to the "Highlander," we can only say that in many respects it is a successful and economical freight engine. The freight business of the Providence road is not so heavy as to furnish a complete test for the power of an engine, and had it been so, the "Highlander" would have probably had a separate cut off valve, so that steam could be used through full stroke in starting. For the service in which it is employed it is efficient and economical.

The economy of the chilled tire is fully realized in this engine, in the cheapness and facility of maintaining it in constant working condition.

The whole equipment of engines of this road is economically operated from the fact that the furnaces and tubes of every engine are in excellent order, and the proportions and adjustments of valves are good, thereby realizing the greatest efficiency of the fuel, while the expense of maintaining is very low from the strength of the frames, the strong staying and bracing of the boiler, the simplicity of the pumps, slides and valve motions, the excellent quality of the springs, the simple sparker, etc., etc. The machines are simple, durable and accessable.

It may be interesting to know something of the extent and position of the establishment from which this road has been equipped with engines. The passenger in the Providence and New York trains will observe a low range of brick buildings near to and upon the north side of the track, about a mile from the Boston station, These are the engine house and repair shops. The machinery of the latter consists of a small stationary engine of six horse power; one large lathe for turning drivers; one boring and splining lathe for trucks and car wheels; seven small iron frame engine lathes; two wood frame lathes; two hand lathes; two drills; two small iron planers; one bolt cutter; one axle-key-way cutter, and fifteen iron vises. By comparing this machinery with that of other repair shops, it will be found not to exceed the amount required to keep the same number of locomotives in repair, but on the Providence road this machinery has sufficed to build nearly the whole equipment of engines, four having been built in one year. Thirty men are the most that have ever been employed in the entire establishment, including men engaged in repairing cars. The boiler smith's work is obtained, completed, from other shops, the Taunton Company having built most of the boilers and tender tanks.

Mr. Griggs is now building an engine with 16 inch cylinders, 18 inch stroke, 5½ feet drivers, 128 two inch solid brass tubes, 12 feet long; copper fire-box with copper stay bolts; separate cut off valve, etc. This will soon be completed and placed on the steamboat train.

SURVEY OF MOTIVE POWER. BOSTON AND PROVIDENCE RAILROAD.—BY ZERAH COLBURN.

Name of Engine.	Builder.	Reception on Road.	Cylinder Connection.	Diam. of Cylinder.	Length of Stroke.	Length of Ports.	Width of Steam Port.	Width of Exhaust.	Diam. of Drivers.	No. of Drivers.	No. of Trucks.	Diameter of Boiler.	Length of Tubes.	Number of Tubes.	Diameter of Tubes.	Diam. of Blast-pipe.	Length of Furnace.
				in.	in.	in.	in.	in.	ft. in.			in.	ft.in.		in.	in.	in.
Whistler	R. Stephenson & Co.	June, 1834	Inside.	12	16	8	1	2	5. 0	Two.	Four.	34	9. 9	76	2 3-16	1 9-16	25½
Boston	Edward Bury.		"	12	20	8	1	2	5. 0	"	Two.	36	7. 8	76	2¼	1⅝	23
Tiot	Locks & Canals Co.		"	12	16	8	1	2	5. 0	"	Four.	34	9. 9	66	2 3-16	1⅝	32
King Philip	"		Outside.	16	20	8	1	2½	4. 6	Four.	"	45	9. 0	135	1¾	1 13-16	37
Norfolk	G. S. Griggs	May, 1845	Inside.	14 7-16	18	8½	1	2	4. 7	"	"	38	9. 6	116	"	1 13-16	31½
Bristol	"	May, 1846	"	14⅝	18	8½	1	2	5. 0	"	"	38	9. 6	121	"	1⅞	30½
Suffolk	"	June, "	"	14 9-16	18	8½	1	2	5. 0	"	"	38	9. 6	121	"	1⅞	31½
Massachusetts.	"	Dec. "	"	14 11-16	18	8½	1	2	5. 0	"	"	41	9. 9	131	"	1⅞	33¼
Blackstone	"	April, 1847	"	14¾	20	8½	1	2	5. 0	"	"	41	9. 9	135	"	1⅞	33¾
Taghconic	"	Jan'y. 1848	"	14¾	18	9	1	2	5. 6	"	"	40½	10. 0	135	"	2 1-16	34½
Narragansett	"	Feb'y. "	"	16	20	9	1	2	4. 6	"	"	40	10. 0	135	"	1⅞	33
Iron Horse	"	Sept. "	"	14 13-16	18	9	1	2	5. 0	"	"	42½	11. 0	134	"		33½
Rhode Island	"	" "	"	14 11-16	20	9	1	2	5. 6	"	"	42½	11. 0	134	"		33½
Canton	"	May, 1849	"	14¾	20	9	1	2	5. 6	"	"	42	11. 0	135	"	2⅛	35
Neponset	"	June, "	"	14¾	20	9	1	2	5. 6	"	"	41×43	11. 0	123	2	2⅝	35
Highlander	"	June, 1850	"	14¾	18	9	1	2	4. 0	Six.	None.	45	9. 4	142	1¾	1 15-16	33
Dedham	"	May, 1851	"	9	16	7	⅞	1¾	4. 6	Two.	Four.	30¾	8. 0	113	1½	1½	20½
Roxbury	"		"	9	16	7	⅞	1¾	4. 6	"	"	30¾	8. 0	113	"	1½	20½
Providence	Taunton Company.	Feb. 1849	"	15	18				5. 0	Four.	"	43	10. 0	129	1¾	1⅞	37

Width of Furnace.	Depth of Furnace.	Weight of Engine in running order.	Weight on Drivers.	Weight of Tender filled.	Area of Tubes.	Area of Furnace.	Area of Grate.	Steam used at 1 revolution of Drivers.	Revolutions of Drivers per mile.	Steam used pr. mile.	Relative amount of Steam used by each engine.	Traction of engine in tons load.	Adhesion equal to tons load.	Wood space in Tender.	Water room of Tend.	Cubic feet in both Cylinders.	Tube surface to each cubic ft. of both cyl.	Fire-box surface for Do.	Area of Grate for do.	Weight on drivers for Do.	Actual weight on each driving wheel.	Actual weight on each truck wheel.
in.	in.	lbs.	lbs.	lbs.	sq. ft.	sq. ft.	sq.ft.	cub.ft.		cub. ft.		tons.	tons.	cords.	galls.		sq. ft.	sq. ft.	sq.ft.	lbs.	lbs.	lbs.
45	38				406	42	8. 0	4. 2	336	1407	5814	288		⅞	800	2.09	194	20.0	3.8			
41½	42				343	40	7. 7	5. 2	336	1759	7268	360		¾	780	2.62	131	15.3	2.9			
42	39½				368	39	6. 7	4. 2	336	1407	5814	288		⅞	908	2.09	176	18.7	3.2			
42	54				557	66	10. 8	9. 3	374	3481	14381	711		1¾	1893	4.65	120	14.2	2.3			
40	40	34460	20555		505	45	8. 7	6. 8	367	2503	10341	512	411	1½	1358	3.41	148	13.1	2.6	6027	5139	3476
40	46¾	35705	21705		527	50	8. 5	7. 0	336	2352	9716	481	434	1½	1355	3.50	150	14.4	2.4	6201	5426	3500
40	40	35805	21050		527	45	8. 7	6. 9	336	2332	9633	477	421	1½	1354	3.47	152	12.9	2.5	6066	5262	3689
37¾	48				585	52	8. 7	7. 1	336	2372	9800	485		1½	1253	3.53	166	14.7	2.5			
40	43				603	49	9. 4	7. 9	336	2658	10980	544		1½	1269	3.95	153	12.5	2.4			
40	49½	41500	26480		618	56	9. 6	7. 1	306	2179	9000	445	530	1½	1526	3.56	174	15.9	2.7	7438	6620	3755
40	44	40100	24000	28800	618	49	9. 2	9. 3	374	3481	14381	711	480	1½	1526	4.65	133	10.6	2.0	5161	6000	4025
39½	45				675	51	9. 2	7. 2	336	2412	9966	494		1⅜	1281	3.59	188	14.1	2.6			
39½	45	44507	28307		675	51	9. 2	7. 9	306	2421	10000	495	566	1⅜	1286	3.95	171	12.9	2.3	7166	7077	4050
39	50				680	57	9. 5	7. 9	306	2421	10000	495		1¼	1471	3.95	172	14.3	2.4			
39	50	43050	28000		708	56	9. 5	7. 9	306	2421	10000	459	560	1¼	1471	3.95	179	14.2	2.4	7088	7000	3762
39	47¼	41200	41200		607	52	8. 9	7. 1	420	2990	12353	612	824	1⅛	1430	3.56	171	14.5	2.5	11573		
32	38	25350	7150		358	29	4. 5	2. 4	374	881	3640	180	143	½	300	1 18	303	24.8	3.8	6059	3575	
32	38				358	29	4. 5	2. 4	374	881	3640	180		½	300	1.18	303	24.8	3.8			
39	46	44400	28000	28400	591	54	10. 0	7. 4	336	2474	10220	506	560	1⅜	1531	3.68	161	14.8	2.7	7609	7000	4100