RAILWAY GAUGES.

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The great need of this country is cheap transportation. All sections would have railway facilities if they had the money or could borrow it at a reasonable rate of interest. As the narrow-gauge will do all the business of any section of the country with a much less bonded debt, it tends to give a better security to the bonds and stock of the roads, making a better sale for the same, and in that way furnishing many feeders to our present through lines which would not otherwise be constructed, and soon connecting lines so as to make new through lines of the three-feet gauge, north and south as well as east and west. Experience has shown that in very rough mountainous countries the narrow-gauge can be built for the transportation of ores, such as gold, silver, iron, copper and other minerals in bulk, before reduced, so as to collect the same at the various smelting works, with the coal, wood and fluxes used in their reduction and manufacture for about one-fifth the cost of such roads as the Erie, Pennsylvania Central, and Baltimore and Ohio; that in the broken rolling country, where most of our roads are located, the cost will be about one-half as much as that of present broad-gauge roads; and in the slightly undulating prairie country the cost will be about three-fifths. As it is easier to raise $10,000 per mile than it is $30,000, in the same ratio is it easier to construct the narrow gauge than the broad gauge. Where the light business of a road would not justify the construction of a broad-gauge, or if one were constructed, the high rates would rather retard than stimulate development, the construction of the narrow-gauge would offer good inducements to capitalists for investment and furnish cheap transportation for the people. Comparing the cost of operating the two gauges we find that the narrow-gauge coach, weight 12,000 pounds, carries, when full, 36 passengers, with a dead weight of 12,000 divided by 36=333 pounds per passenger, while the broad gauge coach, capacity 56 passengers, weighs an average of 19 tons, giving a dead weight of 38,000 divided by 56=678 pounds, a difference of 345 pounds per head in favor of the narrow-gauge. But these coaches seldom run full, in which case the advantage will be still greater in favor of the latter. Suppose we have 38 passengers, two more than the small coach will accommodate, making it necessary to put on a second one. Here we will have two narrow-gauge coaches weighing 24,000 pounds, or 24,000 divided by 38=634 pounds per passenger, while by the broad-gauge we have 38,000 divided by 38=1,000 pounds dead weight per passenger or a difference of 366 pounds per head in favor of the narrow-gauge. Again, let us suppose that we have two narrow-gauge car loads, 72 passengers, or 16 more than can be accommodated by one broad-gauge coach, necessitating the use of a second one. The account will then stand as follows: two narrow-gauge coaches, 72 passengers, 24,000 divided by 72=333 pounds per passenger; while by the broad-gauge it will be, two coaches 76,000 divided by 72=1,055 pounds per passenger, a difference of 722 pounds per passenger, or a total of 52,000 pounds, or over 26 tons' saving in dead weight in favor of the narrow-gauge in only two cars. The dead weight per passenger on roads in Massachusetts in 1870 was 1,250 to 2,782 in New York. In New York this was exclusive of baggage, with an average of 13 passengers per car. On a large majority of roads the average dead weight is much greater. The passenger coaches, then, on the New York roads, run about one-fourth full. Assuming that our broad-gauge railways average the same number (13) per car, we have the following table:

KIND OF TRAFFIC.	Gauge.	No. of Passengers per car.	Weight of car in pounds.	Total paying load in lbs.	Dead weight of passengers in pounds.	Gross load in pounds.
Passenger....	Broad	13	38,000	1,950	2,923	39,950
	Narrow ...	13	12,009	1,950	923	13,950
			26,000		2,000	26,000

A difference of 26,000 lbs. or 13 tons, in favor of the narrow gauge, or 2,000 lbs. per head per passenger. Assuming the weight of the broad-gauge car to be only 15 tons, or 30,000 lbs., the difference in favor of the narrow-gauge cars will still be 18,000 lbs. or 1,384 lbs. per head for each passenger, as against 923 lbs. per head by the narrow-gauge. So much for passenger traffic; now let us see how the account stands with regard to freight. The average weight of the most recently constructed broad gauge cars is 20,000 lbs., capacity 20,000 lbs. The average weight of the southern broad-gauge cars is 18,500 lbs., capacity 16,000 lbs. But to make it as favorable as possible we will consider their weight to be 18,500 lbs., capacity 20,000.

GAUGE.	Freight of box cars in lbs.	Capacity of box cars in lbs.
Broad....	18,500	20,000
Narrow ...	8,000	16,000
		4,000

The average pounds of dead weight to one ton of paying freight carried on railways in Massachusetts and New York in 1870 was:

Massachusetts 3,136   New York................ 3,109

By this we see that the railways of Massachusetts and New York average only about one-sixth of their capacity. The general average of our railways will fall far short of this, especially in the agricultural districts of the South, West and Northwest.

In transporting way-freight the narrow-gauge cars have still greater advantages as is shown by the following table:

GAUGE.	No. of cars to carry Shipment.	TONS.										
		1	2	3	4	5	6	7	8	9	10	11
		DEAD WEIGHTS.										
Br'd	1	18,500	9,250	6,166	4,625	3,700	3,083	2,642	2,312	2,055	1,850	.....
"	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,363
Narr.	1	8,000	4,000	2,666	2,000	1,600	1,333	1,142	1,000	.....	.....	.....
"	2	.....	.....	.....	.....	.....	.....	.....	.....	1,777	1,600	1,454
*	...	10,500	5,250	3,500	2,625	2,100	1,750	1,500	1,312	278	250	1,909

This table shows that if it is necessary to drop cars with 9 tons of freight, at a way-station—this being an amount which is one ton over a car load for the narrow guage, and which renders necessary the use of two cars at the utmost disadvantage—the dead weight is even then only 1,777 lbs. per ton, and still 278 lbs. less than the broad-gauge. As to wear and tear, if we assume that the repairs of machinery and rolling stock are in direct ratio to their cost, the reduction for the narrow-gauge would be about 50 per cent., which is the difference in the first cost. Narrow-gauge locomotives weigh from 6 to 18 tons, depending upon the nature of the service they have to perform. The following table gives the principal dimensions and weights of various patterns and sizes of narrow-gauge locomotives, together with the loads they will haul on a straight track in good condition:

*Difference in favor of narrow-guage.

DIMENSIONS, WEIGHTS AND LOADS OF NARROW-GAUGE LOCOMOTIVES.

Kind of Locomotive.	Cylinders.		Diameter of Driving Wheel.	Weight in Working Order.			Load in Gross, Cars and Lading.			
	Diameter.	Stroke.		Total.	On Drivers.	On each pair of Drivers.	On a Level.	On a 40 ft. grade.	On an 80 ft. grade.	On a 100 ft. grade.
Class 1. Four wheels, connected tank locomotive.	9	12	30	18,000	18,000	9,000	390	120	70	55
	9	16	36	22,000	22,000	11,000	490	150	85	70
	10	16	36 to 40	26,000	26,000	13,000	590	180	105	85
Class 2. Four wheels, connected with separate tender.	9	12	30	16,000	16,000	8,000	385	115	65	50
	9	16	36	20,000	20,000	10,000	480	140	75	60
	10	16	36 to 40	24,000	24,000	12,000	580	170	95	75
Class 3. Six wheels, connected tank locomotive.	10	16	36	28,000	28,000	9,333	615	185	105	85
	11	16	36	33,000	33,000	11,000	740	225	130	105
	12	16	36 to 40	38,000	38,000	12,666	860	265	150	125
Class 4. Six wheels, connected with separate tender.	10	16	36	25,000	25,000	8,333	505	175	95	75
	11	16	36	30,000	30,000	10,000	730	215	120	95
	12	16	36 to 40	35,000	35,000	11,666	850	255	140	115

As the weight on each wheel and the momentum with which the wheels strike irregularities in the track affect the "wear and tear," we give the following data for the two gauges:

WEIGHT ON WHEELS—THEIR MOMENTUM.

[Passenger trains—Speed 25 miles per hour.]

	Five Feet Gauge.		Three Feet Gauge.	
	Weight on single wheel Pounds.	Momentum. Pounds.	Weight on single wheel Pounds.	Momemtum. Pounds.
Engine driver	8,000	288,000	6,250	225,000
Engine truck	5,000	180,000	2,500	90,000
Tender	7,650	174,000	3,500	126,000
Baggage car	4,000	144,000	3,000	108,000
Passenger car	4,760	171,360	1,780	64,080

The ends of the rails are beaten to pieces, the surface abraded, the ties splintered, the fibre of the wood cut under the iron, weak joints rapidly made worse, so that each succeeding wheel falls with an increasing force upon the ends of the yielding rails by the tremendous forces developed by the passage of these enormous weights at high speed. The lightest broad-gauge coach weighs about 16 tons, or 32,000 lbs. empty, and hammers the rail joints with 4,000 lbs. on each wheel. When loaded and driven over the rails at 25 or 30 miles per hour, the weight of the blow is enormous and terribly destructive to the superstructure, crushing out the best rail in five or six years. The passenger car of a three-feet gauge would only hammer the rail with 1,500 lbs. per wheel. The same applies to locomotives. A 30-ton locomotive, and its loaded tender, weighing about 14 tons, or a total of 57 tons, will exert a pressure of nearly six tons on each driving wheel. When driven at a high speed, the strain upon the track is terribly destructive. The "Fairlie" engine, constructed for narrow-gauge lines, bears its whole load, including wood and water, on the driving wheels, thus utilizing the whole weight in the work of hauling the train. Instead of an engine carrying 57 to 50 tons to obtain the power of 20 tons, we have an engine weighing 20 tons and no more; and this load distributed over eight wheels, with a pressure of 2 1-2 tons per wheel, instead of 6 tons, as with the broad-gauge. The action upon the rolling stock is the same as upon the track. The wheel receives a blow of precisely the same weight as that administered to the rail at a low joint, and the shock is transmitted to the axles except what is taken up by the springs and the yielding of the parts of the whole structure of the engine or car. The saving of dead weight is so much saved from the grand total of this destructive agency; and by the reduced weight upon each wheel, no single blow of such enormous forces can be given on the narrow gauge.

Can narrow-gauge locomotives be constructed of sufficient power and speed to answer the general requirements? They can, as daily experience testifies. The locomotives of the Denver and Rio Grande Railway, freight and passenger, are giving entire satisfaction both as to speed and power. By adopting the proper form of construction, the engines can have sufficient power to handle any number of cars that can be prudently and economically run together in one train, and such a train can be handled with as much safety as on the broad-gauge; while the proportion of dead weight being much less, the same number of train men will handle more tons of paying freight, when worked up to the same tonnage. There is no difficulty in making as fast time as the great majority of the broad-gauge roads make, which is all the public demands.

The first class narrow-gauge coaches on the Denver and Rio Grande Railway are 40 ft. long over all, 7 ft. wide inside, 7 ft. 6 in. high, with two 4-wheel trucks, wheels 24 in. in diameter, weight 12,000 lbs. and carry 36 passengers. The sills are only 27 in. above the rails, making the center of gravity very low; hence the cars ride exceedingly steady and with less lateral or oscillating motion than is usually observable upon the broad-gauge. The seats are arranged, double on one side and single on the other, one-half the length of the car having the double seat on the right, and the other half having them on the left, so as to distribute the weight equally. The single seats are 19 in. wide or long; the double, 36 in.; the aisle 17 in. If found desirable the width of the car can be increased to 8 ft., making the single seat 22 in., the double, 39 in., and the aisle 23 in. These cars, finished in the best style, furnish every comfort of a first-class coach. Sleeping coaches with a single berth on each side, can be constructed so as to be as comfortable as those now in use.

The freight cars of the Denver and Rio Grande Railway carry 9 of the largest cattle in a car weighing less than 8,000 lbs., while the broad-gauge cars carry only 14 of the same class in a car weighing from 18,000 lbs. to 20,000 lbs. The stock cars have 4-wheeled trucks, are 24 feet long, the door being at the side, but near the end instead of the center, and on the opposite side of the other end. For heavy and valuable cattle, they have two gates in the car (which when not in use are folded back against the side of the car), which makes three rooms 6x8ft., into which they put three head of stock, each, giving a space of 2x8ft. to each head. The broad-gauge puts 14 head of the same cattle into a 28ft. car, which gives the Denver and Rio Grande and other narrow-gauge cars the same floor room that the broad-gauge cars, have and with much less dead weight.

COMPARATIVE DEAD WEIGHT IN THE TRANSPORTATION OF CATTLE BY THE TWO GAUGES.

GAUGE.	Weight of cars in lbs.	No. cattle per car.	Weight of cattle in lbs.	Gross weight of loaded cars.	Total weight per head.
Broad	18,000	14	19,600	37,600	1,285
Narrow...	8,000	9	12,600	20,600	888
Dead weight in favor of narrow gauge					397

A difference of 397 lbs. per head, 3,573 lbs. per car load of 9 head, and, in a train of 20 cars, 71,460 lbs. or 35 tons in favor of the narrow-gauge. As so many are not put together in the latter, the danger of the cattle getting down is much less, while they can be fed and attended to much better.

COMPARATIVE COST OF TRANSPORTATION.

The average cost of transporting freight by the broad-gauge may be estimated at 1 1-2 cents per ton per mile, and on the narrow-gauge one cent. Estimating the cotton crop of the south at 4,000,000 bales, transported on an average 200 miles, the narrow-gauge would effect a saving of $4,000,000 per annum to the producers; a sum sufficient to build 400 miles of narrow-gauge railway at $10,000 per mile. The East India Company, looking to the extension of the cotton culture in their territory, have projected 10,000 miles of narrow-gauge railway, and that, too, in a country far more densely populated than ours, and offering a large general business. They are, besides, changing their broad to narrow-gauge. Break of gauge is an evil, but not so great as generally supposed. The time of transferring freight need be very little, if any, greater than is now necessarily consumed in the inspection and repair of cars at intermediate points, which are sent over long lines. In Great Britain the cost of transferring freight is about 2 pence per ton. In Canada 5 cents per ton. The cost will be heaviest upon through freight, which has to be changed at each end of a line, at a cost of 5 cents per ton, or a charge of 10 cents per ton total. As the average cost of transporting freight by the broad-gauge is 1 1-2 cents, one ton transported 200 miles would cost $3.00. But, as is seen by the following table, there is a saving of 25 per cent. in actual working expenses. A saving of 25 per cent. on $3.00 would be 75 cents, so that an expense of 10 cents per ton may be incurred in transferring freight, and still leave a balance in favor of the narrow-gauge, or shipper, of 65 cents per ton, $6.50 per car load of 10 tons, or $162.50 for a train of 25 cars.

CLASSIFICATION OF EXPENSES.

	Percentage of whole operating expenses.	Percentage saved by Nar. Gauge.
MAINTENANCE OF ROADWAY—		
Repairs road-beds	.166	.055
Cost of iron for renewals	.129	.065
Repairs, building fences, etc.	.037	......
Taxes	.038	......
Repairs of machinery and cars	.20	.070
OPERATING—		
Office expenses, agencies and employes on trains and at stations	.123	......
Fuel, oil and waste	.125	.041
Loss and damages to goods and persons	......	......
General superintendence, etc	.030	......
Contingencies	.052	.017
Total	... .	.248

In Norway, railways of the 4 ft. 8½ in. and of the 3 ft. 6 in. gauges have been constructed by the same engineers, and worked by the same manager for the government, and the following is the result of six years' experience:

	Gauge, 4 ft. 8½in.	Gauge, 3 ft. 6 in.	Difference in favor of Narrow Gauge.
Cost of construction per mile	$26,343	$17,143	$9,200
Receipts per mile (alike)	27,600	27,600	....
Maintenance per mile	7,173	6,555	608
Locomotive expenses per mile	9,426	5,760	3,666

Mr. Millington, Chief Engineer of the Memphis and Knoxville Railroad, has made a careful estimate of the comparative cost of building 30 miles of the track extending from Memphis to Macon, with 3 feet and 5 feet gauges. The surface of the country is undulating,—in places rolling and broken, but with no serious obstacle to the construction of a first-class road at the average cost per mile of Southern roads. No gradients steeper than 66 feet per mile, and this only for short distances. No curves less than 1,146 feet radius, and none of this radius on steeper grades than 46 feet per mile. Grading all earthwork and easy to handle. The average haul about 400 feet. One girder-bridge of three 50 feet spans. The piers, piling. In consequence of the soil being very liable to wash during heavy rains, piling is used in preference to trestling, for which safe foundations would in so.ne places be difficult to obtain. Weight of rail, 30 lbs. per yard for narrow-gauge, and 60 lbs. for broad-gauge.

GAUGE, FIVE FEET.

COST OF ROADBED.

664	stations, clearing and grubbing, at $9.00 per station		$5,976 00	....
461,150	cubic yards earth excavation, at 30 cents per cubic yard		138,345 00	....
150	lineal feet girder bridge, $12.00 per lineal foot		1,800 00	....
5,665	lineal feet piling and trestling, at $7.50 per lineal foot		42,412 50	....
41,520	cubic feet timber, log culverts, 3½ cents per cubic foot		1,453 20	....
36,950	cubic feet timber in cattle-guards, roads, etc, at 3 cents per cubic foot		1,108 50	....
9,860	feet, board measure, plank in ditto, at 3 cents per foot, board measure		295 80	....
	Laying 30 miles of track, at $500 per mile		15,000 00	....
			$206,391 00	
79,200	cross-ties, at 40 cents each	$31,680 00	....	....
	Engineering, right of way, salaries, office expenses, stationery, incidentals	10,000 00	....	....
			41,680 00	....
				$248,071 00

COST OF SUPERSTRUCTURE.

3,168	tons of rails (60 lbs. per yard), at $90.00 per ton	$285,120 00	....
12,000	joint fastenings, at $1.00 each	12,000 00	....
165,000	pounds spikes, at 5 cents per pound	8,250 00	....
			$305,370 00
	Total for roadbed and superstructure	....	$553,441 00

Cost per mile for road-bed	$8,269 00
Cost per mile for superstructure	10,179 00
Cost per mile for roadbed and superstructure	$18,448 00

THREE-FEET GAUGE.

COST OF ROADBED.

589	stations, clearing and grubbing, at $9.00 per station	$5,361 00	....
244,200	cubic yards earth excavation, at 30 cts. per cubic yard	73,260 00	....
150	lineal feet girder bridge, at $12 per lineal foot	1,800 00	....
5,655	lineal feet piling and trestling at $6 per lineal foot	33,930 00	....
29,580	cubic feet timber, in log culverts, at 33 cents per cubic foot	887 40	....
23,400	cubic feet timber in cattle-yards and road-crossings at 3 cts per cubic foot	702 00	....
6,020	feet, board measure, planks in ditto, at 3 cents per foot, board measure	198 00	....
	laying thirty miles of track at $375 per mile	11,250 00	....
		$127,329 00	
79,200	cross-ties at 30 cents each... $23,760	....	....
	engineering, right of way, salaries, office expenses, stationery and incidentals 10,000		
		33,760 00	....
			$161,089 00

COST OE SUPERSTRUCTURE.

1,584	tons of rails (30 lbs per yard), at $95 per ton	$150,480 00	....
10,500	joints fastenings at 80 cents each	8,400 00	....
105,609	pounds spikes at 6 cents per lb	6,336 00	....
			$165,216 00
	Total for roadbed and superstructure		$326,305 00

Cost per mile for road-bed	$5,369 63
Cost per mile for superstructure	5,507 20
Total cost per mile for road-bed and superstructure.	$10,876 83

RECAPITULATION.

Distance.	Gauge.	Cost of preparing road-bed for rails	Cost of superstructure.	Cost of road-bed and superstructure.	Cost per Mile.		
					Road-bed.	Superstructure.	Total.
M	F.						
30	5	$248,071 00	$305,370 00	$553,441 00	$8,269 00	$10,179 00	$18,448 00
30	3	161,089 00	165,216 00	326,305 00	5,369 63	5,507 20	10,876 83
*	..	$86,982 00	$140,154 00	$227,136 00	$2,899 37	$4,671 80	$7,571 17

Making a saving in favor of the narrow-gauge on the cost of preparing the road bed, 35 per cent.; on the cost of superstructure, 46 per cent.; on the roadbed and superstructure, 41 per cent. We have the following estimates of cost of two Canada roads, guage 3 ft. 6 in.:

TORONTO, GRAY AND BOUCE.

Western Junction to Orangeville, 41 *Miles*.

	Total.	Per mile.
Grading, fencing, ties, bridges and culverts	$196,595	$4,795
Rails and fastenings	181,015	4,415
Track-laying and ballasting	67,770	1,653
Station buildings	24,407	595
Right of way	24,600	600
Telegraph	1,640	40
Engineering	23,370	570
Commissions, officers, directors' fees, etc.	15,469	377
Law expenses	3,936	96
Sundries	2,000	49
	$540,802	$13,190
Rolling stock	105,960	2,560
Total cost	$646,762	$15,750

* Difference in favor of narrow-gauge.

TORONTO AND NEPISSING.

Scarboro Junction to Uxbridge, 32 *Miles*.

	Total.	Per mile.
Grading, fencing, ties, bridges and culverts	$151,307	$4,725
Rails and fastenings	139,041	4,345
Track-laying and ballasting	46,696	1,460
Station building	15,012	470
Right of way	22,092	690
Telegraph	1,500	47
Engineering	14,110	441
Commissions, officers and directors' fees	10,292	321
Law expenses	936	30
Sundries	615	20
	$401,601	$12,549
Rolling stock	101,588	3,175
Total cost	$503,189	$15,724

By which we see that the Toronto, Gray and Bouce Railway has cost $13,190 per mile, exclusive of rolling-stock; and including rolling-stock $15,750 per mile. The earthwork averages 10,500 cubic yards per mile. The line is fenced throughout, at a cost of $800 per mile. The grubbing amounts to an average of one-half an acre per mile; the clearing to three acres per mile; slashing on each side of the railway to the entent of four acres per mile has also been done, the grubbing, clearing and slashing having together cost $140 per mile. The ties have cost an average of 25 cents or $500.

The Toronto and Nepissing Railway has cost $12,549 per mile, exclusive of rolling stock, or including rolling-stock, $15,724 per mile. The earth-work has averaged 9,750 cubic yards per mile. The line is fenced throughout at a cost of $700 per mile. The ties have cost $480 per mile on this section, and the grubbing, clearing and slashing, $140 per mile.

Upon the authority of Col. W. W. Nevin, who is connected with the management of the Mexico National Railway

Company, I give the following statistics in regard to Narrow-Gauge.

IN THE UNITED STATES.

Name.	Miles Built.	Total Length.
Denver and Rio Grande	156	870
Cairo and St. Louis	92	150
Utah Northern	70	160
Kansas Central	65	560
Arkansas Central	64	150
Colorado Central (N. G. Division)	42	237
North and South of Georgia	35	130
Montrose	27	27
Ripley	26	36
At Johnston (private)	25	25
Cherokee, Alabama	23	45
Iowa, Eastern	20	183
Milwaukee and Des Moines	20	380
American Fork (Utah)	18	22
Peoche (Nevada	18	18
Central Valley	12	12
East Broadtop	12	30
Mineral Range, Michigan	12½	100
Wasatch and Jordan Valley	12	16
Pittsburgh and Cattle Shannon	8	8
Bell's Gap	8½	40
Peekskill Valley	7	7
Summit County, Utah	8½	30
Tuskegee	5½	30
Louisville, Harrod's Creek and Westport	5	28
Painesville and Youngstown	12	65
Baltimore, Swan Lake and Lowsontown	6½	6½
Peachbottom	5	60
Bingham Cannon and Salt Lake	20	20
Ceredo Mineral, W. Va	12	20
Cheraw and Salisbury	11	80
Lawrence and Evergreen	5	5
Echo and Coalville, Utah	9	9
Natchez, Jackson and Columbus	6	260
Galena and Southern Wisconsin	30	150
	908½	3,889½
The following were to have completed additional mileage by January, 1874:		
Cairo and St. Louis	52	....
Des Moines and Minnesota	17	....
Parker's Landing and Kansas City	18	....
	1,007½	

IN THE CANADAS.

Name.	Miles. built.	Total length
Toronto, Gray and Bouce	199	200
Toronto and Mississippi	87	218
New Brunswick	70	170
Prince Edward's Island	90	203
	446	791

The following list is given of

ROADS ACTUALLY UNDER CONSTRUCTION.

Name.	Under construction.	Total. length.
Florida, Memphis and Columbia	120	260
Lexington, Lake and Gulf	170	170
Wyandotte, Kansas City and Northwestern	50	250
Cairo and Tennessee River (under construction in Duck River Valley, Ala.)	75	100
South Branch (W. Va.)	26	51
Cheraw and Salisbury	15	80
Nashville and Vicksburg	26	470
Bambridge, Cuthbert and Columbus	20	140
California Central	150	465
Des Moines and Sioux City	20	180
Salt Lake, Sevier Valley and Pioche	25	300
Alameda, Oakland and Piedmont	60	60
St. Louis and Manchester	8½	30
Juan, San Pete and Sevier	10	75
Washington, St. Louis and Cincinnati	65	950
Greenville and Paint Rock	5	22
Stockton and Ione (California)	36	36
St. Louis and Western	100	315
Denver and Rio Grande ....miles graded.	50	....
Utah Northern ....do.	90	....
Arkansas Central ....do.	86	....
North and South of Georgia ....do.	60	....
Summit County (Utah) ....do.	3½	....
Peachbottom ....do.	45	....
Ceredo Mineral (W. Virginia) ....do.	6	....
Natchez, Jackson and Columbus ....do.	14	....

The following

PROJECTED ROADS

Are organized and more or less under way:

North Pacific Coast	250
Big Sandy Valley	137
People's Narrow Gauge, of Iowa	170
Minneapolis, Rochester and La Crescent	140
St. Louis and St. Charles	14
Holly Springs, Brownsville and Ohio (being graded)	..
Long Island Narrow Gauge	..
Toledo and Maumee	..
Northern and Southern Narrow Gauge, N. C	..
St. Louis and Florissant	16
The South Park Railway, Col	260
Tennessee Central	..
Memphis and Raleigh	..

From which we see that the total length of projected narrow-gauge roads in the United States is 3,889 1-2 miles, and in the Canadas 791, making a total of 4,680 1-2. Of this there are completed 1,354 1-2 miles; 908 1-2 in the United States, and 446 in Canada.

Wherever the narrow-gauge has been adopted it has proven a success—in Norway, Sweden, Denmark, Russia, India, Great Britain, Canada, United States and other places. Costing about one-half as much as the broad-gauge, many sections of the country now waiting for railway facilities for development can afford to build them at once, and thus prepare a market for their produce. Their first cost being small, their operating expenses and maintenance light, they will prove paying investments in almost any part of this country. For the reasons enumerated, I would recommend the narrow-gauge of three feet for general adoption.