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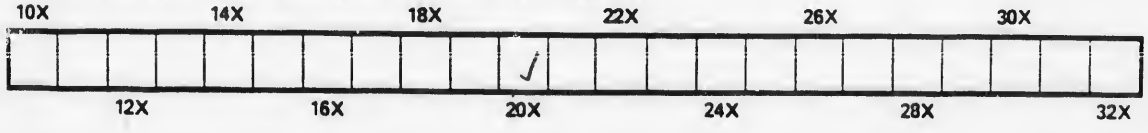

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Narrow Gauge Railways

IN AMERICA:

EMBRACING

A SKETCH OF THE RISE, PROGRESS AND SUCCESS

OF THE NEW SYSTEM, AND

VALUABLE STATISTICS AS TO GRADES, CURVES, WEIGHT OF RAIL, LOCOMOTIVES, CARS, ETC.

ALSO, A

DIRECTORY OF NARROW GAUGE RAILWAYS

IN NORTH AMERICA.

BY

HOWARD FLEMING.

ILLUSTRATED.

LANCASTER, PA.
INQUIRER PRINTING AND PUBLISHING COMPANY.
1875.

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INTRODUCTORY.

Every new innovation has its advocates and adversaries, and the narrow gauge railway has not been exempt in this particular. Notwithstanding that the opposition was intense to the narrow gauge railway of forty years ago, it has now become the broad gauge or standard of to-day, and has assumed in its turn an antagonistic attitude to the narrow gauge railway of the present time. A fiercer contest has been waged during the last decade over the question of gauge, protracted and bloodless though it has been, than many a sanguinary struggle. The wordy warfare has been carried on through pamphlets and the columns of the newspapers, until if gathered together they would almost assume the proportions of the writings of Swedenborg. Although so much has been written about the narrow gauge railway, no book has been issued to show what has been accomplished and what is still being carried on.

The object of the compiler in submitting this brochure to the public and railroad fraternity, is to give results and facts as far as practicable, as the majority of either party have little or no conception of the progress made by this new system that has so recently been placed in practice.

In preparing this work the author has indulged in no high conclusions or false deductions, neither does he argue that the present standard gauge railroads should be converted into narrow ones, except in some instances; but he does insist that it is more profitable to construct a narrow gauge well, than build a broad gauge badly, and that it is better to have a railway that can carry with equal facility to a market either live stock, agricultural produce, mineral product or general freight, and that can be built for a moderate cost, than to be without any

means of transportation, or be waiting until a broad gauge railway will be able to be supported.

It is to be regretted that so many of the railways do not furnish an exhibit of their gross earnings and operating expenses, and also refrain from publishing a financial statement, as it is believed that their publication does more real good for a railway company than resolute silence. It is to be hoped, therefore, that when a revision of this work takes place, into which doubtless unavoidable errors have crept, narrow gauge railways will transmit this most requisite information.

The compiler acknowledges his indebtedness for much valuable data received from the officers of the several Narrow Gauge Railway Companies enumerated in this work; also, from the following Locomotive and Rolling Stock Construction Companies: The Baldwin Locomotive Works of Philadelphia, Messrs. Porter, Bell & Co. of Pittsburg, Messrs. Jackson & Sharp, of Wilmington, Del., and Messrs. Billmeyer & Smalls, of York, Pa.

H. F.

Philadelphia, January, 1875,
216 *South Fourth Street.*

NARROW GAUGE RAILWAYS.

THEIR ORIGIN AND GROWTH—THE FESTINIOG LINE —ARGUMENTS IN THEIR FAVOR—PROGRESS IN THE UNITED STATES.

During the early history of railways in England, a great controversy arose among engineers as to the best gauge to be adopted. Two eminent engineers, the greatest of the time, Brunel and Stephenson, took opposite sides, and divided the profession into two hostile factions, who carried on with much energy and some acerbity of feeling what was called "the war of the gauges." The Brunels advocated the Broad Gauge, and the Stephensons became the champions of the Narrow. The former gave to the Great Western line the seven foot gauge: the latter to the Liverpool and Manchester, and numerous other lines, the four feet eight and a-half inch, or narrow gauge of the period.

This controversy lasted twenty years, and every argument that skill and ingenuity could invent was brought into requisition. Volumes were written to prove what after all had to be determined by experience. Like most controversies, this one at last came to an end under the accumulated evidence of years, leaving the narrow gauge the victor—the victory having been made decisive by the conversion of Brunel's Great Western Broad Gauge Railway to the present "standard" of four feet eight and a-half inches throughout the entire line during 1874; and in America and Canada, where a broad gauge of six feet and five feet six inches had been adopted in some instances, such as the Ohio & Mississippi, and the Grand Trunk, the track has been narrowed to four feet eight and

a half inches at great expense—experience having proven that the original gauge was too wide for the traffic, and that to use the words of a celebrated engineer, the machinery and rolling stock had been built to haul and transport a gallon when they did not have more than a quart to carry. That a six feet gauge is too wide, is demonstrated by the report of Captain Tyler on the Erie Railway, in which he recommends it to be narrowed, even though the estimated cost of effecting it amounts to $8,500,000. Further, a practical financier has stated that, "you could not raise a dollar in the United States to-day, to build a road of wider gauge than four feet eight and a-half inches."

Stephenson's gauge was the result of accident or unexplained cause, as when the parts of the first locomotive were put together, it was found to fit a gauge of four feet eight and a-half inches, instead of four feet nine inches, as was intended, and which was then the distance between the wheels of ordinary vehicles in England. With few exceptions, this gauge has been adhered to ever since. No one asked the question until a few years ago—Why was the present standard gauge chosen, and why will not a narrower one answer all purposes? Man is an imitative creature, and England, the birthplace of the railway, inhabited principally by a race of conservative men, has now in consequence a railway system of 16,082 miles built on the four feet eight and a-half inch gauge. Although only 268 miles, according to the English Board of Trade returns, were constructed during 1873, yet Capt. Tyler, in his report, considers that the railway system is far from complete, and that many hundred miles will have to be built to give the benefit of railway communication to outlying districts. The aggregate length of railways authorized by Parliament during the years 1870, 1871, 1872 and 1873, and not yet constructed, alone amounts to more than 1800 miles. The question that naturally suggests itself is, why were not these railways built? The answer is, because the lines of route are not able to support a gauge costing on the average $175,000 per mile, and because capitalists are aware of the fact that one-seventh of the amount invested in English railroad shares pays no dividend.

This knowledge should cause the construction of the above required mileage of the narrow gauge of to-day, which, as will be hereafter shown, is built and equipped for a much more moderate figure. It would be absurd to advance, still more to sustain an argument for the conversion of the *present English system* to a narrower gauge; and yet in the light of evidence, we cannot deny that a vast economy would have been made, had two-thirds of its present mileage been constructed either of the Canadian gauge of three feet six inches, the South American metre gauge of three feet three inches, or the United States standard narrow gauge of three feet; it being fully able and more than sufficient to meet all the demands of traffic *now*, and how much more when first constructed, and when the business had not attained its present proportions!

The world-famed and initial narrow gauge railway, the Festiniog, in North Wales, was originally constructed in 1832, as a horse tramway, to carry slate fro 1 the quarries to a shipping point at Portmadoc, it was made nominally of a two feet gauge, the exact gauge being half an inch less than that. This state of affairs continued until 1863, when on the recommendation of Mr. C. E. Spooner, the engineer of the line, locomotive power was adopted. The two locomotives built for the line by Messrs. G. England & Co., in 1863, are four-wheeled engines, the wheels being two feet in diameter and coupled. The wheel base is five feet and the cylinders which are outside are eight inches in diameter, with twelve inch stroke. The weight of these engines, in working order, is eight tons. Subsequently Messrs. England built five other engines of a similar class, two of them, however, being heavier, and weighing ten tons in working order. The year 1869 was marked by the introduction of the Fairlie engine on the Festiniog Railway, and the results which have since been obtained, show that Mr. Spooner exercised sound judgment in recommending the adoption of this system. The Fairlie engine, "Little Wonder," was built by Mr. Fairlie at the Hatcham Works, and is mounted on two steam bogies, each bogie having four coupled wheels two feet four inches in diameter. The wheel base of each bogie is five feet, and the total wheel base of

the engine nineteen feet, while the weight in working order is nineteen and a half tons. Each bogie has a pair of cylinders $8\frac{3}{16}$ inch in diameter, with thirteen inch stroke. In ordinary work this engine will take up a train, the total gross weight, inclusive of engine, being 127½ tons, of which about twenty-one tons will be passengers and goods carried. On the down journey when the slate trucks are loaded and the goods wagons empty, the total weight of engine and train is about 336½ tons, of which 230 tons are paying load.

Imperial princes and Royal Commissions from Russia, France, Italy, Spain, Norway and Germany, together with engineers from the United States, Brazil, "and the uttermost parts of the earth," have wended their way to the Welsh hills to behold and investigate and criticise this minature iron road. The novelty was so enduring at first that scarcely a week elapsed without self-appointed inquisitors presenting themselves before the chief engineer and manager of the line, Mr. Spooner, until at last he began to wonder whether he acted in that capacity or as a showman.

It may not be inopportune here to present the following abstract from the report for 1873 of the Festiniog Railway, according to the returns of the British Board of Trade:

Length of road, single track, 23½ inch gauge, 14 miles.

Capital cost.

Paid up common stock (4% dividend in 1873)	$430,930
Preferred stock (5% dividend in 1873)	175,000
Loans (bearing 5 % interest)	60,000
Total cost ($47,566 per mile)	$665,930

Besides dividends and interest charges, the company paid in 1873, $6,760 for "way leave," and $1,355 for rent of lands, and adding this to the interest and dividends we have $37,102, which is $\frac{5}{57}$ per cent. of the cost of the road.

The number of passengers carried and receipts therefrom were:

	NUMBER.	RECEIPTS.
First Class	4,495	$1,950
Second Class	3,562	1,220
Third Class	120,577	17,790
	128,634	$20,960

The tons of freight carried were:

	TONS.	RECEIPTS.
Minerals	124,830	$80,860
General Merchandise	18,845	17,800
	143,675	$98,660
Freight and Passenger Earnings		$119,620
From other sources		2,915
Total Earnings		$122,535
Working Expenses (59 63 per cent)		73,070
Net Receipts		$49,465

The enthusiasm provoked by the Festiniog Railway, and the various papers issued by Robert F. Fairlie, especially those read before the British Association in 1870 and 1871, on "The Gauge for the Railways of the Future," and "Railway Gauges," has not been without effect.

On the Continent of Europe, narrow gauge railways are in successful operation in Belgium, France, Italy, Switzerland, Austria, Russia, Norway and Germany.

In India there are some 500 miles of the metre gauge being worked, and a considerable amount under construction. The last act, however, of the Secretary of State for India, reflects little credit upon him as a statesman, in that he has reversed the wise policy initiated by the late lamented Earl of Mayo, in respect to the question of the gauge of the lines to be hereafter constructed in India. We cannot but think that this decision will be reconsidered, in view of the report of the Government Director before us.

The total investment in Indian Railways is about £100,000,000 ($500,000,000), the interest being guaranteed by the British Government on the 5,872 miles of railroad completed, which have cost on an average about $82,500 per mile.

The net earnings in 1873 were less than £3,200,000 ($16,000,000), without this guarantee, therefore, the investment would be very unsatisfactory—indeed it would never have been made; and yet where the traffic grows very slowly, a gauge of five feet six inches, with its attendant heavy expenses, is persisted in to the detriment of the British Government, financially.

Were the Indian Railroad system constructed on the metre gauge it is altogether probable that it would have been much more profitable.

In Australia and New Zealand, the narrow gauge is represented by such lines as the Queensland Railway, and the Dunedin and Port Chalmers Railway, and others.

In South America, the Argentine Confederation, the Republics on the River Plata, the Brazils and Peru, narrow gauge railways are in operation, under construction or projected. In Mexico a short line is in very successful operation.

Of the system of narrow gauge railways in Canada, New Brunswick and British possessions, in North America, we shall speak more at length, further on.

It has been reserved to the United States to carry out most fully this new departure, which originated, over forty years ago, at a secluded spot in North Wales. The object of the author is to give now the history of the rise, progress and success of the narrow gauge railway in America. No such record has yet been published. By issuing it, it is hoped to cement the relations of narrow gauge railways the one to the other, and to exhibit, in a connected form, the work done in the field and that is being still carried on. Poor's Manual of U. S. Railroads does not speak, in its preface, of the narrow gauge railways or the new system that is being introdnced, and which is rapidly gaining grand proportions. Vernon's Railroad Manual likewise is silent, in its editorial and prefatory remarks on the railroads of the United States and Dominion of Canada, in this particular; so that it behooves us, as advocates and successful demonstrators, to give to the world the results obtained since the first narrow gauge passenger railway ran its first train in America.

Before enumerating and giving a short sketch, as far as practicable, of the narrow gauge railways, a resumé of the arguments urged in their favor may not be out of place:

First. The cost of constructing a railway is nearly as the width of its gauge; in very rough countries the narrow gauge will be greatly less than the proportion to its width, whilst in flat, level ground the proportion will be more; but taking the

average (excluding rolling stock, fencing, stations and telegraphs) the cost will be found to vary as the gauge.

Second. Every inch added to the width of a gauge, beyond what is absolutely necessary for the traffic, adds to the cost of construction, increases the proportion of dead weight, increases the cost of working, and in consequence, increases the tariffs to that extent, and by that much reduces the useful effect of the railway.

Third. The dead weight of trains, conveying either passengers or goods, is in direct proportion to the gauge on which they run; or in other words, the proportion of non-paying to paying weight (as far as this is independent of management) is increased exactly as the rails are farther apart; because a ton of materials disposed upon a narrow gauge is stronger, as regards its carrying power, than the same weight when spread out over a wider basis. In proof of this we need only cite the case of the Festiniog Railway. The wagons used upon it, for carrying timber, weigh only 12cwt., and they frequently carry a load of over 3½ tons at a speed of twelve miles an hour. In other words, these wagons carry as much as six times their own weight, whilst the best wagons on the ordinary English gauge do not carry as much as twice their own weight.

On the Denver and Rio Grande the freight cars weigh less than three tons, and carry a paying load of eight tons, being nearly three times their own weight, whilst on American standard roads it is generally one to one.

Fourth. A saving, in first cost of construction, equal to 33 per cent., is effected, owing to the flexibility of the gauge, in allowing the road to be built so as to follow very closely the natural contour of the country, and to the reduction in graduation, bridging and superstructure. As a comparison of cost, we may take the Denver extension of the Kansas Pacific Railway, built under the same engineering supervision as the Denver and Rio Grande; the character of work on the two roads being much the same, though that of the D. & R. G. is somewhat the heaviest. The Kansas Pacific uses a rail weighing fifty-six pounds per yard; the Denver and Rio Grande using rail weighing thirty pounds per yard. Kansas Pacific

cost, per mile, with equipment, $23,500. Denver and Rio Grande cost, per mile, with equipment, $13,500.

Messrs. F. E. Canda & Co., railroad contractors of very wide experience, lately favored an inquirer with the following estimates of the probable cost of a narrow gauge road over a prairie country like that around Chicago. This estimate has a basis of positive knowledge acquired in building the Cairo & St. Louis narrow gauge railway:

COST PER MILE—THREE FEET GAUGE.

Grading	$2,200
Iron (30 lbs. to the yard)	4,080
Fish plates, fastenings, etc.	435
Cross ties (2,640)	800
Bridging and Culverts	400
Track-laying and surfacing	400
Engineering	250
Right of Way	300
Station Houses, Water Stations, etc	375
Sundries	280
	$9,520

ROLLING STOCK.

For a road 100 miles in length, doing a coal traffic as well as general freight and passenger business, the following would be a fair equipment:

12	Freight locomotives	$8,000	$96,000
4	Passenger locomotives	7,000	28,000
300	Coal cars	450	135,000
70	Flat cars	420	29,400
100	Box cars	520	52,000
10	Passenger cars	3 000	30,000
3	Passenger cars, second-class	1,500	4,500
3	Baggage cars	1,400	4,200
			$379,100

Or $3,791 per mile.

If a forty pound rail were used, the cost would be about $1200 per mile more than the above estimate, but where the grades are not steep, or the traffic especially heavy, a thirty pound rail is deemed quite sufficient.

Comparing these figures with a standard gauge road running out of Chicago, say the Chicago, Burlington & Quincy, the first cost of which we believe was about $20,000 per mile, (owing to the accounts being destroyed by the great fire of

October 9, 1871, the actual sum cannot be stated,) a saving is effected through the adoption of the narrow gauge of about $7,000 per mile.

About these proportions may be expected to hold good in any country not mountainous. In rough country it reaches 50 per cent., and in mountainous regions it amounts often to a difference between entire practicability and impossibility, as between the two gauges.

Mr. T. E. Sickles, writing of the section of the Colorado Central Railway that passes through Clear Creek Cañon, says: "On this 13½ miles the creek falls 1,700 feet. The cost of grading a road bed through the cañon for a four feet eight and one-half inch track, was estimated to be $90,000 per mile. The *actual cost* of grading a road bed for a *three feet track*, has not exceeded $20,000 per mile."

"This large difference resulting from the fact that the locations of the two lines occupy different ground. On the broad gauge location the minimum radius of curvature adopted was 955 feet, and on the narrow gauge it is 220 feet. The cañon is so tortuous that the broad gauge location would have required in construction numerous tunnels and bridges across the stream, with high embankments, and deep, open rock cuttings. The adoption of the narrow gauge admitted of an alignment conforming approximately to the windings of the cañon, enabling a graded road bed to be obtained for less than one quarter of the estimated cost of a broad gauge road bed, with the additional advantage that increase of distance secured more favorable grades."

Further, the equipment is adapted to the gauge and the requirements of traffic. Lighter locomotives and rolling stock being made use of, entails consequently a lighter rail.

Fifth.—Traffic Capacity. The evidence furnished by several commissions, establishes beyond question that the four feet eight and a-half inch gauge possesses a capacity far greater than is needed.

The Massachusetts Railroad Commissioners, in their fifth annual report, state that "the average number of passengers to each train during the last year was 71, and the average num-

ber of tons of freight was 64." Taking each train as consisting of four passenger cars, we have an average of 18 to each car, when they are constructed to carry 56. Each car weighing say, 35,000 pounds, an unproductive weight capacity of nearly 2,000 pounds is transported for each passenger; and, according to the returns, for each ton of freight moved, 2.9 tons of rolling stock is hauled.

The traffic capacity of the narrow gauge has ever been an argument urged against it by its opponents, but before presenting facts we offer the following:

A narrow gauge passenger car weighing say 15,000 pounds is constructed to carry 36 passengers. We will presume for an instant that they only carry on the average 12 passengers, being the same proportion as 18 is to 56; an unproductive weight capacity is, therefore, carried of 1250 pounds for each passenger, being 750 less than than the standard gauge; but this is a presumption that rarely or ever occurs, the cars being most frequently more than half occupied, so that the dead weight proportion is considerably reduced.

Touching freight capacity, the following letter is produced, which speaks for itself. This effectually disposes of the theory that the narrow gauge cannot compete with the broad one:

DENVER, COLORADO, Aug 20, 1873.

W. W. Borst, Esq., Superintendent Denver & Rio Grande Railway;

DEAR SIR:—It was with some doubts that I applied to you for transportation for my Great World's Exposition, consisting of circus, menagerie and aquarium, over your line, it having been intimated to me that great difficulty might be experienced in obtaining sufficient accommodations over the *Narrow Gauge*, and even if these were obtained, it would be extremely hazardous, as many of my cages of animals are very high. I have had several years' experience in transporting my circus, etc., over railroads, and I desire hereby to express to you my appreciation of your arrangements made for us, and to say that never has my World's Exposition been moved more promptly or satisfactorily, your cars being ample to accommodate my stock, wagons, cages and even the elephant, weighing five tons and standing nine feet eight inches in height. The stock and animals have never ridden on any line with as much ease and comfort as on your *Narrow Gauge* road. Your cars being so near the ground, renders them much easier to load than those of the ordinary gauge. I have met with courteous and business-like treatment from your employees and agents, and everything was a complete success.

Truly Yours,

[Signed] JOHN ROBINSON, JR.,

Manager Old John Robinson's Great World's Exposition.

We shall refer to the subject of "cars" under that head further on.

Sixth. Economy in management. In this respect the narrow gauge railway shows a marked advantage; the cost of operating being about twenty per cent. under that of a standard gauge road. The Denver and Rio Grande Railway reports the ratio of expenses to gross earnings for the year ending December 31st, 1873, 50.2 per cent., and for 1874, approximately 56 per cent. The Mineral Range, 55 per cent. The Parker and Karns City, 56.9 per cent. The Toronto and Nipissing, 55.7 per cent.

In comparing the wear and tear of the two gauges, the advantage is immensely in favor of the narrow gauge, with its light machinery and rolling stock. The ordinary standard gauge passenger car, weighing 35,000 pounds empty, hammers the rail joints with 4,375 pounds on each wheel, when loaded and hauled over the rails at twenty-five or thirty miles per hour; the weight of the blow is enormous, and terribly destructive to the superstructure.

A first-class narrow gauge passenger car weighs 15,000 pounds, empty, and consequently only hammers the rail with 1,875 pounds per wheel.

The same truth applies to locomotives. A thirty ton locomotive, and its loaded tender weighing about seventeen tons, or a total of forty-seven 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 narrow gauge railway uses locomotives weighing from eight tons up to engines weighing forty-two tons. The weight being distributed over the driving wheels, thereby gaining the necessary adhesion and requisite power, a greater paying load can be hauled, either on a level or up a grade, than on the broad gauge.

To exemplify this Mr. Richard B. Osborne, a civil engineer, has prepared the following table, assuming the very largest class of locomotives put on the three feet gauge, with cylinders of fifteen by eighteen, thirty-six inch drivers and thirty tons weight, and with a tractive power, on a level, equal to 1,460

tons, so as to compare it directly with an engine of equal power on the standard road.

On a level—gross weight of train 1460 tons.

	Tons.
The 3 feet engine with 399 tons of cars will haul of coal.....	1064
The 4 feet 8½ inch engine with 566 tons of cars will haul of coal.....	900

On a maximum grade of 26 4-10 feet, gross weight being 587 tons:

	Tons.
The 3 feet engine with 160 tons of cars will haul of coal.....	427
The 4 feet 8½ inch engine with 226 tons of cars will haul of coal.....	361

On a maximum grade of 40 feet, gross weight being 444 tons:

	Tons
The 3 feet engine with 121 tons of cars will haul of coal.....	323
The 4 feet 8½ inch engine with 171 tons of cars will haul of coal	273

These trains, it will be seen, *correspond in gross weight;* the three feet gauge by its *less* weight of cars transporting about seventeen per cent. *more* productive *load* than the standard gauge.

On a gradient of 80 feet per mile, gross weight 252 tons;

	Tons.
The 3 feet engine with 70 tons of cars, will haul of coal	182
The 4 feet 8½ inch engine with 97 tons of cars, will haul of coal.....	155

From the foregoing we learn:

First. That an engine of the 3 feet gauge can take a *greater number of tons* of freight in its cars against the same grade; and

Second. That it will haul the *same number* of tons of load in its cars up *steeper grades* than the engines of the 4 feet 8½ inch gauge, with *its* loaded cars, can at all accomplish.

We have shown before that the load of freight on the 4 feet 8½ inch, against a 26⅘ grade is 361 tons, and that this *freight* load can be increased on the 3 feet gauge to 427 tons against a like grade; so also can it be stated that the freight load of 361 tons, not being increased on the 3 feet road, it could be taken by the narrow gauge engine over 33 feet grades instead of 26⅘ feet. A gain in gradient obtained of 25 per cent. by the adoption of the 3 feet gauge.

So likewise the freight load of the 4 feet 8½ inch engine on a gradient of 80 feet being 155 tons; that of a 3 feet would be 182 tons. But giving the 3 feet engine the load only of its

rival, or 155 tons, it will transport it over grades of 95 feet, or about 20 per cent. greater.

It seems then clear that while the *steam power* of the 3 feet gauge engine is *no greater* than the other, and keeping the *same paying loads* as the wider gauge, the smaller road can overcome gradients from 20 to 25 per cent. greater.

Under the caption of "Locomotives" will be found some further remarks on the power of narrow gauge engines. We therefore leave this subject for the present.

Seventh—Safety. During the early discussions on the relative merits of the standard and narrow gauge railway, the question as to safety on the narrow gauge was propounded, and it was boldly asserted at the time that it would be extremely hazardous to ride in cars the wheels of which were only three feet apart, and that if they were hauled at a velocity equal to the cars on the ordinary guage, it would be courting certain danger. It was the old argument, in another form, against the first introduction of steam locomotion. That the hypothesis was fallacious is evidenced in the fact that *since the first narrow gauge train commenced running in America, there has been no serious accident entailing loss of life reported.* We leave it to our readers to compare this statement with the record of standard gauge railroads.

PROGRESS OF NARROW GAUGE RAILWAYS.

Although narrow gauge railways in the United States are comparatively new, it being only four years since the ground was broken—in 1871—for the initial line, the Denver & Rio Grande Railway, yet a large amount of mileage can be shown as completed and under speedy construction, nothwithstanding the strong opposition and prejudice against them at their first introduction. That the opposition is declining and the prejudice being overcome, is evidenced in the fact that such first-class standard gauge lines as the Pennsylvania, the Lehigh Valley, the Philadelphia, Wilmington and Baltimore, and the Mem-

phis and Charleston, recognize in narrow gauge railways important adjuncts and feeders to their trunk line, and have assisted in their completion by either supplying superstructure or equipment, or guaranteeing, as in the case of the Philadelphia, Wilmington and Baltimore, and Baltimore Central to the Peachbottom Narrow Gauge Railway, a commission of 25 per cent. for the first year, and 20 per cent. for the second year, etc., on all passengers or freight carried by them, which is recarried over the Peachbottom road from their country, or consigned from Philadelphia or Baltimore to points in the country reached over the Peachbottom.

That the prejudice of the public is quickly disappearing, and that they are becoming convinced of the capacity, usefulness, and moderate first cost of the narrow gauge railway, is shown by the following table, giving the mileage constructed during each of the four years, 1871–74:

In 1871 there were built			179	miles of narrow gauge railway.			
In 1872	"	"	450	"	"	"	"
In 1873	"	"	509¼	"	"	"	"
In 1874	"	"	886¾	"	"	"	"
Total,			2025	"	"	"	"

On June 19–20, 1872, a National Narrow Gauge Railroad Convention was held at St. Louis; the meeting being attended by a long list of delegates from the narrow gauge railroad companies—completed or organized—car and locomotive builders, and others interested in the movement, when the following points were suggested for discussion and elucidation:

"1. The want of railway facilities.

"2. The comparative cost of the two systems.

"3. Our means of constructing the broad gauge as compared with the narrow gauge.

"4. The comparative cost of operating the two gauges.

"5. Can narrow gauge locomotives be constructed of sufficient power and speed to answer general requirements?

"6. Can the passenger coaches be made safe, comfortable and popular with the traveling public?

"7. Can freight cars be constructed of convenient size for the transportation of cotton, live stock and general freights?

"8. What saving in dead weight will the narrow gauge effect?

"9. How will the saving in first cost and dead weight affect the rates of freight and passage?

"10. Break of gauge or connections.

"11. Experience and opinions of experts.

"12. The narrow gauge, as compared with the broad gauge, as the means of development."

These several topics were most thoroughly investigated, and results as far as then practicable stated. A resolution was passed to the effect, that having found the three feet gauge so numerously represented in this Convention, it be adopted as the standard narrow gauge by all roads, where there are no particular reasons for adopting a less gauge.

The late John Edgar Thomson, when conversing with a gentleman who was requesting his opinion on the narrow gauge question, stated, "that were he now building certain of the branch roads of that great highway, the Pennsylvania Railroad, (one now carrying annually 10,000,000 tons of freight,) he would make them 3 feet instead of 4 feet 8½ inch gauge."

After such an endorsement by so celebrated an engineer and financier, whose whole life had been devoted to the study of railroading in its several departments, and with the past few years as a basis to stand upon, we believe that narrow gauge railways will be "a power in the land," and that they will revolutionize certain districts in America, and whole countries in other parts of the world, and be the means of making fruitful the barren places.

In support of the statement just made, we produce two tables taken from an official report, showing by counties the progress of Colorado in population and wealth from 1870 to 1874. The counties in bold type are those through which the Denver and Rio Grande Railway runs. It will be seen that their development is trebled and quadrupled. The Denver and Rio Grande was begun in 1870.

ASSESSMENT LIST.

COUNTY.	1870.	1874.
Arapahoe	$4,731,830	$15,088,085
Bent	351,248	2,172,267
Boulder	1,121,972	2,547,964
Clear Creek	1,100,112	1,485,008
Conejos, including La Plata	265,702	141,415
Costilla, including Rio Grande	118,062	528,249
Douglas	574,397	1,470,636
Elbert		1,675,760
El Paso	524,965	3,160,323
Fremont	375,950	1,314,695
Gilpin	2,000,000	2,322,342
Greenwood	446,924	Abolished in 1874.
Huerfano	324,932	702,856
Jefferson	1,034,738	2,034,529
Lake	172,917	250,998
Larimer	332,510	905,944
Las Animas	457,932	1,186,482
Park	175,550	795,707
Pueblo	857,811	3,784,348
Saguache	129,656	599,308
Summit	123,926	158,722
Weld	954,361	2,063,166
Totals	$16,015,521	$44,388,804

POPULATION.

COUNTY.	CENSUS 1870.	CENSUS 1873.
Arapahoe	6,829	25,000
Bent	592	3,850
Boulder	1,939	5,325
Clear Creek	1,596	5,500
Conejos	2,504	3,800
Costilla	1,779	3,350
Douglas	1,388	3,100
El Paso	987	3,450
Fremont	1,064	3,300
Gilpin	5,490	7,500
Greenwood	510	600
Huerfano	2,250	3,350
Jefferson	1,390	6,230
Lake	522	875
Larimer	838	3,250
Las Animas	4,276	5,780
Park	447	2,800
Pueblo	2,265	8,950
Saguache	304	2,000
Summit	258	1,050
Weld	1,636	5,100
Totals	39,864	104,860

The Secretary of the Utah Western Railway writes: "The promoters of broad gauge roads here, as elsewhere, try to retard the narrow gauge as much as possible; but in spite of

this the broad gauge has built only about 87 miles since May 17, 1869, while there have been built about 160 miles of narrow gauge since August 23, 1871, with a very good prospect of making a grand union road during the coming summer, to unite most of the narrow gauge roads in Utah."

On a previous page the subject of converting broad gauge lines into narrow gauge railways in certain instances was briefly mentioned. It has been demonstrated that a narrow gauge railway will be remunerative where a broad gauge cannot, owing to its much larger expenditures; it is therefore not to be wondered at that the Directors of such, being convinced of the efficiency and lesser expenditure of the narrow gauge railway, should convert their line into one by altering the gauge and disposing of the rolling stock for other, seeing that if this is not accomplished, their railway must be run at a loss, or else, train service must be discontinued. Or again where certain short lines, built on the standard gauge, connect with trunk lines built on the narrow gauge, and it is expedient to overcome break of gauge, and consequent transhipment, that such lines be converted into 3 feet ones; or further, where the surveys being made for a standard gauge the original intention being to construct a line 4 feet 8½ inches wide, subsequent consideration on the probable traffic and consequent revenue, induced the construction of a narrow gauge railway.

The following railways are mentioned as an example of each proposition:

The Chester and Lenoir Narrow Gauge Railway, formerly the Kings Mountain Broad Gauge Railroad.

The San Rafael and San Quentin, leased by the North Pacific Coast Narrow Gauge Railway and being converted into one of 3 feet.

The Kalamazoo, Lowell and Northern Michigan Railway, organized for standard gauge, and to be constructed of narrow gauge.

NARROW GAUGE RAILWAYS IN OPERATION.

STATE OR TERRITORY.	NAME OF ROAD.	TOTAL PROJECTED MILEAGE.	MILES BUILT IN				TOTAL MILEAGE COMPLETED.
			1871	1872	1873	1874	
Pennsylvania	Bell's Gap	19			9		9
"	East Broad Top	30			11	19	30
"	Lawrenceville and Evergreen	2¾			2¾		2¾
"	Mauch Chunk and Summit Hill	15				15	15
"	Montrose	27		14	11		25
"	Parker and Karns City	14			4	6	10
"	Peachbottom	60			8	30	38
"	Pittsburg and Castle Shannon	45		3	3	4	10
"	Railway of Cambria Iron Co	25		25			25
"	Wapwallopen	6				6	6
New York	Central Valley	24			12		12
"	Crown Point	13				13	13
"	Peekskill Valley	5½			5½		5½
Ohio	Ohio and Toledo	65				22	22
"	Painsville and Youngstown	64		12	11	41	64
"	Toledo and Maumee	88				8	8
Illinois	Cairo and St. Louis	150		30	62	26	118
"	Galena and Southern Wisconsin	72				30	30
Iowa	Des Moines and Minnesota	197				37	37
"	Iowa Eastern	200		15	1	4	20
Michigan	Mineral Range	100			13		13
Missouri	Wyandott, Kansas City and N W	240				10	10
Kansas	Kansas Central	550		56			56
Colorado	Colorado Central	49		21	4		25
"	Denver and Rio Grande	850	76	87		9	172
"	Denver, South Park and Pacific	100				16	16
"	Golden City and South Platte	20				18	18
Utah	American Fork	21		18			18
"	Bingham Cañon	23			18	5	23
"	Summit County	9			9		9
Utah	Utah Northern	450			25	17	44	86

"	American Fork	21			18		18
"	Bingham Cañon	23				18	5 23
"	Summit County	9				9	9

Utah	Utah Northern	450		25	17	44	86
"	Utah Western	45				18	18
"	Wasatch and Jordan Valley	16			12		12
Nevada	Eureka and Palisade	81				50	50
"	Pioche and Bullionville	18			18		18
California	Alameda, Oakland and Piedmont	60			10		10
"	Monterey and Salinas Valley	35				19	19
"	North Pacific Coast	225				51	51
"	San Louis Obispo	36				9	9
"	Santa Cruz	25				8	8
Washington	Olympia	20				20	20
"	Walla Walla	20				20	20
Texas	Rio Grande	22		8	14		22
Arkansas	Arkansas Central	150		48			48
Mississippi	Natchez, Jackson and Columbus	180			10		10
"	Nashville and Vicksburg	450				20	20
"	Ripley	26		26			26
Alabama	Cherokee (N. G. division)	8	8				8
"	Tuskegee	6	6				6
Georgia	Memphis Branch	17			5		5
"	North and South of Georgia	130			23		23
Tennessee	Duck River Valley	15				5	5
"	Memphis and Raleigh	10			10		10
Kentucky	Louisville, Harrods Creek and Westport	28			5		5
South Carolina	Chester and Lenoir	105				25	25
Virginia	Longdale	63¼				63¼	63¼
West Virginia	Ceredo	20			12		12
New Jersey	Camden, Gloucester and Mt. Ephraim	12			3		3
Massachusetts	Grafton	3				3	3
"	Martha's Vineyard	9				9	9
"	Worcester and Shrewsbury	3			3		3
Canada	Toronto, Grey and Bruce	195	40	47	57	51	195
"	Toronto and Nipissing	230	49	15	24		88
New Brunswick	New Brunswick	170			52	48	100
"	Riviere du Loup	91				91	91
Prince Edward's Is.	Prince Edward's Island	200			50	70	120
		6202	179	450	509¼	886¾	2025

Of the roads mentioned in the preceding table, the following have the amount of mileage set opposite each respectively under construction:

	MILES.
Peachbottom	22
Ohio and Toledo	24
Toledo and Manmee	4
Cairo and St. Louis	32
Iowa Eastern	20
Wyandott, Kansas City and N. W.	90
Denver and Rio Grande	40
Denver, South Park and Pacific	40
Utah Northern	5
Utah Western	27
Palisade and Eureka	30
Santa Cruz	7
Chester and Lenoir	50
North Pacific Coast	30
Memphis Branch	12
Colorado Central	24
North and South of Georgia	43
Golden and South Platte	2
Camden, Gloucester and Mt Ephraim	9
	511

It is believed that a large amount of narrow gauge mileage will be constructed during 1875, as the railways in operation have fully demonstrated their capacity in every class of traffic, and have become a living example to the younger organizations. That they have been closely watched and criticized is evidenced by the large number of companies to which charters have been granted to build narrow gauge roads within the last two years.

On the next page we give a list of the companies in the most forward state, that have been recently heard from; also their total projected mileage, and their mileage under construction, and the address to which communications should be sent, prefacing it with the remark that the data here given is as correct as circumstances will permit, seeing that there is no Bureau or organization created purely for the collection of such statistics, and to which narrow gauge railways could report. It is, therefore, not improbable that those lines that are reported as surveyed, may have their line graded, and those stated as under construction have part of their line ironed and in operation.

STATE OR TERRITORY.	NAME OF ROAD.	Total Projected Mileage.	Mileage Under Construction.	ADDRESS.
California	Central	465	30	W. W. Magary, Sec., 338 Montgomery St., San Francisco

STATE OR TERRITORY.	NAME OF ROAD.	Total Projected Mileage.	Mileage Under Construction.	ADDRESS.
California	California Central	465	30	W. W. Magary, Sec., 338 Montgomery St., San Francisco.
"	Hollister and Salinas Valley	21	Surveys made.	Office at Hollister, Monterey co., Cal.
"	Los Angeles and Independence	250	" "	Jas. U. Crawford, C. E., Los Angeles, Cal.
"	Nevada County	22	22	John C. Coleman, Pres., Nevada City, Cal.
"	San Jose and Alviso	10	10	S. A. Bishop, San Jose, Cal.
"	Santa Rosa Branch	12	12	E T. Farmer, Treas., Santa Rosa, Cal.
"	Sonoma and Marin	20	Surveys made.	Office at Petaluma, Cal.
"	Stockton and Ione	40	18	James D. Schuyler, C E., Stockton, Cal.
Illinois	Chicago, Millington and Western	209	8	Geo. N. Jackson, Sec., 78 5th Ave., Chicago.
"	Havana, Rantoul and Eastern	348	38	Guy D. Penfield, Sec., and J. F. Hinckley, C. E., Rantoul, Ill.
"	Keithsburg and Eastern	250	90	J. K. Hornish, Keithsburg, Ill.
Indiana	41st Parallel	145	Surveys made.	" " " "
Iowa	" "	288	" "	" " " "
"	St. Louis, Keosauqua and St. Paul	230	10	Chas. H. Fletcher, Pres., Keosauqua, Iowa.
Maryland	Baltimore, Hampden and Towsontown	7½	7½	W. S. Shoemaker, C.E., St. Clair Hotel, Balt.
Michigan	Kalamazoo, Lowell & Northern Michigan	68	10	F. Edwin Danbar, Sec. Kalamazoo, Mich.
Minnesota	Caledonia and Mississippi	24	12	Office at Caledonia, Minn.
"	Wabasha and Faribault	70	40	W. S. Walton, Sec., Wabasha, Minn.
Missouri	St. Louis and Florissant	16½	16½	Coffee & McGowan, Contr's. St. Louis, Mo.
"	St. Louis and Manchester	18	18	John F. Long, Pres., St. Louis.
"	St. Louis and St. Charles	14	Surveys made.	John L. Fergusson, Pres. St. Louis.
"	St. Louis and Western	300	" "	Chas. Hunt, Pres., St. Louis.
Ohio	Dayton and South-eastern	140	40	J. E. Williams, Xenia, Ohio.
"	Grand Rapids and Van Wert	70	Surveys made	D. W. H. Howard, Pres., Toledo, Ohio.
"	Lake Erie, Alliance and Wheeling	160	60	Hugh Blakley, Alliance, Ohio.
"	Lake View and Collamer	7	7	Office at Cleveland, Ohio.
"	Portsmouth and Pound Gap	520	Surveys made.	J. W. Fulton, Pres.. Portsmouth, Ohio.
"	Miami Valley	52	Being surveyed.	Office at Lebanon, Ohio.
South Carolina	Cheraw and Salisbury	25	25	B. D. Townsend, Pres., Society Hill, S.C.
"	Cheraw and Chester	95	29	Fleming Gardner, C. E., Chester, S. C.
Tennessee	Greenville and Paint Rock	22	8	O. G. Vanderhoof, C E, Knoxville, Tenn.
"	Memphis and Knoxville	357	Surveys made. 30 miles graded.	Col. Donovan, Memphis, Tenn.
Texas	Western Narrow Gauge	450	20	T W. House, Pres., Houston, Texas
Virginia	Elizabeth City and Norfolk	70	70	W. H. Adams & Co., Contrs., Wash'tn, D.C.
"	Richmond and Trans-Allegheny	250	Surveys made.	John Enders, Pres., Richmond, Va.
"	Washington, St. Louis and Cincinnati	793	30	P. B Borst, Pres., Luray, Va.
Wisconsin	Milwaukee and South-west	300	40	J. H. Stearns, C E, Milwaukee, Wis.

NARROW GAUGE LOCOMOTIVES.

The locomotives for working narrow gauge railways necessarily conform to the same principles as those for the standard gauge; when, therefore, the projectors of the initial narrow gauge railway in the United States requested the Baldwin Locomotive Works of Philadelphia to submit designs for passenger and freight engines, their drawings did not essentially differ except in dimensions from those made for standard roads. A description of the first passenger engine, constructed in June, 1871, and aptly named "Montezuma," its mission being to run through the territories once owned by that ancient monarch, will not be out of place.

The engine has four drivers connected and a two-wheeled truck.

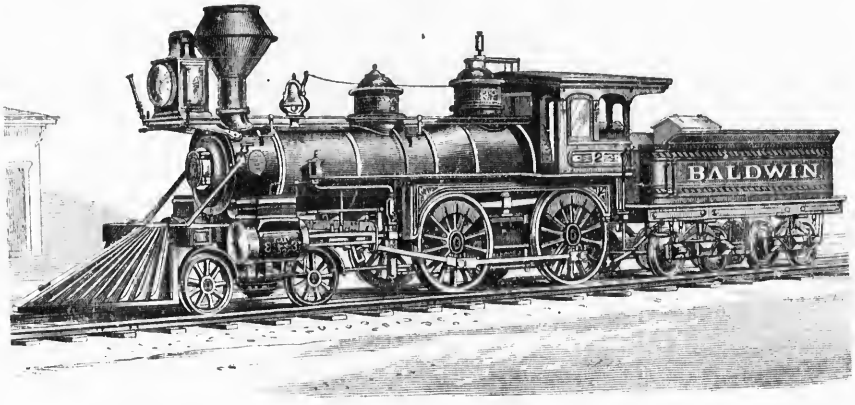
Diameter of cylinders, 9 inches.		Stroke of piston, 16 inches.	
" " driving wheels		40	"
" " pony wheels		24	"
Distance between centre of pony wheels and centre of front drivers	5ft	8½	"
Distance between driving wheel centres	6	3	"
Total wheel base of engine	11	11½	"
Rigid wheel base (distance between driving wheel centres)	6	3	"
Diameter of tender wheels		24	"
Distance between centres of tender wheels	6		"
Total wheel base of engine and tender	26	5½	"
Length of Engine and tender over all	35	4	"
Capacity of tender		500	gals.
Weight of tender empty		5,500	lbs.
" " engine in working order		25,300	"
" " " on drivers		20,500	"
" " " on each pair of drivers		10,250	"
" " " on pony wheels		4,800	"
Height of smoke-stack above rail	9	9	"
Height of cab from foot board to centre of ceiling	6	3	"

Its tractive power, exclusive of the resistance of curves, is as follows:

On a level	512	gross tons
On a grade of 40 feet to the mile	164	" "
On a grade of 80 feet to the mile	98	" "

From these figures should be deducted 17 gross tons, the weight of the engine and tender in working order, to get the total weight of cars and lading that can be drawn on a level or on the grades named. The speed attainable is between 25 and 35 miles per hour.

In the course of time defects were apparent in engines for passenger service constructed as above. Locomotives, therefore, are not now built on that pattern, but made similar to the "Baldwin," a view of which is here given.



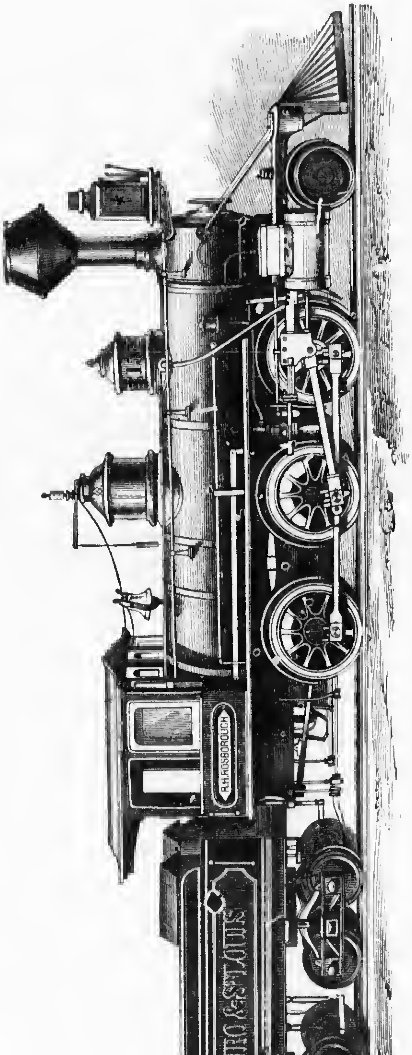
The dimensions and tractive power are as follows:

Cylinders 11 inches diameter, 16 inches stroke.

Driving wheels	42 in. diam.
Truck wheels	24 " "
Wheel base total	18 ft 3 in.
" " rigid	7 " 2 "
Tender, four wheeled, tank capacity	750 gallons.
" eight wheeled " "	1,100 "

Weight of engine in working order:

On drivers	25,000 lbs.
On truck	13,000 "
Total weight of engine	38,000 "
Its tractive power on a level is	600 gross tons
" " " " 20 feet grade	280 " "
" " " " 40 " "	175 " "
" " " " 60 " "	125 " "
" " " " 80 " "	95 " "
" " " " 100 " "	75 " "


R.H.ROSBOROUGH

Several sizes of such locomotives, ranging from 15 to 20 tons gross weight in working order, are in service; their speed being from 30 to 40 miles per hour with light trains on a level track or track of easy grades.

For freight service engines of what is called the "Mogul" pattern are most used, and have given the best practical results. The cut on page 28 of the "R. H. Rosborough" shows such an engine. This plan of engine has come into use chiefly within the past ten years, and owes its success to the kind of truck with which it is constructed. This truck, called a "pony truck," has a swinging bolster connected to the frame of the truck by pendant links, and can thus move laterally under the engine in passing a curve. The middle pair of driving wheels usually have tires without flanges, and it will thus be seen that there can be little or no "binding" of wheels on a curved track. Engines of this pattern are working on roads having curves of as short radius as 240 feet.

The following are the dimensions:

Cylinders 13 inches diameter, 16 inches stroke.

Driving wheels	36 in. diam.
Truck wheels	24 " "
Wheel base total	18 ft. 7in.
" " rigid	12 " 9 "

Tender, eight wheeled, tank capacity, 1,400 gallons.

Weight of engine in working order:

On drivers	40,000 lbs.
On truck	6,000 "
Total weight of engine	46,000 "
Its tractive power on a level is	965 gross tons.
" " " " 20 feet grade	445 " "
" " " " 40 " "	285 " "
" " " " 60 " "	205 " "
" " " " 80 " "	160 " "
" " " " 100 " "	125 " "

The advantage of this plan of locomotive is found in the fact that nearly the entire weight is utilized for adhesion; only sufficient load being carried on the pony truck to enable it to fulfil effectually its function of guiding the engine on curves. The maximum of useful effect in traction power consistent

with an easy motion on the track and the minimum wear and tear of both track and machinery, it is believed are given by this plan of engine when properly constructed. On many roads engines of this plan are used for passenger as well as for freight service. They can be run at a speed of from 20 to 25 miles per hour, with passenger trains when necessary, and at the same time they possess a reserve power which is valuable in case of heavy trains, head-winds, bad track, snow-drifts or other circumstances of emergency. Five or six different sizes of these engines are made for three feet gauge railways; the lightest of 15 gross tons weight, and thence upwards to engines of 25 tons weight.

The "Consolidation" pattern, illustrated by the cut of the "Mosca," on page 31, is an extension of the "Mogul" principle, four instead of three pairs of driving wheels being used in connection with the pony truck. By this means an engine of a total weight of about 25 gross tons may be used on a track laid with rails as light as 30 pounds to the yard, as the weight on any one wheel is reduced to only about 5,500 pounds, with a total adhesive weight of 44,000 pounds.

Its dimensions are as follows:

Cylinders 14 inches diameter, 16 inches stroke.

Driving wheels	40 in. diam.
Truck wheels	24 " "
Wheel base, total	18 ft. 6 in.
" " rigid	12 " 8 "
Tender, eight wheeled, tank capacity	1,400 gals.

Weight of engine in working order:

On drivers	44,000 lbs.
On truck	8,000 "
Total weight of engine	52,000 "
Its tractive power on a level is	1,060 gross tons.
" " " " 20 feet grade	490 " "
" " " " 40 " "	310 " "
" " " " 60 " "	220 " "
" " " " 80 " "	175 " "
" " " " 100 " "	140 " "

For all descriptions of special service, such as hauling cars at mines, iron mills or furnaces, and for shifting purposes, four

DENVER & RIO GRANDE
MOSCA
13

and six wheel connected locomotives with separate tenders, or with water tanks carried on the boilers, are largely and successfully used. A very great advantage of the narrow gauge, moreover, is found in the requirements of such special service. Curves of a radius as short as 25 or 40 feet are often necessary, and small four-wheeled locomotives of 2½ or 3 feet gauge, with their wheels closely coupled, can readily pass such curves and work about yards and buildings in a very limited space. For all kinds of hauling for which horses or mules are usually employed, steam power may thus be used with very great economy; the cost of working four or five horses with their driver being greater than the operating expense of one of these small engines.

For further details concerning narrow gauge locomotives, parties desiring such are recommended to address the Baldwin Locomotive Works of Philadelphia, whose make of engines have a celebrity that is world-wide.

In response to an inquiry, they state that the narrow gauge engines built by them in 1874, amounted to 26 per cent. of the whole, an increase of 16 per cent. over 1873, and that the panic has not affected their construction as much as wide gauge.

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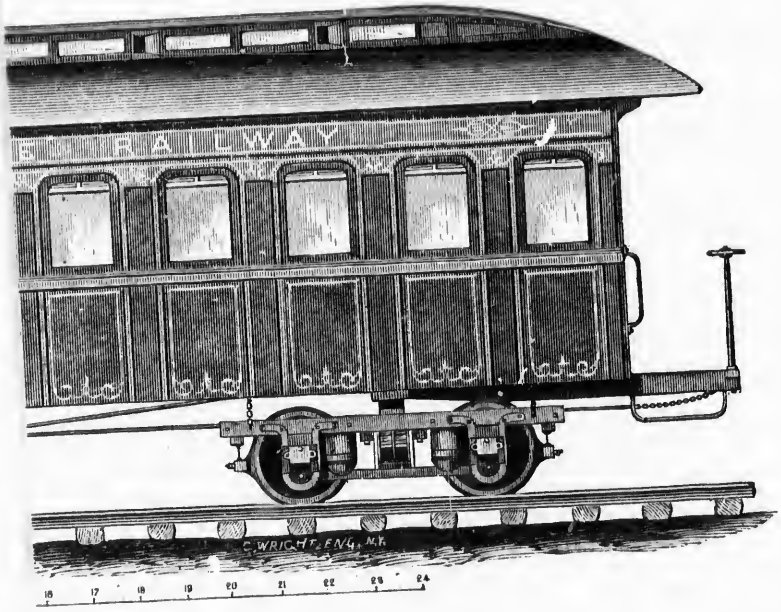


1 Car,

RP COMPANY,

E.

NARROW GAUGE PASSENGER CARS.

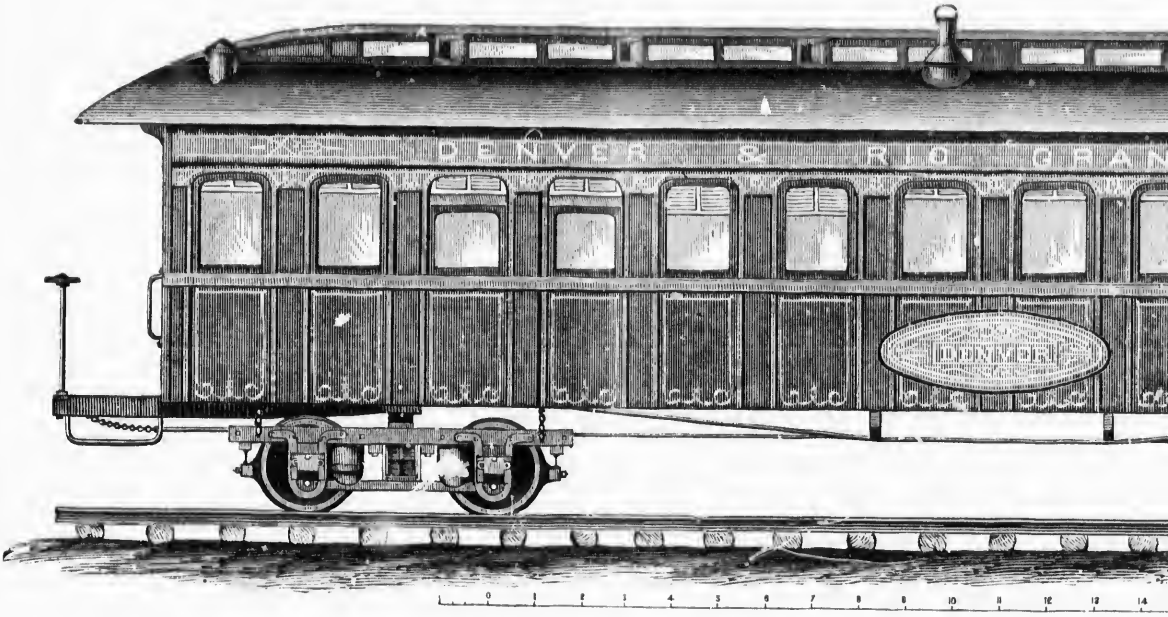
When the question was first discussed of building Narrow Gauge Railways in the United States, the projectors naturally looked to the engineering fraternity of Great Britain for precedents. The result was apparent in the establishment of a measure of favor towards the use of four-wheeled passenger cars, built on the *coupé* plan, so common on European roads. Further reflection however decided that it would be impossible to revive a custom that had become so obsolete in America, as the one of confining a small number of passengers in the equivalent of a stage-coach body.

In the meantime the Jackson and Sharp Company, of Wilmington, Delaware, prepared and submitted designs for passenger cars, built on the American plan, of placing a long body on swinging trucks, to the Denver and Rio Grande Railway, the initial narrow gauge railway in the United States. These were approved and adopted by the managers, and on the opposite page will be seen a side view of the car "Denver," constructed in 1871, and being the first narrow gauge car built in America. The dimensions are as follows:

Length	35 feet.	Weight	15,000 pounds.
Width	7 "	Dead wt. per pass	416 "
Height	10½ "	Capacity	36 pass.
Diam. of wheel	2 "	Ht. of sill from ground	27 inches.

The interior arrangement may be inferred from the accompanying cut. The seats are double on one side and single on the other, this arrangement being reversed in the centre of the car, so that each side carries half double and half single seats—an arrangement which secures a perfect balance of weight when the car is full.

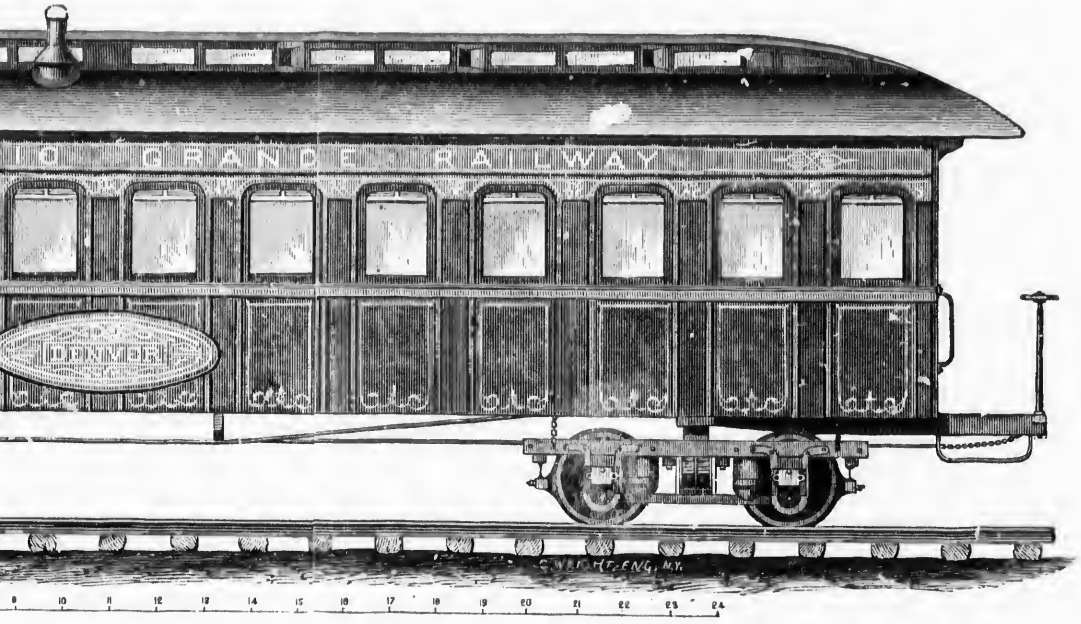
The single seats are nineteen inches wide, the double seat, thirty-six inches, the aisle seventeen inches. These cars are



Narrow Gauge Railro

BUILT BY THE JACKSON & SH

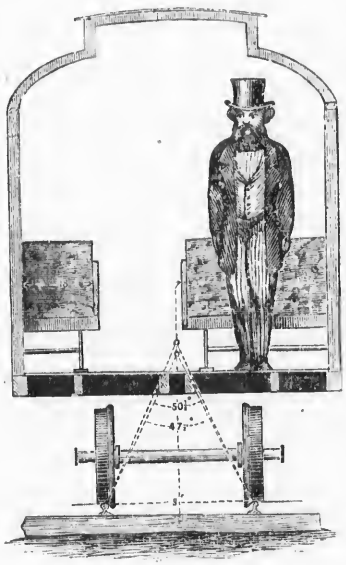
WILMINGTON, DELAW



auge Railroad Car,

CKSON & SHARP COMPANY,

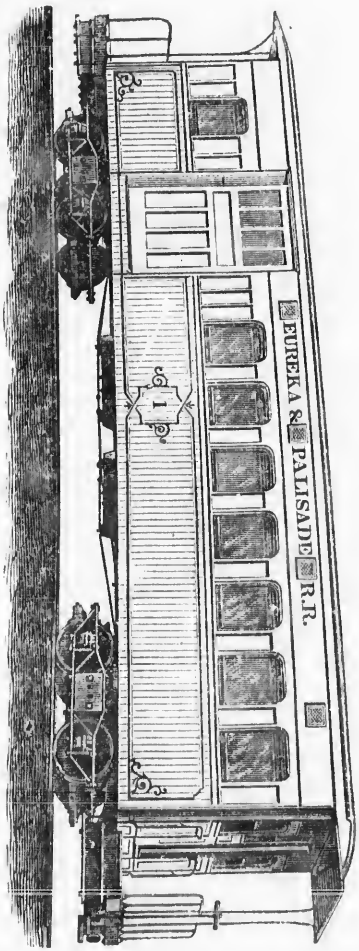
GTON, DELAWARE.



finished in the best style; the wood work, the upholstery, decorations, and the whole arrangement being first-class. The above section shows how the angle of stability diminishes from fifty and one-half degrees for the empty car to forty-seven and one-half degrees for one loaded. This excellent result is due to a careful study of the parts, so that the load is carried within the shortest possible distance from the track. Even when exposed to the fierce onset of the Colorado gales, the cars have always proved themselves equal to the emergency. This has not been peculiar to that locality alone, but from all roads throughout the country the same satisfactory record has been received.

It was thought among narrow gauge engineers, when the system was in its infancy, that in no case should the width of car exceed double the gauge of the road. Even the 7 feet width of body in the Denver and Rio Grande cars was regarded with feelings of apprehension until such time as the practical demonstration of the case proved the fallacy of the hypothesis. Since 1871 the width of cars has been steadily increased by builders, until at length a width of 8 feet over body has been attained and operated with great success. The height of cars has remained unaltered, and other details the same. A most important advantage has been secured by the change in width, for by this means it is possible to seat four passengers abreast instead of three, and thus increase the carrying capacity of the car from thirty-six to forty-seven passengers. This improvement especially commends itself to the wants of short lines of twenty to forty miles length, and to temperate climates. In tropical climates it is best to keep the

width at eight feet and lengthen the seats so that three passengers will be accommodated abreast. Cars eight feet in width and seating four passengers abreast have an aisle of seventeen and one-fourth inches wide, and seat rooms of thirty-five inches each. As such cars weigh about 16,000 pounds, the dead weight per passenger is only 340 pounds. The saving in dead weight is very marked as compared with that of 722 pounds per passenger, so common on roads having a gauge of 4 feet 8½ inches.



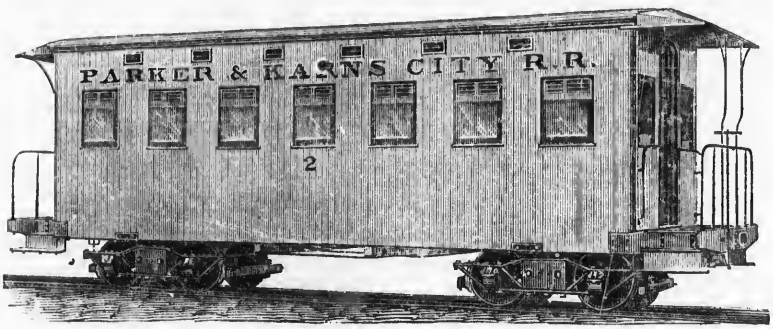
Thus far we have described only the mode of seating the passengers in first-class cars in which the seats have reversible backs. In second- and third-class cars it is the custom of some builders to arrange the seats parallel to the walls of the car, the same way as obtains on street railways, and placing at the same time seats in the aisle for twelve passengers. The latter seats are arranged transversely and back to back. Where no saloon is used a car of thirty-five feet in length will seat, by this arrangement, sixty passengers, giving a dead weight of about 266 pounds per passenger. We leave it to others to infer what saving may safely be relied upon under such favorable relations between dead weight and effective load.

The following illustration is of a car equal to the best second-class passenger cars, constructed to carry freight, baggage, express, mails and passengers, designed and constructed

for the Eureka and Palisade Railway Company, of Nevada, by an establishment at York, Pa.

One-third of the length is adapted to carry freight, baggage or express matter, and the other two-thirds contain seats for 24 passengers. The body is placed over plain, substantial bolster trucks, and makes a very cheap and useful car.

The next cut is of a third-class passenger car running on the Parker and Karns City Railway of Pennsylvania.



The length of frame is 22 feet, and width 7½ feet. The wheels are 24 inches in diameter, and the weight 12,000 pounds. The seats are parallel with the sides of the car and have room for 26 passengers. Cars of this class can be made longer, to carry 30 to 36 passengers with small additional cost.

It can scarcely be necessary to enlarge on the comfort and ease enjoyed in the cars of the narrow gauge system, or to point out the close similarity in arrangement of stoves, saloons, sashes, ventilators, etc., common to the broad and narrow gauge systems. Suffice it to say that the Company who first demonstrated the feasibility of building comfortable passenger cars, has since manufactured most luxurious parlor as well as sleeping cars for roads of three feet gauge. There is, in fact, no limit to the comfort that can be secured with the development of the system.

The same style of body, by means of a suitable partition and doors, can be converted into a combined baggage and smoking car, having a baggage room 13 feet 9 inches in length, and a smoking room with seating capacity for 27 passengers, also a saloon in the same room.

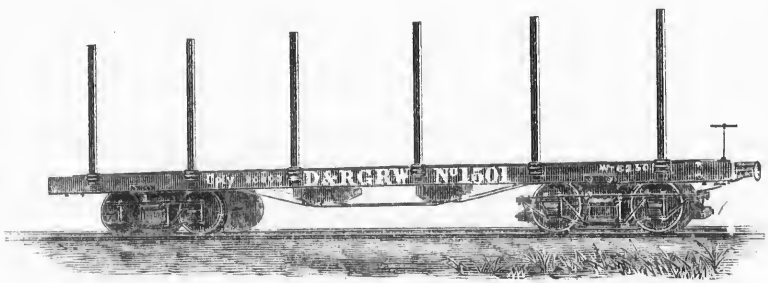
By a vote taken at the Narrow Gauge Convention held in the City of St. Louis, June 1872, it was decided that as a matter of expediency, the height of the centre of drawheads of cars should be 24 inches above the upper surface of the rails. The wisdom of this cannot be overestimated, for with a three feet gauge there is no possible reason for a difference in height of drawheads on converging lines of road. If the 24 inch wheel is universally adopted as the standard, both in the case of passenger and freight service, then the narrow gauge system will have the uniformity of design recently established on the broad gauge. In the former case the height of drawhead would be 24 inches and the diameter of the wheels 24 inches; in the latter 33 inches height of drawhead and 33 inches standard height of wheel. Such dimensions are in accordance with the laws of most perfect stability for the freight, as well as the passenger cars.

The many improvements that have been adopted on the standard gauge, such as the Miller Platform and Coupler, the Westinghouse Air Brake, etc., have also been applied to narrow gauge cars with equal success; so that in mechanical as well as in artistic adaptability the narrow gauge system is equally pliable with the standard gauge, while in working economy it is vastly its superior.

NARROW GAUGE FREIGHT CARS.

The question as to whether narrow gauge freight cars could transport with equal facility the same class of freight as that carried in standard gauge cars, so naturally arose when railways of three feet gauge were projected, that it will not be inopportune to refer in this place to each class of car constructed, and compare it and its relative capacity with the same class on an ordinary gauge railway.

In 1871, the well-known car builders, Messrs. Billmeyer & Smalls, of York, Pa., were requested by the Denver and Rio Grande Railway Company to submit designs and dimensions for a Flat Car and Box Car, for their three feet gauge railway, then being constructed. The designs being approved, they commenced building *the first eight-wheeled narrow gauge freight car constructed in America.* A view and description of this car is given below:

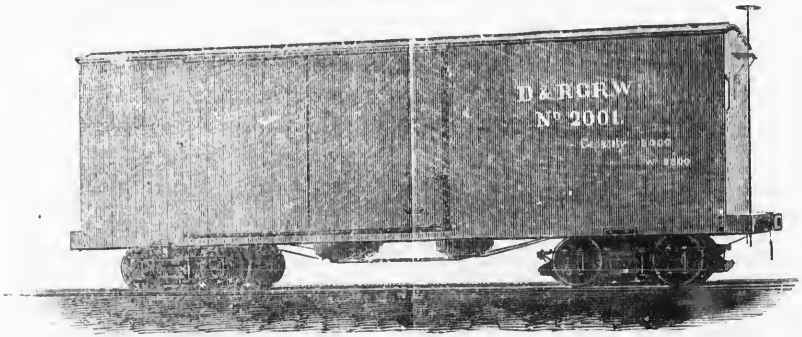


Length of frame 23½ feet. Width, 6 feet. Wheels 20 inches in diameter, fitted on 3⅛ inch axles with steeled iron trucks, and steeled spiral bearing springs encased.

Weight of car, 6,250 pounds. Capacity, 10 tons. Cars of this class have been built 25 feet long, 6½ to 7 feet wide with 24 inch wheels, and weighing about 7,500 pounds.

Gauge.	*Weight of car in pounds.*	*Capacity in pounds.*	*Proportion of dead weight to paying load.*
Standard.....	18,000	20,000	1 to 1.11
Narrow.....	6,250	19,000	1 to 3.04

The following is a view and description of the first eight wheeled Box Car built by the same builders:

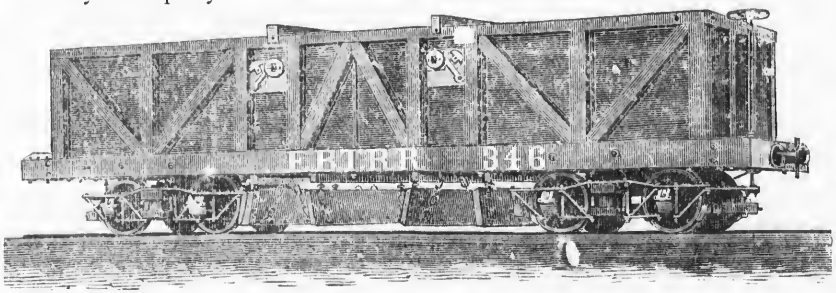


Length of frame, 23½ feet. Width, 6 feet. Wheels, 20 inches in diameter, fitted on 3⅛ inch axles, with steeled iron trucks, and steeled spiral bearing springs encased.

Weight of car 8,800 pounds. Capacity, 9 tons. Cars of this class are now being built 25 feet long, 7 feet wide, with 24 inch wheels, and weighing about 10,000 pounds.

Gauge.	*Weight of car in pounds.*	*Capacity in pounds.*	*Proportion of dead weight to paying load.*
Standard.	19,000	20,000	1 to 1.05
Narrow	8,800	17,600	1 to 2

The following is a view and description of an eight-wheeled Coal Car with two drops in centre, designed and constructed by Messrs. Billmeyer & Smalls, for the East Broad Top Railway Company.



Length of frame, 23½ feet. Width, 6 feet. Wheels, 20 inches in diameter, fitted on 3⅛ inch axles with steeled iron trucks, and steeled spiral bearing springs encased.

Weight of car, 9,000. Capacity, 10 tons.

Gauge.	*Weight of car in pounds.*	*Capacity in pounds.*	*Proportion of dead weight to paying load.*
Standard.....	18,000	30,000	1 to 1.66
Narrow	9,000	20,000	1 to 2.22

The following is a view and description of an eight-wheeled Stock Car, designed and constructed by Messrs. Billmeyer & Smalls, for the Costa Rica Railroad.

Length of frame, 23½ feet. Width, 7 feet. Wheels, 20 inches in diameter, fitted on 3⅛ inch axles with steeled iron trucks, and steeled spiral bearing springs encased.

Weight of car, 8,000 pounds. Capacity, 9 to 12 large head of cattle facing the ends of car, or 16 small cattle facing side of car.

Gauge.	*Weight of car in pounds.*	*No of cattle per car.*	*Weight of cattle in pounds.*	*Gross weight of loaded cars.*	*Total weight per head.*
Standard,	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 pounds per head, 3,573 pounds per car load of nine head, and in a train of twenty cars 71,460 pounds, or thirty-five tons in favor of the narrow gauge. Prominent stock men state that they prefer sending their stock to market in such cars, because the cattle steady themselves better, and there is less danger of their getting down, and because it is easier to feed and attend to them.

From the foregoing comparisons it will be seen that the least dead weight is hauled when a narrow gauge car is moved, and that relatively a greater amount of paying weight is trans-

ported in it than in the standard gauge. This is one of its greatest advantages and is well worth remembering. The following extract from the First Annual Report of the Denver and Rio Grande Railway Company is so much to the point, that we shall conclude this chapter with it:

With concentrated or heavy freight, which constitutes on this, as on nearly all railroads, the great bulk of the tonnage to be transported, the advantage realized has been 35 per cent. That is to say, thirty-five hundredths more freight has been regularly carried on the narrow gauge rolling stock, with the same total weight of cars and load as on the broad gauge. This can be most readily seen by observing a train of 16 loaded cars (which weigh say 8½ tons each when empty) arriving at Denver on the broad gauge road, and their contents transferred to the Denver and Rio Grande Railway. The *same freight* is placed in 20 narrow gauge cars, the empty weight of which is somewhat less than three tons each. The comparison will then stand as follows:

Cars.	*Empty weight.*	*Paying load.*	*Total dead weight.*	*Total paying load.*	*Total weight cars and load.*
16 wide-gauge.....	8½ tons each.	10 tons each.	136 tons.	160	296
20 narrow-gauge....	less than 3 tons each.	8 "	60 "	160	220
					Saving in total weight 76 tons

Which is equivalent, after allowing for the weight of cars necessary to carry it, to 56 tons *additional freight* which the narrow gauge train could take without any increase of weight over the broad gauge train; in other words, 35 per cent. more—this is on the presumption that the cars on each gauge are fully loaded. But it very often happens in the ordinary course of railroad business that cars are very frequently not loaded to their capacity, in which event the narrow gauge receives a proportionately greater benefit. For instance, if from any station there was a load of but 5½ tons to carry, the narrow gauge car would weigh no more with this load than the broad gauge would, entirely empty.

It is the case with almost any kind of freight that *whatever a car on the Denver and Rio Grande Railway holds of goods up to 5½ tons is so much clear gain to it.* That is, it can carry that much in each car as cheaply as the wide gauge road can run its cars empty.

REPORTS OF ROADS.

ALAMEDA, OAKLAND AND PIEDMONT RAILROAD.

This Company was organized in February, 1873, to construct a narrow gauge railway from Oakland, in Alameda county, to Piedmont Hotel, a watering place on the Coast Range, thence into Contra Costa county, a distance of about 60 miles. During 1873 some ten miles were constructed between Oakland and Piedmont Hotel, that are reported to be doing a good business, as the line runs through a fine agricultural country.

No statistical information could be obtained.

The capital stock is $100,000, all paid in.

The office of the Company is at Oakland, Cal.

ARKANSAS CENTRAL RAILROAD.

This Company was organized in 1870 under the General Railroad Law of 1868, to build a railway of 3 ft. 6 in. gauge, from Helena to Little Rock, a distance of 150 miles. During 1872, 48 miles between Helena and Clarendon were constructed and put in operation, and 80 miles graded, bridged and tied. Negotiations are on foot to procure money for the completion of the line during 1875.

The maximum grade is 52.8 feet to the mile.

The sharpest curvature is 13° 30′ (425.40 feet radius).

The weight of rail 35 and 45 pounds to the yard.

The weight of engines, 8, 10 and 20 tons all placed over the drivers.

Equipment—3 locomotives, 2 passenger cars, 1 baggage, 34 freight cars of all classes.

A. H. Johnson, President, Helena, Arkansas.

Edward Vernon, Vice-President, New York City.

J. A. Toppan, Superintendent, Helena, Arkansas.

AMERICAN FORK RAILROAD.

This Company was incorporated on the 3d of April, 1872, to construct a narrow gauge railway from American Fork, a station on the Utah Southern Railroad, eastward, up the cañon and passing the Miller and other mines, to Sultana, an estimated distance of 22 miles. Work was commenced in May, and by October, 18 miles were completed between the junction with the Utah Southern Railroad and the mines at the head of American Fork Cañon.

The maximum grade is 297 feet to the mile, and the average grade exceptionally heavy.

The sharpest curvature is 25° (229 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of one of their engines, built by Messrs. Porter, Bell & Co., of Pittsburg, is 17 tons, having cylinders 12x16 and six drivers. This engine takes a train of over 47 tons up the maximum grade.

Financial statement—Capital stock authorized, $300,000; all paid in. No funded debt.

Lloyd Aspinwall, President, New York City.

H. Horner, Secretary and Treasurer, Salt Lake City.

E. Wilkes, Superintendent, Salt Lake City.

BELL'S GAP RAILROAD.

This Company was incorporated under the general law of Pennsylvania, May 11, 1871, with power to construct a railway from Bell's Mills, on the Pennsylvania Railroad, to Lloyds, in Cambria county, a distance of 8½ miles. The road has since been projected to Fallen Timber, making the total length 19 miles. The road was put under construction in 1872; and in June, 1873, 8½ miles were placed in operation. No additional mileage has since been added.

The grade is very heavy, the maximum of 158.4 feet to the mile being continuous for 6¾ miles.

The sharpest curvature is 28° (206 feet radius). There are ten of these curves on the maximum grade, two of which are 600 feet long, turning an angle of 168°.

The weight of rail is 35 pounds to the yard.

The weight of engines 15 tons.

Equipment—2 locomotives, 2 passenger cars, 78 freight cars of all classes.

Operations for year ending December 31, 1874—Gross earnings, $42,415.71. Operating expenses, $20,830.70 (49.12 per cent.) Net earnings, $21,585.01..

Financial statement—Capital stock authorized, $200,000; paid in, $200,000; funded debt, 1st mortgage, 7 per cent. bonds, maturing July 1, 1893, $200,000; floating debt, $15,000. Total liabilities, $415,000.

A. L. Massey, President, 11 Merchants' Exchange, Phila.

J. G. Cassatt, Secretary and Treasurer, Altoona, Pa.

Jos. Ramsary, Jr., Superintendent, Antestown, Pa.

BINGHAM CANON RAILROAD.

This Company was organized in 1872, to build a narrow gauge railway from the mines at Bingham Cañon to Sandy Station, on the Utah Southern Railway, an estimated distance of 22 miles. Work was commenced in 1873, and 16 miles completed and put in operation between Sandy and the Winamuck Smelting Works. The following year the line was extended to Bingham Station and the Utah Mining Company's works, 6 miles.

The maximum grade is 240 feet to the mile. There is also a grade of 200 feet per mile, continuous for 3 miles, and the average grade is very heavy.

The weight of rail is 35 pounds to the yard.

The weight of engines 18 tons.

Cost of road with equipment per mile, $13,000.

Equipment—3 locomotives, 4 passenger cars, 1 baggage, 100 freight cars of all classes.

Operations for eleven months, ending October 31, 1874—Gross earnings, $103,247.39. Operating expenses, $40,711.76 (39.43 per cent.) Net earnings, $62,535.63.

Financial statement—Capital stock authorized, $300,000 paid in, $45,000; funded debt, $240,000.

C. W. Scofield, President, New York City.

B. W. Morgan, Vice-President, Pittsburgh, Pa.

W. B. Wells, Sec'y. and Treasurer, Salt Lake City, Utah Ter.
George Goss, Superintendent, Salt Lake City, Utah Ter.

CAIRO AND ST. LOUIS RAILROAD.

This Company was organized in 1865, and a charter incorporating it passed February 16th, authorizing it to construct a railroad between St. Louis and Cairo, a distance of 145 miles. In 1867 the charter was amended, but nothing was done until 1871, when it was resolved to build the line on a three-feet gauge. The surveyed route of the road passes through the fertile counties of St. Clair, Monroe, Randolph, Jackson, Union and Alexander, touching at the towns of Columbia, Waterloo, Red-bud, Sparta, Murphysboro and Jonesboro. It passes through the finest fruit-growing district of Illinois and by the Chester and Big Muddy coal fields, and through large tracts of timbered land, much of which is yet to be cultivated. The first ground was broken August 30, 1871, and during 1872 thirty miles were operated. The following year sixty-two miles were constructed, bringing the line to Murphysboro. In 1874 twenty-six miles were built northward from Cairo, leaving a gap of thirty-two miles to be ironed during 1875, and which is now being laid.

The maximum grade is 95.48 feet to the mile, and on many parts of the line the gradient is heavy, but it is the intention of the managers to reduce the grades to a maximum of 75 feet per mile.

The sharpest curvature is 7° (819 feet radius), and to retain it within this limit, the engineers have in many places incurred great expense in excavation and embankment.

Several tunnels occur in the alignment, one being 1000 feet in length.

The weight of rail is 40 pounds to the yard.

The weight of engines from 10 to 23 tons.

Estimated cost of road per mile, including equipment, $20,894.

Equipment—11 locomotives, 7 passenger cars, 3 baggage, mail and express, 403 freight cars of all classes.

Operations for year commencing September 16, 1873, and ending June 30, 1874.

Gross earnings, $175,023.41. Operating expenses, $138,-977.25 (79.4 per cent.). Net earnings, $36, 046.16.

Financial statement—Capital stock authorized, $5,000,000; paid in, $2,626,000. Funded debt. First mortgage 7 per cent. bonds due 1901, $2,500,000; floating debt, $266,805.45; total liabilities, $5,392,805.45; average amount of stock and debt per mile of road, $35,952.03.

S. Staats Taylor, President, Cairo, Illinois.

F. Bross, Secretary, Cairo, Illinois.

F. E. Canda, General Manager, St. Louis, Illinois.

General Office, 304 North Fifth Street, St. Louis, Illinois.

CENTRAL VALLEY RAILROAD.

This company was incorporated by the Legislature of New York to build a narrow gauge railway between Bainbridge, a station on the Albany and Susquehanna Railroad, and Smithville Flats, Chenango county, N. Y., a distance of 12 miles. Construction commenced in 1872, and the line was opened for traffic the following year. It is purposed to extend it to McDonough, 12 miles further.

Efforts to obtain statistical information from this road have been without result.

Passenger cars were built for it by Messrs. Jackson & Sharp, of Wilmington, and freight cars by Messrs. Bill[illegible]meyer & Smalls, of York, Pa.

H. S. Crozier, President, Smithville Flats, N. Y.

Thomas Hurley, Contractor, Smithville Flats, N. Y.

CHESTER AND LENOIR RAILROAD.

This company was organized at Newton, N. C., on the 10th of July, 1873, to build a narrow gauge railway from Chester, S. C., to Lenoir, N. C., a distance of 105 miles. During that year negotiations were commenced for the purchase or consolidation of the King's Mountain Railroad, a line of 5 feet gauge, running between Chester and Yorkville 22 miles, with the intention of converting it into a 3-feet gauge, to form part of the Chester and Lenoir Railroad. The negotiations were consummated April 3d, 1874, and the change of gauge and disposal of the broad gauge rolling stock commenced forth-

with. On August 31st the line was opened, and the first train on the narrow gauge ran through between Chester and Yorkville. Fifty miles that are under construction will be completed and opened during 1875.

The maximum grade is 100 feet to the mile.

The weight of rail is 30 pounds to the yard.

The weight of engines 10 tons.

Cost per mile, including equipment, $8,000.

Equipment—1 locomotive, 2 passenger cars, 10 freight cars of all classes.

A. H. Davega, President, Chester, S. C.

Fleming Gardner, Chief Engineer, Chester, S. C.

COLORADO CENTRAL RAILROAD.

This company was organized in 1871, under the auspices of the Union Pacific Railway, to build narrow gauge lines from Golden to Central City and Georgetown, a total distance of 49 miles. At Golden connection is made with the Colorado Central, standard gauge railway, which runs to Denver.

During 1872 twenty-one miles were operated, and the following year four miles additional. No mileage was completed in 1874. The total line operated on December 31st was 25 miles. Twenty-four miles are under construction.

The maximum grade is 275 feet to the mile, and the average grade heavy.

The sharpest curvature 42° (136 feet radius).

The weight of rail is 32 pounds to the yard.

The weight of engines from 11 to 18 tons each, nearly all being placed over the drivers.

Equipment—6 locomotives, 3 passenger cars, 54 freight cars of all classes.

H. M. Teller, President, Central City, Col.

J. L. Overton, Superintendent, Central City, Col.

CROWN POINT RAILROAD.

This Company was organized in 1874 to build a narrow gauge railway from Crown Point, on Lake Champlain, where the furnaces of the Crown Point Iron Company are situated, westward thirteen miles to their ore beds. The road was completed

and put in operation during the summer of the same year. The line is controlled and operated by the Crown Point Iron Company.

The weight of rail is 45 pounds to the yard.

The engines were built at Scranton by the Dickson Manufacturing Company, and the cars at Crown Point by the Company.

Cost of road, including equipment, per mile, $25,000 cash.

No further statistical information could be obtained.

The line is reported as being successfully operated.

John Hammond, President, Crown Point, N. Y.

Thomas Dickson, Treasurer, Scranton, Pa.

S. M. Weed, Secretary, Crown Point, N. Y.

DENVER AND RIO GRANDE RAILWAY.

This company was incorporated October 27, 1870, under the General Railroad Law of Colorado, to construct a railroad from Denver to El Paso, on the border of Mexico, and thence if suitable concessions could be obtained from the Government of Mexico, to the capital of that Republic, a projected distance of about 1720 miles, of which 850 would be in the United States.

General Palmer, the President of the railway, who is well acquainted with the topography of the Rocky Mountain region, and with the proposed line of route, and resources of the country, after studying the narrow gauge lines in Europe, proposed to build the Denver and Rio Grande Railway on a 2 feet 6 inch gauge. After, however, carefully weighing all the statistics and considering the interests and requirements of the section of territory through which the line would pass, it was finally decided to adopt a gauge of three feet, as the one best adapted to the many and diversified wants of Southern Colorado and New Mexico. Work was commenced early in 1871, and the first spike on a narrow gauge track was driven on Friday, July 28th. The first narrow gauge train was run over the three miles of track completed, on August 16th, and the first division of 76 miles, from Denver to Colorado Springs, was opened for general traffic on October 27th, 1871. The second

division, from Colorado Springs to South Pueblo, 43 miles, was completed and opened, June 15th, 1872.

On the Arkansas Valley branch, 38 miles, from South Pueblo to the coal mines of Fremont county, were completed and put in operation November 1st, 1872, and 9 miles from coal mines to Cañon City, were constructed and opened for general traffic, July 6th, 1874.

Resume:

Main line, Denver to South Pueblo	119	miles.
Branch, South Pueblo to Cañon City	47	"
Side track	6	"
Total track mileage, December 31, 1874	172	miles.

The line is graded to Huerfano, 40 miles, which will be ironed during 1875, and also 50 miles further to Trinidad.

The maximum grade is 75 feet to the mile, and the average grade 36 feet to the mile.

The sharpest curvature is 19° (302.94 feet radius), and the proportion of curvature to tangent as 3 is to 5.

The weight of rail is 30 and 35 pounds to the yard.

The weight of passenger engines 12 tons.

The weight of freight engines 17 tons.

Equipment—13 locomotives, 12 passenger cars, 4 baggage, mail and express cars, and 323 freight cars of all classes Miller platforms and Westinghouse brakes are in use on all the passenger trains.

Operations for fiscal year ending December 31, 1873: Gross earnings, $392,653.89. Operating expenses, $197,124.31 (50.2 per cent.). Net earnings, $195,529.58.

The *net earnings* increased for the year 88¼ per cent. over 1872.

For the year ending December 31, 1874, the gross earnings are approximated at $376,987, and the operating expenses at 56 per cent. of the same.

Financial statement—The capital stock is unlimited, but in no case to be less than the total debt of the company. According to the latest returns the capital stock paid in was $3,300,000; Funded debt, first mortgage; 7 per cent. gold bonds, $3,196,500; floating debt, none. Total liabilities, $6,496,500.

Wm. J. Palmer, President, Colorado Springs, Col.

Robt. H. Lamborn, Vice-president, Philadelphia, Pa.

William S. Jackson, Secretary and Treasurer, Colorado Springs, Col.

W. W. Borst, Superintendent, Denver, Col.

DENVER, SOUTH PARK AND PACIFIC RAILROAD.

This company was organized in 1872 to build a narrow gauge railway from Denver, Colorado, southwesterly into the South Park, a fine agricultural, dairying and stock raising region, a projected distance of about 100 miles. Various causes prevented the commencement of construction until 1874, when 16 miles were completed and opened to Morrison, where there are Sulphur Springs and other attractions. During 1875 the line will be completed to Fairplay, about 50 miles.

The maximum grade is 105 feet to the mile.

The sharpest curvature 20° (288 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of engines 14 and 18 tons—12 and 15 tons respectively being placed over the drivers.

The operating expenses for the first six months were three-fourths of gross earnings, and the Superintendent writes that had it been broad gauge it could not have been operated with total earnings. He considers it a success in every respect.

Hon. John Evans, President, Denver, Colorado.

Benjamin M. Gilman, Superintendent, Denver.

DES MOINES AND MINNESOTA RAILROAD.

This company was incorporated by the Legislature of Minnesota in 1873, to build a railway from Des Moines to Ames, a station on the Chicago and North-western Railway, a distance of thirty-seven miles; the line has since been extended to McGregor in Clayton County, one hundred and sixty miles further. At first it was proposed to construct it of the standard gauge, but subsequent consideration induced the laying down of a three feet gauge track. Grading was completed in November, 1873, and track-laying commenced at Des Moines

January 12th, 1874, the line being completed and opened for traffic to Ames, July 29th.

The maximum grade is 80 feet to the mile.

The sharpest curvature 12° (478 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of engines 15 tons, 12 tons being placed over the drivers.

Cost of road per mile, including equipment, $7,000.

Equipment—2 locomotives, 2 passenger cars, 2 baggage and express, 44 freight cars of all classes.

Operations, for the three months that the entire road has been opened, have averaged per month, gross earnings, $4,000 operating expenses, $2,500.

Financial Statement—Capital stock authorized, $300,000; paid in, $300,000; Funded debt: First mortgage, $130,000; Second mortgage, $70,000. Total funded debt, $200,000; Floating debt, $20,000.

James Callanan, President, Des Moines, Iowa.

J. J. Smart, Vice President and Supt., Des Moines, Iowa.

Chas. H. Getchell, Treasurer, Des Moines, Iowa.

J. B. Stewart, Secretary, Des Moines, Iowa.

EAST BROAD TOP RAILROAD.

This company was incorporated May 24th, 1871, under the general railroad law of Pennsylvania, to construct a railway rom Mount Union, on the Pennsylvania Railroad, to Robertsdale, Huntingdon County, where are situated some coal mines, a distance of 30 miles. The line was placed under construction during 1872, and the following year 11 miles were operated between Mount Union and Orbisonia, at which place are the iron furnaces of the Rock Hill Coal & Iron Co. During 1874, the nineteen miles between Orbisonia and Robertsdale were constructed, and the entire line formally opened for traffic on October 16th. The grade is very heavy and the alignment tortuous, two tunnels of 830 feet and 1,150 feet, respectively, having to be driven to reduce the grade and reach the desired point.

The maximum grade is 140 feet to the mile, and is continu-

ous for three miles, the average grade for the entire line being 80 feet.

The sharpest curvature is 17° (338 feet radius).

The weight of rail laid is 40, 45 and 50 pounds to the yard, and the track is well ballasted, so that trains run very smoothly.

The weight of passenger engines is 17 tons.

The weight of freight engines is 25 tons.

Equipment—5 locomotives, 2 passenger cars, 1 baggage, mail and express, 146 freight cars of all classes.

The construction account not being closed, the cost per mile cannot be given.

Financial statement, January 1st, 1875—Capital stock authorized, $500,000; subscribed, $489,900; paid in, $409,000. Funded debt 7 per cent.; first mortgage bonds, $388,000.

Wm. A. Ingham, Prest., 320 Walnut street, Philadelphia, Pa.

A. W. Sims, Superintendent, Orbisonia, Huntingdon, County, Pa.

EUREKA AND PALISADE RAILROAD.

This company was organized in 1873 to construct a narrow gauge railway from Eureka, Nevada, southward to Palisade, a station on the Central Pacific Railway, a distance of 81 miles. Work was commenced in 1874, and during the year 50 miles were constructed and opened to traffic about the end of the year; the balance of the line is being pushed to completion.

The line is laid with steel rails, 40 pounds to the yard.

Estimated cost of road per mile, including equipment, $10,000.

Equipment—2 locomotives, 2 passenger cars, 25 freight cars.

Edgar Mills, President, Sacramento, Cal.

George H. Rice, Superintendent, Salt Lake City, Utah.

Woodruff & Anna, Agents, Palisade, Nev.

GALENA AND SOUTHERN WISCONSIN RAILROAD.

This company was organized in 1871 to construct a railroad from Galena, on the Illinois Central Railroad, via Platteville to

Muscoda, on the Wisconsin River, a distance of 72 miles. During 1872–3 thirty miles were graded and bridged, and one tunnel of over 400 feet in length driven. Various causes prevented track laying until September 1874, when the above mileage was ironed.

The maximum grade is 74 feet to the mile.

The sharpest curvature, 10° 40′ (537 feet radius).

The weight of rail is 35 pounds to the yard.

The weight of engines 14 and 16 tons.

Cost per mile, including equipment, $11,000.

Equipment—2 locomotives, 1 baggage and smoking car, 28 freight cars of all classes.

Operations—The line having only been open a few weeks, no returns are made.

Financial statement—No returns.

James M. Ryan, President, Galena, Ill.

Edward Harding, Chief Engineer, Galena, Ill.

GOLDEN CITY AND SOUTH PLATTE RAILROAD.

This company was organized in 1871, under the laws of Colorado, to construct a narrow gauge road from Golden, where connection is made with the Colorado Central Railway, south-eastward, to Acequia, a station on the Denver and Rio Grande Railway, a distance of 20 miles. During 1873 the line was graded, and the following year 18 miles were ironed, but owing to the panic, the rolling stock has not yet been obtained.

The maximum grade is 148 feet to the mile.

The sharpest curvature 18° (319 feet radius).

The weight of rail is 30 pounds to the yard.

Financial Statement—Capital stock, $400,000.

E. L. Berthoud, Secretary, Golden, Col.

IOWA EASTERN RAILROAD.

This company was incorporated in 1871 to construct a narrow gauge railway from Beulah, on the Chicago, Milwaukee & St. Paul Railway, south-west via Elkader to Des Moines, a distance of about 200 miles. Work commenced in the early part of 1872, and during the summer, 15 miles were laid. In

October the line was opened for traffic, without a station, engine house, water tank, turn table and money. The only station at the south end was a cloth tent, and that at Beulah a baggage car. Box tops were put on platform cars and 16 transformed into box cars. In the face of the greatest difficulties, the railroad was kept in operation during the winter of 1872–3, all freight at Beulah having to be transhipped by hand, the grain having to be handled in sacks. In December, 1872, 100 car loads of freight were delivered to the Chicago, Milwaukee & St. Paul Railway, which made a very liberal arrangement by which the little road obtained a fair return. During 1873 the railroad was extended one mile toward Elkader; a station and grain warehouse built at the terminus; a water tank, turn table and side track put in, and station buildings erected at St Olaf, Farmersburg, Bismarck and Froelich, and the C. M. & St. P. Railroad built a station house at Beulah, and ample side tracks, and the Iowa Eastern put in an engine house, turn table and side tracks. The track of the narrow-gauge was elevated above the other railroad, so that now grain is handled in bulk, being spouted into the broad gauge cars—from five to eight minutes per small car. During December the railroad handled from 16 to 24 car loads per day to C. M. & St. P. Railroad, and hauled, during the week, including January 1st, 126 car loads into Beulah. In December 153 broad gauge cars were loaded from the narrow gauge—three times the amount done in December, 1872. In January, 1874, they earned enough to pay for all improvements. This railroad has demonstrated its capacity to do the business of the country—handling hogs, cattle, flour, grain, lumber, everything offered, at fair and reasonable rates.

During 1874 the road was constructed to Elkader, 4 miles, and the surveys made to Motor, 20 miles further.

The weight of rail is 30 pounds to the yard.

The weight of engines, 10 tons.

Cost of road per mile, including equipment, $12,000.

Equipment—2 locomotives, 2 passenger cars, 2 baggage cars and 25 freight cars of all classes.

Operations for year ending December 31, 1873, 16 miles;

gross earnings, $24,341.04; operating expenses, including repairs, $15,622.52; net earnings, $8,718.52.

Financial statement not published.

E. H. Williams, President, McGregor, Iowa.

W. D. Cooke, Treasurer, McGregor, Iowa.

KANSAS CENTRAL RAILROAD.

This Company was organized on the 1st of June, 1871, with the above title, to construct a railway westward from Leavenworth to Denver, with branches from Holton to Netawaka, and Clay Centre to Salinas, a total length of main line and branches as projected of 550 miles. The country to be traversed is acknowledged to be the most fertile and promising section of Kansas; the line of road passing through the most densely populated agricultural region of the State. Construction was commenced in 1872, and during that year 56 miles were completed and put in operation between Leavenworth and Holton.

The maximum grade is 75 feet to the mile.

The sharpest curvature, 12° (478 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of passenger engines, 12½ tons.

The weight of freight engines, 17½ tons.

Cost of road, with equipment, per mile, $14,820.

Equipment—3 locomotives, 2 passenger cars, 91 freight cars of all classes.

Operations and financial statement not published.

L. T. Smith, President, Leavenworth, Kans..

Paul E. Havens, Secretary, Leavenworth, Kans.

Wm. R. Martin, Superintendent, Leavenworth, Kans.

MARTHA'S VINEYARD RAILROAD.

This company was organized in 1874 to construct a narrow gauge railway across the Island of Martha's Vineyard, Mass., between Oak Bluffs and Katama, a distance of 9 miles, to accommodate the summer pleasure travel. Work was commenced in the early part of the year, the line being completed and open for traffic August 24th.

The maximum grade is 52 feet to the mile.

The weight of rail is 30 pounds to the yard.

The weight of engine, 10 tons.

Equipment—1 locomotive, 2 passenger cars.

The Secretary writes: The receipts for the two weeks alone demonstrated it to be a perfect success. Had it not been for the delay in rolling stock being ready, the Company could have declared a ten per cent. dividend.

E. P. Carpenter, President, Foxboro, Mass.

J. H. Hills, Secretary, Edgartown, M. V.

Henry Ripley, Superintendent, New Bedford, Mass.

MEMPHIS BRANCH RAILROAD.

This Company was organized at Rome, Georgia, in 1873, to construct a narrow gauge railway from Rome westward to Gadsden, Alabama, a distance of about 17 miles, which were graded and five miles ironed about the end of the year.

The maximum grade is 66 feet to the mile.

The sharpest curvature, 4° 30′ (1273½ feet radius.)

The weight of rail is 28 pounds to the yard.

The weight of engine, 10 tons.

Cost per mile, including equipment, $13,600.

Equipment—1 locomotive, 1 passenger car, 5 freight cars of all classes.

W. S. Cothran, President, Rome, Ga.

C. H. Stillwell, Secretary and Treasurer, Rome, Ga.

C. M. Pennington, Superintendent, Rome, Ga.

MINERAL RANGE RAILROAD.

This Company was chartered by the Legislature of Michigan in 1871, for the purpose of constructing a railroad from Copper Harbor, on Lake Superior, thence following the general direction of the Mineral Range (so called), southwesterly to some point on the Ontanagon river, an estimated distance of 100 miles. Construction on the first division (Hancock to Calumet), 12½ miles, was commenced on the opening of the summer of 1872, and after the long winter succeeding, was resumed and carried on with all the energy requisite to over-

come the obstacles presented by the hard climate and rough face of the country. Track laying was commenced August 8, 1873, and on September 8, trains were run from Hancock to Highway Crossing, 8 miles, and on October the 11th, to Calumet, 12½ miles. There has been no further construction.

The maximum grade is 211 feet to the mile. There is also a grade of 146 feet per mile sustained for two miles.

The sharpest curvature is 14° (410 feet radius).

The weight of rail is 35 pounds to the yard.

The weight of engines, six drivers connected, 17½ and 20 tons; with the exception of two tons all placed over the drivers.

Cost of road per mile including equipment, $23,714.03.

Equipment—2 locomotives, 4 passenger cars, 24 freight cars of all classes.

Operations for year ending December 31, 1874—Gross earnings, $99,089.48. Operating expenses, $54,559.60 (55.01 per cent.); net earnings, $44,529.88.

Financial statement—Capital stock subscribed, $107,700; paid in, $101,525. Funded debt, first mortgage 8 per cent., bonds $167,500. Floating debt, $73,697.33. Total liabilities, $342,722.33.

Chas. E. Holland, President, Hancock, Mich.
Jas. H. Macdonald, Superintendent, Hancock, Mich.

MONTEREY AND SALINAS VALLEY RAILROAD.

This company was organized early in 1874, by the farmers of Salinas Valley, California, who were at the mercy of railroad corporations in that State for the purpose of carrying their grain, etc., to the sea, instead of to San Francisco, and which would make them independent of monopoly in any form whatever. With an enterprise that does them much credit, they went to work and located a line between Salinas and Monterey, where there is deep water, a distance of 19 miles, and also erected two large warehouses opening the line for traffic in October. In the spring of 1875, it is intended to extend the railroad up the valley to Soledad, 35 miles.

The maximum grade is 100 feet to the mile.

The sharpest curvature, 10° (573 feet radius).

The weight of rail is 35 pounds to the yard.

The weight of engines 18 tons.

Cost of road per mile, including equipment and erection of two warehouses, $13,000.

The line is reported as doing a very good business.

Financial statement not returned.

C. S. Abbott, President, Salinas City, Monterey County, California.

John Markley, Secretary, Salinas City, Monterey County, California.

MONTROSE RAILROAD.

This company was incorporated April 15, 1869, under the general law of Pennsylvania, to build a railway between Montrose and Tunkhannock. No action was taken until April 27, 1871, when the first meeting was held and the board of directors elected. It was then resolved that the road should be built on a narrow gauge of three feet, as it would be sufficient for all the business likely to be offered, and could be constructed for so much less than a 4 feet 8½ inch gauge.

Surveys were commenced May 15th, 1871, and a favorable line, 28 miles long, located as follows: From the depot of the Pennsylvania and New York Canal and Railroad Company at Tunkhannock to Marcy's Pond, thence along the west bank of the Pond to a summit between the waters of Marcy's Pond and the Meshoppen Creek, crossing the same, it runs in a nearly direct line to the village of Springville, thence by the village of Dimock into the borough of Montrose. Grading was commenced in the summer. The Lehigh Valley Railroad Company agreeing to furnish the rails, ties, spikes and splices necessary for the superstructure as soon as it was completed. During 1872, the line was placed in running order to Springville, 14 miles, and by the end of 1873, to Allenville, 25 miles.

The maximum grade is 95 feet to the mile; the average ascending grade between Tunkhannock and Montrose being 38 feet to the mile.

The sharpest curvature is 18° (320 feet radius).

The weight of rail is 40 pounds to the yard.

The weight of engine, 15 tons.

Cost of road, including equipment, per mile, $12,844.

Equipment—2 locomotives, 2 passenger cars, 1 baggage, mail and express car, 13 freight cars of all classes.

Financial statement, December 31, 1873—Capital stock authorized, $500,000; subscribed, $278,450; paid in, $248,-351. Funded debt, 7 per cent. bonds maturing 1892, $30,900; Floating debt, $43,821.84. Total liabilities, $323,072.84.

James J. Blakslee, President, Mauch Chunk, Pa.

Charles L. Brown, Secretary, Montrose, Pa.

NATCHEZ, JACKSON AND COLUMBUS RAILROAD.

This Company was incorporated by the Legislature of Mississippi, in 1871, to construct a railway from Natchez, via Jackson to Columbus, a distance of about 180 miles. Work was commenced in the latter part of 1872, a gauge of 3′ 6″ being adopted, and the road located from Natchez northeast 25¾ miles to Fayette, the county seat of Jefferson county—the road bed being completed for 12 miles out of Natchez. The rails were laid on ten miles during 1873. On February 10, 1874, the President of the Company invited proposals for the construction, completion and equipment of the road to Fayette, the company paying no money on the contract, but offering its property and resources for the ultimate satisfaction of the contractor, which consists of bonds of the county of Adams, amounting to $134,900, bearing an interest of seven per cent., payable annually; of timber sufficient for all bridges as far as 3 44-100 miles from the terminus of the completed section, of one hundred tons of rails, not yet laid, and the power of the company for leasing or mortgaging the road, which is now unincumbered.

Every effort to obtain late information has been unsuccessful.

W. D. Martin, President, Natchez, Miss.

J. H. Fitzpatrick, Secretary, Natchez, Miss.

S. M. Preston, Chief Engineer, Natchez, Miss.

NORTH PACIFIC COAST RAILROAD.

This Company was incorporated and certificate filed in the office of the Secretary of State of California, December 19, 1871.

The line of route is as follows: Starting at deep water at Sancelito, just opposite the City of San Francisco, with which it connects by ferries, it skirts for two miles the shore of Richardson's Bay, thence crossing an arm of the same bay by means of a substantial bridge 4,000 feet in length, it passes through Marin county, via the town of San Rafael, to Tomales, at the head of the bay of that name, thence through Sonoma county to the Russian River, crossing which four miles from its mouth, it follows near the coast of the ocean to the mouth of the Walhalla River, a distance of 115 miles, and is projected from there to Humboldt Bay, making total length of line 225 miles. The line passes through a very fertile and wealthy region. The topography of the country it traverses warranted the largest estimate of economy in first cost, equipment and operation. The narrow gauge possessing these features, it was accordingly adopted.

The surveys were made in 1872, work being commenced at various points on the main line in February of the following year. Owing to the several tunnels, bridging and trestle work, track-laying was delayed until 1874, when 51 miles were ironed and opened for traffic about the end of the year. Thirty miles are under construction, and will shortly be put in operation.

The maximum grade is 121 feet to the mile, maintained for 2½ miles. There is also one of 85 feet, 1½ miles long, and another of 80 feet, 2 miles in length, and the average grade is exceptionally heavy.

The sharpest curvature is 22° 23′ (256 feet radius) set out on the maximum grade. The prevailing curvature is 10° to 16°; the proportion of curvature to tangent being about as 5 is to 3.

Number of lineal feet, trestle and pile bridges, 17,600.

Number of lineal feet, truss bridges, 570.

There are several tunnels on the line, one being 1250 feet in length.

The weight of rail is 35 pounds to the yard.

The weight of engines, four wheels and six wheels connected, is 22½ tons, 16 and 17 tons being placed over the drivers. One engine, on the Fairlie principle, single boiler, six wheels connected, weighs 32 tons, 24 tons being placed over the drivers.

The average cost per mile, including equipment for first division, is estimated at $23,400.

Equipment—5 locomotives, 9 passenger cars, 3 baggage, mail and express, 101 freight cars of all classes.

Operations—The line having just been opened, no returns have been received.

A. D. Moore, Prest., 426 California street, San Francisco, California.

Howard Schuyler, Chief Engineer, San Francisco, Cal.

Geo. F. Hartwell, Superintendent, San Francisco, Cal.

NORTH AND SOUTH OF GEORGIA RAILROAD.

This Company was organized in the city of Rome, Ga., on August 11th, 1871, under and by an act of the Legislature of the State of Georgia, approved October 24, 1870, to construct a narrow gauge railway from Columbus to Rome, a distance of 130 miles via La Grange and Carrollton.

During 1872, some 60 miles were graded, and in the latter part of the year a few miles were ironed. In 1873, 23 miles were opened for traffic between Columbus and Hamilton Nothing further has been done owing to the late panic, and the railway has now passed into the hands of a Receiver since its failure to pay the interest on the bonds issued it by the State.

The maximum grade is 90 feet to the mile.

The sharpest curvature 6° (955 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of engines 15 tons.

Cost per mile, including equipment, $15,000.

Equipment—2 locomotives, 2 passenger cars, 4 baggage and express, 16 freight cars of all classes.

Operations and financial statement not published.

T. E. Blanchard, President, Columbus, Ga.

Dr. Llewellen, Receiver, Columbus, Ga.

OHIO AND TOLEDO RAILROAD.

This Company was incorporated in 1872, and is a continuation of the Painesville and Youngstown Railroad, with which it connects at the latter point, running by the valley of Mill Creek to Columbiana, thence by way of Leetonia, Guilford, Hanover, Lynchburg, East Rochester, Minerva, Oneida and Carrollton, to the Conotton Valley, terminating at Cannonsburg, in the vast coal fields of Carroll and Tuscarawas counties, a total distance of 65 miles and from thence is projected to Toledo. Work was commenced in the summer of 1874, and 22 miles, between Oneida and Guilford, built on the towing path of the old Sandy and Beaver Canal, were completed and opened for traffic in September. The balance of the road is now under construction and will be in operation during 1875.

The grades and curves are very easy.

The weight of rail is 32 pounds to the yard.

The weight of engines, 16 tons.

Cost per mile, including equipment, estimated at $9,000.

Equipment—2 locomotives, 2 passenger cars, 6 freight cars of all classes.

E. R. Eckley, President, Minerva, Ohio.

Geo. P. Davis, Treasurer, Minerva, Ohio.

S. Weaver, Secretary, Minerva, Ohio.

OLYMPIA RAILROAD.

This Company was organized in 1873, at San Francisco, to construct a narrow gauge railway from Olympia, the capital of Washington Territory, to Tenino, twenty-five miles below Puget Sound, where are situated some coal lands—a distance of about 20 miles. Work was commenced in 1874, and about the end of the year the line was completed. No statistical information could be obtained.

Average cost of road per mile, including equipment, $15,000.

Financial statement—Capital stock authorized, $1,000,000.

Olympia Railroad and Mining Company, San Francisco, California.

PAINESVILLE AND YOUNGSTOWN RAILROAD.

This company was organized, and certificate of incorporation filed in the office of the Secretary of State for Ohio, November 17, 1870; being, we believe, the second narrow gauge railway company formed in the United States.

The capital stock authorized by the charter is $2,000,000, and the line of route from Fairport Harbor, Lake Erie, via Painesville to Youngstown, a distance of 64 4-10 miles.

The engineers commenced surveying the line on July 24th, 1871. In locating the line the advantages offered by the partially constructed road-bed of the Painesville and Hudson Railroad were availed of to Chardon, a distance of 12 miles. The company for the use of this road-bed paid $60,000.

On July 4th, 1872, twelve miles were completed and put in operation, and in the following year eleven miles additional, making the total line operated during 1873, 23 miles. Forty-one miles were completed in 1874, thus making the total amount of track laid on December 31st, 1874, 64 miles, of which only fifty miles were operated, owing to want of depôt facilities, and difficulties of procuring right of way through the corporation limits of the city of Youngstown.

The maximum grade which it was found necessary to maintain for two miles is 82 feet per mile; there is also one of 60 feet maintained for three miles.

The sharpest curvature is 14° (410 feet radius).

The weight of rail is 35 pounds to the yard.

The weight of passenger engines 12 tons.

The weight of freight engines 18 tons.

Average cost per mile, including equipment, $19,000.

Equipment—6 locomotives, 4 passenger cars, 2 baggage, mail and express cars, 73 freight cars of all classes.

Financial Statement—According to the latest returns, captal stock authorized, $2,000,000; paid in, $571,314.

Paul Wick, President, Youngstown, Ohio.
A. B. Cornell, Secretary, Youngstown, Ohio.
Mason Evans, Assistant Secretary, Youngstown, Ohio.
G. R. Crane, Superintendent, Youngstown, Ohio.

PARKER AND KARNS CITY RAILROAD.

This Company was incorporated June 30th, 1873, under the General Railroad Law of Pennsylvania, to construct a narrow gauge railway from Parker Junction, on the Alleghany River, to Karns City, in Butler county, a distance of 10 miles. The line runs up the winding valley of Bear Creek, passing through Petrolia and the lower oil regions, and is projected beyond Karns City to Millerstown. The road was placed under construction in 1873, and by the end of the year four miles were in operation. On April 8th, 1874, the line between Parker Junction and Karns City was formally opened for traffic.

The maximum grade is 96 feet to the mile, and the average for the entire line 83 feet to the mile.

The maximum curvature on the main line is 27° (212 feet radius), on side track 47° (122 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of passenger locomotives 16½ tons.

The weight of freight locomotives 18 tons.

The cost per mile, including equipment, $26,012.88.

Equipment—4 locomotives, 5 passenger cars, 2 baggage, mail and express, 43 freight cars of all classes.

Operations for year ending December 31st, 1874:

During the first three months only four miles were operated, and in the latter part of the year the expenses were exceptionally heavy, so that the following figures should not be taken as a test of the road:

Gross earnings $131,689.90; operating expenses, $74,997.01 56.9 per cent). Net earnings $56,692.89.

Financial Statement.—Capital stock authorized, $150,000; paid in, $75,000; funded debt, first mortgage 7 per cent. gold bonds, $63,000; floating debt, $78,442.44. Total liabilities, $216,442.44.

Saml. D. Karns, President, Parker, Pa.

F. Parker, Vice-President, Parker, Pa.
R. M. Moore, Auditor, Parker, Pa.
W. C. Mobley, Superintendent, Parker, Pa.

PEACHBOTTOM RAILROAD.

This company was incorporated by an Act of the General Assembly of Pennsylvania, approved March 24th, 1868. Supplements thereto were passed at the sessions of the Legislature in 1871–2, 1872–3, granting additional privileges. During 1872 the line was located as follows: Leaving Oxford on the Philadelphia and Baltimore Central Railroad, it pursues a westward course through Lancaster county, crossing the Susquehanna river just opposite Peachbottom, thence northwestward to York, a distance of 60 miles. From York it is proposed to extend the line to the eastern terminus of the East Broad Top Railroad, 85 miles, thus forming a through coal route 145 miles in length, from the great coal field of Broad Top eighty square miles in area to the eastern markets. Some twelve miles were graded in 1872, and during the following year track was laid on eight miles, but was not operated. In 1874, 38 miles were completed and put in operation. Twenty-two miles are now under construction, and will be opened shortly.

The maximum grade is 100 feet to the mile.

The sharpest curvature 19° (303 feet radius).

The weight of rail is 30 pounds to the yard.

The weight of engines 10 to 12 tons, all placed over drivers.

Equipment—3 locomotives, 3 passenger cars, 18 freight cars of all classes.

Operations and financial statement not reported.

S. G. Boyd, President, York, Pa.
Samuel Dickey, Vice President, Oxford, Pa.
Wm. Wallace, Secretary, Hopewell Centre, Pa.

PEEKSKILL VALLEY RAILROAD.

This railway was built by the Peekskill Iron Company in 1873, from their furnaces, at Peekskill, Westchester county, to a point on the Hudson River Railroad, a distance of five and a-half miles. The gauge of this railway is two feet, and

it is the narrowest on this continent. The superstructure and equipment is very light. The only statistical data obtained is that the weight of the engine is four tons.

Communications should be addressed to the company.

PITTSBURG AND CASTLE SHANNON RAILROAD.

This company was incorporated under the General Railroad Law of Pennsylvania, April 4th, 1868, to construct a railway from Pittsburg to Finleyville via Castle Shannon, where are situated the coal mines of the company; the line has since been projected to Waynesburg, in Greene county, 45 miles south of Pittsburg. Part of the road was purchased from the Pittsburg Coal Company, who had laid down a track of 3 feet 4 inches, which gauge has been adhered to. During 1872 three miles were placed in operation, and the following year three additional, bringing the line to Castle Shannon. In 1874 four miles were constructed, making total length of track laid, December 31st, 10 miles. The entire road is built very substantially in order to sustain a heavy coal traffic.

The maximum grade is 80 feet to the mile.

The sharpest curvature 45° 50′ (125 feet radius).

The weight of rail is 45 pounds and 60 pounds to the yard

The weight of passenger engine, 12 tons.

The weight of freight engines, from 9 to 20 tons.

Cost per mile, including equipment, $40,000.

Equipment—6 locomotives, 6 passenger cars, 3 freight cars, 300 coal cars.

Operations for year ending December 31st, 1874: gross earnings, $352,000; operating expenses, $280,000 (79.54 per cent.); net earnings, $72,000.

Financial Statement—Capital stock authorized, $1,000,000; paid in, $541,000, funded debt, first mortgage 6 per cent. bonds, $246,000; floating debt, $83,000. Total liabilities, $870,000.

M. D. Hays, President, Pittsburg, Pa.

Josiah Reamer, Secretary and Treasurer, Pittsburg, Pa.

RIO GRANDE RAILWAY.

This Company's charter is dated August 12th, 1870, but it was not organized till May 22d, 1871, when it was resolved to build a railway from Brownsville on the Rio Grande, opposite Matamoras, Mexico, eastward to Point Isabel, in the harbor of Brazos Santiago on the Gulf of Mexico, a distance of 22 miles, with a gauge of 3 feet 6 inches. Work was commenced in 1872, and eight miles constructed during that year. In 1873 fourteen miles were built, completing the road, when it was opened for traffic.

The maximum grade is 8 feet to the mile, and the curvature almost nil.

The weight of rail is 36 pounds to the yard.

The weight of engines is 14 tons.

The Secretary reports that they are doing a very good business.

Financial statement not published.

Antonio Longaria, Pres't, Brownsville, Cameron Co., Texas.

Jos. Kleiber, Secretary, Brownsville, Cameron Co., Texas.

H. N. Zook, Superintendent, Brownsville, Cameron, County, Texas.

RIPLEY RAILROAD.

This Company was organized in 1871, to build a narrow gauge road from Middletown, a station on the Memphis and Charleston Railroad, to Ripley, in Tippah county, Miss., a distance of 26 miles. Grading was commenced and completed by the Company, and the iron and equipment furnished by the Southern Security Company, who own and operate the road; the line being opened for traffic in the latter part of 1872.

The maximum grade is 106 feet to the mile.

The weight of rail is 35 pounds to the yard.

The weight of engines, 12 to 15 tons.

Cost of road, including equipment, per mile, $12,500.

Equipment—2 locomotives, 2 passenger cars, 1 baggage, 15 freight cars of all descriptions.

Operations and financial statement not published.

Communications should be addressed to the Southern Security Company, Memphis, Tenn.

SAN LUIS OBISPO RAILROAD.

This Company was organized in 1873 to construct a narrow gauge railway from San Luis Obispo, California, to the steamer landing on the bay at Avila, thence south via Arroya Grande into Santa Maria county, a distance of about 36 miles. Work was commenced in 1874 on the division between San Luis Obispo and Avila, 9 miles, which is believed to be now in operation.

No statistical information could be obtained.

David C. Norcross, President, San Luis Obispo, California

SANTA CRUZ RAILROAD.

This company was organized in 1873 to build a narrow gauge railway from the harbor of Santa Cruz to Watsonville, a station on the Southern Pacific railway, a distance of 25 miles. Grading commenced the same year, but tracklaying was delayed until the end of 1874, when 8 miles were ironed.

No statistical information could be obtained.

F. A. Hihn, President and Manager, Santa Cruz, California.

SUMMIT COUNTY RAILROAD.

This Company was organized in 1873 in Salt Lake City, to construct a narrow gauge railway from Echo, a station on the Union Pacific Railway, south-eastward to Coalville, a distance of about 9 miles. Work was commenced and the line completed and opened during 1873. A Company has since been incorporated to build a line 35 miles in length, from Coalville westward to Salt Lake City.

The maximum grade is 300 feet to the mile.

The sharpest curvature not known.

The weight of rail is 30 pounds to the yard.

No further information obtainable.

J. A. Young, President, Salt Lake City, Utah T.

Wm. M. Riter, Superintendent, Coalville, Summit Co., Utah T.

TOLEDO AND MAUMEE RAILROAD.

This Company was incorporated and certificate filed in the office of the Secretary of State for Ohio, May 16th, 1873. Organization did not take place till September. The line runs between Toledo and Maumee, all in Lucas county, a distance of 8 miles, which was completed and opened for traffic August 12, 1874. The road has since been projected to Van Wert, on the Ohio State line, a distance of 80 miles, part of which is now under construction, there to connect with the 41st parallel narrow gauge railway of Indiana, which is to connect with the Keithsburg and Eastern, which will connect with the Keithsburg and Council Bluffs Railway.

On all these railways some work is being done, and when all are completed a consolidation will be effected, thus forming an air line between the great grain-growing regions of the north-west and the port of Toledo, to be known as the 41st Parallel Railroad.

The maximum grade is 15 feet to the mile.

The sharpest curvature 30° 58′ (185 feet radius).

The weight of rail is 25 pounds to the yard.

The weight of engine 8¾ tons.

Cost per mile, including equipment, $6,875.

Equipment—1 locomotive, 1 passenger car, 5 freight cars of all classes.

Financial statement—Capital stock authorized, $125,000; subscribed, $48,000; paid in, $41,000; Funded debt, none.

Wm. J. Wells, President, Toledo, Ohio.

Geo. W. Reynolds, Vice-President, Toledo, Ohio.

TUSKEGEE RAILROAD.

This Company was organized under the laws of Alabama in 1871, to construct a narrow gauge road from Tuskegee to Chehaw, a distance of 6 miles. Work was commenced the same year, and the line completed in November.

The maximum grade is 60 feet to the mile.

The weight of rail 25 pounds to the yard.

The weight of engine 10 tons.

Equipment—1 locomotive, 1 passenger car, 3 freight cars of all classes.

G. W. Campbell, Superintendent, Tuskegee, Ala.

UTAH NORTHERN RAILROAD.

This Company was organized in the fall of 1871, to construct a narrow gauge railroad from Brigham, a station on the Central Pacific Railway, via Logan to Franklin, a distance of 61 miles. The line has since been extended from Brigham southward to Ogden, 25 miles, and northward to a point on the Northern Pacific Railway, in Montana, a total projected distance of 450 miles.

Work was commenced in 1872, and during that year 25 miles were constructed and operated between Brigham and Hampton. In 1873 the line was extended to Hyde Park, 21 miles, and 11 miles were laid from Ogden northward. During 1874 the line was completed to Brigham, and from Hyde Park to Franklin, 30 miles, making total line in operation at the end of 1874, 86 miles.

The maximum grade is 96 feet to the mile.

The weight of rail is 30 pounds to the yard.

The weight of engines 13 and 17 tons.

Equipment—5 locomotives, 4 passenger cars, 42 freight cars of all classes.

The line having only been open a short time, its operations are not published.

Financial statement not given.

John W. Young, President, Salt Lake City, Utah.

Moses Thatcher, Secretary and Superintendent, Logan, Utah.

Chas. Nibley, G. F. and T. Agent, Logan, Utah.

UTAH WESTERN RAILWAY.

This company was organized in 1874 to purchase all rights and interests of the Salt Lake, Sevier Valley and Pioche narrow gauge railway, which had twenty miles of its line graded and bridged, etc. The transfer was consummated in September and the line of route laid as follows:

Leaving Salt Lake City, it runs westward to the southern

extremity of Great Salt Lake—20 miles; thence to Stockton, in Tooele County—45 miles; and from thence is projected to the Pacific. Track laying was commenced in November, and by the end of the year 18 miles were completed and put in operation. Construction is still going on, the entire line to be open during 1875.

The maximum grade is 74 feet to the mile.

The curvature is almost nil—the alignment being very direct.

The weight of rail is 30 pounds to the yard.

The weight of engine 19 tons.

Equipment—1 locomotive, 2 passenger cars, 18 freight cars of all classes.

Financial Statement—Capital Stock, $920,000. Funded debt, $720,000.

John W. Young, President, Salt Lake City, U. T.
H. B. Clawson, Vice President, Salt Lake City, U. T.
John N. Pike, Secretary, Salt Lake City, U. T.
H. P. Kimball, Superintendent, Salt Lake City, U. T.

WALLA WALLA RAILROAD.

This Company was organized in 1872, to construct a narrow gauge railway from Walla Walla, Washington Territory, eastward twenty miles to a point on the Oregon state line. Work commenced in 1873, and during that year ten miles were constructed; the following year ten miles additional, completing the line.

No statistical information could be obtained, although efforts were made to secure it.

D. S. Baker, President, Walla Walla, W. T.

WASATCH AND JORDAN VALLEY RAILROAD.

This Company was incorporated in 1873, to construct a narrow gauge railway from Sandy, a station on the Utah Southern Railway, to Alta City, in Little Cottonwood Cañon, where the "Emma" and other large mines are situated, a distance of about 16 miles. During 1873, twelve miles were completed and opened between Sandy and Fairfield, and in 1874 it was extended two miles.

The maximum grade is 287 feet to the mile. There is a grade of 250 feet to the mile continuous for 3 miles, and the ruling gradient is heavy.

The line is reported as doing a good business. No statistical information or statements returned.

Wm. Jennings, President, Salt Lake City.

Frank Fuller, Superintendent, Salt Lake City.

WORCESTER AND SHREWSBURY RAILROAD.

This Company was organized under the Massachusetts General Railroad Law of 1872, and certificate filed April 27, 1873, to construct a narrow gauge road from Washington Square, in the City of Worcester, to the westerly shore of Lake Quinsigamond, near the dividing line between Worcester and Shrewsbury, a distance of about 3 miles, thence to Shrewsbury, the line being built to accommodate pleasure travel.

Work was commenced in May, and the road formally opened for public travel on July 31, 1873.

The maximum grade is 160 feet to the mile, partly on a 12° curve.

The sharpest curvature is 15° 40′ (366.8 feet radius).

The weight of rail is 35 pounds to the yard.

The weight of engine 4 tons.

Equipment—1 locomotive, 2 passenger cars.

Cost of road, including equipment, per mile, $10,836.96.

Financial statement—Capital stock authorized, $40,000; paid in, $26,225; floating debt, $2,168. Total liabilities, $28,393.

E. B. Stoddard, President, Worcester, Mass.

Joseph E. Davis, Treasurer, Worcester, Mass.

James Draper, Superintendent, " "

WYANDOTT, KANSAS CITY AND NORTHWESTERN RAILROAD.

This Company was organized under the General Railroad Law of Missouri, on the 10th day of June, 1872, to construct a narrow gauge railway, from Kansas City, Mo., East through the counties of Jackson, Lafayette, Saline, Howard, Boone,

Callaway, Montgomery, Warren, St. Charles and St. Louis, to the city of St. Louis, a distance of about 240 miles.

The line of route passes through an exceedingly fine agricultural region, and contiguous to the road in Lafayette and Saline counties, there are deposits of an excellent quality of bituminous coal. Surveys were commenced in April, 1873, but no construction on the first division, between Kansas City and Arrowrock (owing to the panic) was commenced until the spring of 1874. On June 15th, the first spike was driven at Independence, Mo., and the first train ran through from Kansas City to Independence, 10 miles, August 3d.

The maximum grade is 76 feet to the mile.

There is no sharp curvature.

The weight of rail is 30 pounds to the yard.

The weight of engines, 15 tons.

Cost of road, including equipment, per mile, $18,500.

Equipment—2 locomotives, 4 passenger cars, 22 freight cars of all classes.

Operations. Gross earnings have averaged $1,300, per month. Operating expenses not published. Financial statement, withheld.

Capital Stock authorized, $2,000,000.

F. C. Eames, President, Kansas City, Mo.

A. L. Harris, Treasurer, Kansas City, Mo.

H. Hale, Superintendent & C. E., Kansas City, Mo.

CANADIAN NARROW GAUGE RAILWAYS.

From a report of Mr. Edmund Wragge, issued in 1871, we make the following extracts:

"The narrow gauge railways which have been already constructed in the Dominion of Canada, and which are also the first upon this continent, are the Toronto Grey and Bruce Railway and the Toronto and Nipissing Railway. For some years prior to 1866, there had been scarcely any railway progress in Canada, and owing to the bad repute in which Canadian Railways were held as an investment in England, it seemed hopeless to wait until the country was able, of itself, to find the means to construct railways of the ordinary character and involving the ordinary cost.

"Mr. George Laidlaw, of Toronto, who is the pioneer of narrow gauge railways upon the Continent of America, seeing no way of being able to raise the money necessary for an ordinary railway, advertised in the English newspapers for some account of how a cheap railway could be constructed, and, at that time, knowing nothing of narrow gauge railways, received answers, among others, from Mr. Carl Pihl, the government engineer of Norway, in which country the three feet six inch gauge is the national gauge; and from Sir Charles Fox & Sons, of London, who had already constructed a railway of three feet six inch gauge in India, and some two hundred miles of similar gauge railway in Queensland, Australia. With that perspicuity for which he is distinguished, Mr. Laidlaw at once saw that this class of road was the one for which he was seeking, and which, while it would afford all the accomodation likely to be needed for many years to come, could be constructed at a minimum cost, consistent with efficiency. He, therefore, immediately opened communications with the firm of Sir Charles Fox & Sons, and without going into the details of the various steps which have followed

this movement, it may be stated they obtained, after a hard fight in the Legislature, where they had to meet in opposition all the railway authorities of the Dominion, charters for the construction of the Toronto Grey and Bruce, and Toronto and Nipissing Railways, upon a gauge of three feet six inches.

The operations of these railways were so satisfactory, and the conditions of the country the same in the Province of New Brunswick and Prince Edward's Island, that their respective governments granted charters for the construction of railways with a three feet six inch gauge.

On December 31, 1874, the following railways in the British Possessions in North America had narrow gauge track laid:

	Miles Built.	*Total Project'd Mileage.*
Toronto, Grey and Bruce	195	195
Toronto and Nipissing	88	230
New Brunswick	100	170
Riviere du Loup	91	91
Prince Edward's Island	120	200
	594	886

During 1875, the Toronto & Nipissing, the New Brunswick and the Prince Edward's Island Railways expect to build or partially complete the remaining unconstructed portion of their lines.

In addition to the above mentioned railways, the following of 3 feet 6 inch gauge are under construction or projected:

Bangor & Calais Shore.
Great Southern of New Brunswick.
Kingston & Pembroke.
London, Huron & Bruce.
Credit Valley.
Fenelon Falls.

TORONTO, GREY AND BRUCE RAILROAD.

This Company was incorporated by special act in 1868, to build a narrow gauge railway of 3 feet 6 inch gauge from Toronto, via Orangeville and Mount Forest, to Sydenham, on Owen Sound, a distance of 122 miles, and also a branch from

Orangeville to Teeswater, 72 miles. Some months elapsed in educating the various counties and townships lying along the route of the railway, so that it was not until September, 1869, that the surveys were made. The following month construction commenced. During 1871–2 forty-nine miles were put in operation on the main line, between Toronto and Orangeville, and thirty-eight miles on the branch. The following year 144 miles were operated, and by the end of 1874 the entire line of 195 miles was in working order.

The alignment is of particular interest at two points on the T. G. & B. R., being marked at the crossing of the Humber River (15 miles from Toronto), and at the ascent of the Caledon Hills (35 miles from Toronto), by a series of sharp curves, combined with which are heavy grades, deep cuts and high embankments.

The maximum grade is 106 feet to the mile.

The sharpest curvature 12° 25′ (462 feet radius).

The weight of rail 40 pounds and 56 pounds to the yard.

The engines weigh from 16 to 42 tons.

Cost per mile, including equipment, $16,541.

Equipment—18 locomotives, 12 passenger cars, 3 post office and express, 3 smoking and baggage, 407 freight and other cars of all classes.

Operations for fiscal year ending June 30, 1874—During the first three months of the year the length of line operated was 87 miles; during the two following months 155½ miles, and during the remaining seven months 164½ miles. Of this latter length, however, 9 miles (from Mount Forest to Harriston) were in an incomplete state, and consequently very little attempt was made to obtain traffic over this portion.

Gross earnings, $347,744.10; operating expenses, $199,191.20 (57.03 per cent.); net earnings, $148,552.90.

Gross earnings per mile for year 1873–4, . . . $2,416

Gross earnings per mile for year 1872–3, . . . 2,047

Financial statement from June 1869, when work was commenced to 30th June, 1874.—Capital stock authorized, $3,000,000; paid in, $271,372.09; municipal bonuses, $869,170.50; government bonuses, $231,592.00; funded debt, $879,333.70

of 8 per cent. bonds, $321,200.22 of 7 per cent. bonds. Total receipts on capital account, $2,572,668.51. Per contra, payments on account of road and equipment, $2,572,668.51. There is also a floating debt of $469,444.43, which is partly offset by $166,000 bonds unsold.

John Gordon, President, Toronto, Canada.
Wm. Ramsay, Vice-President, Toronto, Canada.
W Sutherland Taylor, Sec'y. and Treas., Toronto, Canada.
N. Weatherston, Genl. Supt., Toronto, Canada.
Edmund Wragge, Chief Engineer, Toronto, Canada.

TORONTO AND NIPISSING RAILROAD.

This Company was incorporated by the Canadian Legislature in March, 1868, to construct a railway of 3 feet 6 inch gauge from Toronto to Lake Nipissing, a distance of 230 miles. Work was commenced in 1869, and during the two following years some 40 miles were operated. In 1872 64 miles, and in 1873 88 miles between Toronto and Coboconk, the present terminus, were opened. This was the first narrow gauge railway opened for traffic on the continent of America.

The maximum grade is 106 feet to the mile.
The sharpest curvature 9° 30′ (600 feet radius).
The weight of rail is 40 and 56 pounds to the yard.
The weight of engines from 16 to 42 tons.
Cost per mile, including equipment, $15,293.

Equipment—12 locomotives, 7 passenger cars, 3 baggage and express, 296 freight cars of all classes, 1 snow plough.

Operations for year ending June 30th, 1874—Gross earnings, $218,207.31; operating expenses, $121,273.60 (55.70 per cent.); net earnings, $96,933.71.

Financial Statement—Capital stock authorized, $3,000,000; paid in, $193,350; municipal bonuses, $375,072.59; government bonuses, $104,860; funded debt, $672,500, 8 per cent. bonds; floating debt, $290,558.39; total liabilities, $1,636,330.98.

Wm. Gooderham, Jr., President, Toronto, Canada.
Alex. T. Fulton, Vice-President, Toronto, Canada.
Joseph Gray, Sec'y and Treas., Toronto, Canada.
Edmund Wragge, Chief Engineer, Toronto, Canada.

NEW BRUNSWICK RAILROAD.

This company was incorporated by the New Brunswick Government in 1870, to construct a railway of three feet six inch gauge, from Gibson, opposite Fredericton, on the St. John's River, to Edmunston on the upper St. John River, a distance of 161 miles, with a branch to Woodstock, nine miles. The road has since been projected to Riviere du Loup, a station on the Grand Trunk Railway, making a total distance of 260 miles.

Work was commenced in 1873, and 52 miles opened for traffic during that year. On 31st December, 1874, 100 miles were in operation between Gibson and Tobique, and it is intended to complete the road during 1875.

The maximum grade is 85 feet to the mile.

The sharpest curvature 10°, (573 feet radius.)

The weight of rail is 40 pounds to the yard.

The weight of engines, built on the Fairlie principle, 27 tons.

The cost per mile, including equipment, will probably not exceed $13,500.

Equipment—4 locomotives, 3 passenger cars, 1 baggage and express, 40 freight cars of all classes.

Operations.—Not reported.

Financial Statement.—Capital stock authorized, $3,000,000. paid in, $650,000; funded debt, first mortgage 6 per cent. bonds, $1,000,000; floating debt, $43,000; total liabilities, $1,693,000.

Alex. Gibson, President, Frederickton, N. B.

PRINCE EDWARD'S ISLAND RAILROAD.

This road, of a 3 feet 6 inch gauge, which was built and is operated by the Government, traverses the whole length of the Island, from Tiguish, in the North, to Georgetown and Souris, in the East, connecting also with Summerside and Charlottetown, on the South, a total distance of main line and branches of 200 miles. Work was commenced in 1873, and fifty miles constructed during that year. In 1874 seventy miles were

built, and the whole line will be completed during the present year.

The maximum grade is 60 feet to the mile.

The sharpest curvature 9° 30′ (600 feet radius).

The weight of rail is 40 pounds to the yard.

Cost per mile, including equipment, $14,600.

F. W. Hindeman, Charlottetown, P. E. I.

Observations on Narrow Gauge Railways.

BY PRACTICAL MEN.

I fully believe in this kind of road for short travel. *President Worcester and Shrewsbury Railway.*

We are much delighted with our Narrow Gauge Road, and believe it an entire success.—*President Memphis Branch Railway*

Have found no difficulty in working the road yet on account of gauge.—*President New Brunswick Railway.*

We are abundantly satisfied that "Narrow Gauge" 3 feet) is the only road now that will pay for the bunding of new railways.—*Vice-President Toledo and Maumee Railway.*

As regards our opinion of Narrow Gauge, we simply state that they cost less to construct and operate, and do as good work as the broad gauge.—*Secretary Monterey and Salinas Valley Railway.*

I consider that our experiment fully demonstrated that for safety, comfort and traffic, the Narrow Gauge is the true system. The theory grew in favor with every one connected with the Company, or who observed its working and economical construction and maintenance.—*Superintendent North and South of Georgia Railway.*

I consider Narrow Gauge Railways adapted to all localities where grades exceed 100 feet per mile, and the formation of the country necessitates curves of greater degree than 12.—*Chief Engineer Colorado Central Railway.*

So far as my experience with Narrow Gauge Railroads is concerned, I would say that I can see no reason why our road will not do as much work as any of the standard gauge local roads are now doing. Having had several years experience upon 5-feet gauge roads, I will say that for any road not having a heavy through business in connection with other standard roads, I would unhesitatingly recommend the three-feet gauge.—*Chief Engineer Galena and Southern Wisconsin Railway.*

The gauge is 3 feet 6 inches, and is all that can be wished, as far as the gauge is concerned. Our traffic is now getting so heavy that we are laying down 56-pound rails, some of iron and some of steel.—*Chief Engineer Toronto Grey and Bruce Railway.*

I consider the Narrow Gauge fully equal to all the requirements of all kinds of traffic, being cheaper to build, and cheaper and safer to operate than the standard gauge.—*President Mineral Range Railway.*

After three years' trial we are convinced that any railroad business may be done on a Narrow Gauge Road, and can be done cheaper than on the gauge now common The construction of the Narrow Gauge Road is much cheaper than the proportion between that and the common gauge would seem to indicate. The bridges, with proportionately less material, are much stronger. Tunnels require little or no strengthening. The repair of road and machinery is trifling.—*President Pittsburg and Castle Shannon Railway.*

We have been operating this road since the fall of 1872, and the Narrow Gauge has given entire satisfaction.—*Superintendent Arkansas Central Railway.*

The experience of this Company in every instance confirms their opinion of the efficiency of the Narrow Gauge system, and they think it fully proven that a three-feet gauge is capable of doing all the business required of any ordinary road.—*Secretary Painesville and Youngstown Railway.*

I would state that our road carries the freight between these two points with quite as much facility as the former 5-feet track. The Superintendent reports that he uses only ⅓ of the amount of fuel that was formerly used.—*Chief Engineer Chester and Lenoir Railway.*

We are perfectly satisfied, from the workings of our road, that the Narrow Gauge system is the plan on which all roads of the South should have been constructed. We consider it perfectly adequate to meet every emergency in traffic; in fact, we believe it superior in point of capacity. We have been operating our road since November, 1871, and have never had an accident. We consider the Narrow Gauge system to be superior in point of security, economy and convenience.—*Superintendent Tuskegee Railway.*

We are perfectly satisfied that the three feet gauge is all that is required for the demands of commerce. We have all we can do in the way of both freights and passengers. The present looks favorable, and the cost being much less than broad gauge we are able to freight under the Iowa Tariff Laws with a fair profit.—*Vice-President Des Moines and Minnesota Railway.*

That this Company was able, notwithstanding a panic which caused the failure of 77 railroads in the United States, to meet all its obligations promptly and survive the gale, is a matter worthy of congratulation. It is to be attributed, chiefly, to the fact that the route occupied is one which possessed the elements for a good local trade, and that each division was able to follow the principle of "pay as you go;" also to the fact that the *Narrow Gauge* permitted an economy in building and operating without which we could not have avoided the common fate. With so new a line, had the additional interest upon capital and cost of operating required by the standard gauge been imposed upon us, we could hardly have escaped.—*President Denver and Rio Grande Railway.*