Conduit House near summit of Old Portage Railroad.

Pittsburgh-Bradford Railroad Plane No. 6. 1842.
THE PORTAGE RAILROAD.

Between the seaboard and the Ohio Valley, the Allegheny mountains formed a most formidable barrier to inter-communication. Where and how best to cross this mountain chain proved to be a most serious engineering problem. To the credit of the men who located and constructed the first railroad over the mountains it should be recorded, that although the system of inclined planes in the end was found to be defective, yet in the first years of its existence the Portage Railroad was regarded, especially in foreign countries, as a most wonderful feat of engineering. General Bernard, the distinguished military engineer, who had visited every important part of Europe, when passing over the State works in 1834, said to W. Milner Roberts, then in charge of the road, "The Portage Railroad is second only to the passage of the Simplon in boldness and magnitude."

Through these mountains, whose peaks rise over 2,600 feet above the level of the sea, a railroad was built and put in operation in 1834, when engineering science was in its infancy not only in America but also in the Old World, where no similar conditions had been overcome.

Sherman Day, the historian of Pennsylvania, writing in 1842 of this work and of Sylvester Welch, the chief engineer of the Portage Railroad, says:

Mr. Welch has immortalized his name by a work equal in importance and grandeur to any in the world. He has raised a monument to the intelligence, enterprise and public spirit of Pennsylvania, more honorable than the temples and pyramids of Egypt or the triumphal arches and columns of Rome. They were erected to commemorate the names of tyrants or the battles of victorious chieftains, while these magnificent works are intended to subserve the interests of agriculture, manufactures and commerce—to encourage the arts of peace—to advance the prosperity and happiness of the whole people of the United States—to strengthen the bonds of union!

About these old planes, the original location of which, now overgrown with grass and shrubbery, is still pointed out to the interested tourist, will ever cluster memories of the courage and perseverance which characterized the pioneers of Pennsylvania's railroads.

By direction of the Pennsylvania Legislature, Messrs. Clarke and Holgate made a survey in the summer of 1824 for a continuous canal through the Allegheny mountains. In order to insure a sufficient supply of water from adjacent natural streams, their plans contemplated the construction of a tunnel four miles long. This tunnel was surveyed and estimated for, and the adherents of the canal who believed that method of water transportation better than the railroad, insisted upon the construction of a tunnel which was described as "a well dug horizontally." Their project was severely ridiculed by the public press, who spoke of it "as a bad hole for the taxpayers to put their money in," and fortunately for the

1 The term "portage" was introduced by the early French traders to designate the place where canoes were carried overland from one stream to another, between which there was no navigable connection.
Pennsylvanians of that period, wiser counsels prevailed.¹

What effect this tunnel, if constructed 300 or 400 feet below the present summit tunnel, would have had upon the final solution of the problem of crossing the mountain furnishes food for conjecture.

Although work had been actively begun on the State canals in 1826 and 1827, no decision was then reached as to the best mode of crossing the mountains.

By the fourth section of the act of the Legislature of Pennsylvania, approved March 24, 1828, the Canal Commissioners were directed to construct a railroad over the Allegheny mountains, to connect the two canals which were then being built from the east and from the west to the foot of the mountains. The engineers were busily engaged in investigating the adaptability of methods pursued at other places to accomplish the same result. Solomon W. Roberts, afterwards engineer of the Portage Railroad, in his report for 1828 cites the following description of the Mauch Chunk railroad, then in operation and constructed as follows:

The road being prepared, oak sleepers seven feet long are laid across the road, bedded on them and level with its surface, and four feet apart, into which are keyed the side rails of white pine 4x6 inches, 16 feet long and placed parallel 3½ feet apart (which is the width between the wheels of the carriage); on the inner edge of them are plates of rolled iron 1½x½ inches thick, for the wheels to run upon. A single track this mode costs $3,050 per mile.

But a more substantial and durable railway is recommended. Prepare stone supports or sleepers, about 20 inches square and about 2½ feet long, with the upper end of each properly cut, and drilled 8 inches deep to receive a wooden plug. Place these stones in 4 parallel lines and 5 feet apart in the direction of the road, the upper or cut end of each to be level with the surface of the road. On them place the side rails of locust timber 6 by 10 inches square, and 15 feet long, to be secured to the stone supports by inch bolts, driven through into the wooden plugs in the stones; upon the inner edge of these side rails of each set of tracks, plates of rolled iron two inches by half an inch are secured by spikes or screws, countersunk, one in about three feet, the whole to be done in the best manner.

How best to construct the proposed railway through a rugged country, to overcome an elevation of 1,400 feet above the canal¹ at the eastern side of the mountain, then descending from the summit 1,175 feet to the canal on the western slope, was the problem that confronted the engineers of the State, whose experience had been gained almost entirely in surveys for and construction of canals.

The eastern slope of the mountain is steep. The broken ends of the strata of the slates and sandstones of the bituminous coal measures protruded beyond the surface in many places, "as if an immense wedge had been driven in a northwesterly direction, under that part of the earth's crust."

The descent on the western slope is much more gradual, as the stratification becomes flatter as the line approaches Johnstown. (See diagram.)

The Commissioners having, in December, 1828, secured the services of Moncure Robin-

¹ See chapter entitled "State Canals."
son, C. E., to direct a new survey to be made over the proposed route, new lines were run over the mountains in the spring of 1829 under his direction with a view of determining whether, in the language of the instructions from the Commissioners, "the construction of a macadamized turnpike of the best kind" might not be preferable to a railway with "stationary engines or self-acting inclined planes." Mr. Robinson was also requested to suggest "any other plan which might occur to him as calculated to afford the best accommodation to trade." From this action of the Board it will appear that although the Legislature of the State had decided upon a railway over the mountain, the Commissioners were anxious for further expert opinion in order to satisfy their constituents, many of whom were interested in stage lines and wagon transportation, that a railway after all was better than a turnpike. It is interesting to note in this connection that Mr. Robinson's report, dated November 21, 1829, concludes with a decided recommendation in favor of a railway instead of a turnpike. Notwithstanding this report, still another mountain survey was ordered by act of the Legislature approved March 27, 1830, "to take into view a portage over the mountains in the spring of 1830 un-

The "Wagoner of the Alleghenies," evidently dissatisfied with the reports of the engineers of the previous year, brought his "influence" to bear upon the member of the Legislature from his district with the above result, notwithstanding the fact that thousands of dollars were being expended in the construction of a railway from Philadelphia to Lancaster, between which points a good turnpike—the first chartered by the State—had been in operation for 40 years. Through the temerity of the politicians another summer was wasted in surveys.

The Commissioners, while retaining the services of Mr. Robinson as engineer, concluded that it would be advisable to increase the staff to three, and Colonel Stephen H. Long and Major John Wilson were subsequently appointed associates with Mr. Robinson.

After their appointment, Messrs. Long and Wilson having "no personal knowledge of the localities to be traversed by the contemplated road, nor of the nature of the obstacles to be overcome," deemed it necessary to make an additional "detailed survey and thorough examination of this route before passing upon the merits of the various lines under consideration."

During the summer of 1830 the Canal Commissioners, accompanied by the engineers, visited Carbondale, Pennsylvania, to examine the Coal Railway with inclined planes which had been constructed by the Delaware and Hudson Canal Company in 1828-29. From their examination of the "stationary machinery" at Carbondale they were led to believe that "the capacity of the Portage Railroad per day of twelve working hours would reach 500 tons," if properly constructed and operated.

From the result of the surveys made in the summer of 1830 Messrs. Long and Wilson made an elaborate report, in which they recommended the location of a line requiring the use of eleven inclined planes, several of which, while straight in plan, were to be curved in elevation, with varying grades. This method of construction was advised by Col. Long in order to reduce the cost of grading. Moncure Robinson, however, advocated the use of straight planes, notwithstanding the fact that the expense of construction would be increased.

Describing the circumstances that led to the final decision to construct only ten inclined planes, W. Milner Roberts, in a communication to the American Society of Civil Engineers, makes the following statement:

---

1 Reminiscences and Experiences of Early Engineering Operations on Railroads, with Special Reference to Steep Inclines, by W. Milner Roberts, C. E.—Transactions, American Society of Civil Engineers, August, 1878.
After a partial examination of the grounds, in 1831, I suggested that it might be practicable to locate the line with five inclines on each side of the summit, all straight, dispensing with one plane, and Mr. Welch instructed me to locate them, if the cost should not prove too great. By the employment of short levels between Nos. 6 and 7, and 7 and 8, and making plane No. 8 considerably longer than the others, and with the maximum inclination of 10½ feet per 100 feet, the location of ten instead of eleven inclines, all of them straight, was finally effected. At that early period in railroading the crossing of the Allegheny mountain was regarded as quite formidable. Had the Legislature authorized surveys to determine whether a regularly graded road throughout or an inclined plane road should be adopted, it is possible that a road with inclined planes might never have been built there; but the general plan was, as already intimated, settled by the Legislature in advance. A graded line would have been only about ten miles longer, even on a grade of 52.8 feet per mile, or about 47 instead of 37 miles.

It was not, however, certain when the Allegheny Portage Railroad was located (in 1831) that locomotives would be used upon it. After very careful surveys, at my earnest solicitation, a grade of 52.8 feet per mile, for about three miles, on a straight track, below Plane No. 10, was adopted, in lieu of a line with numerous curves on a grade of 44.24 feet per mile. To bring the grade down to 52.8 feet I had to sink it, at the foot of the plane, ten feet below the bed of the creek, put a culvert for a stream under the inclined plane, and excavate an entirely new creek channel for a considerable distance. It answered perfectly.

After due deliberation the engineers submitted a report, December 21, 1830, in which they made final recommendations for the construction of a railroad with ten inclined planes, thus avoiding the necessity of a tunnel at the summit. After holding this report for three months, the Legislature, by law approved March 21, 1831, decided "That the said Canal Commissioners shall commence forthwith, and prosecute without delay, a railroad over and across the Allegheny mountains, from the basin in Hollidaysburg, in the county of Huntingdon, to Johnstown, in the county of Cambria, a distance of about thirty-eight miles, according to the route, extent and plan thereof, stated in their report of the twenty-first day of December, one thousand, eight hundred and thirty, excluding the plan of a tunnel as recommended by Moncure Robinson, in his report of the twenty-first of November, one thousand, eight hundred and twenty-nine; and also that they shall commence and prosecute without delay, the extension of the Juniata division of the Pennsylvania Canal, from the town of Huntingdon, in the county of Huntingdon, to the basin at Hollidaysburg, in the same county, either by canal or slack-water navigation: towards the expenditures of which railroad and canal or slack-water navigation, as specified in this section, during the present year, the sum of seven hundred thousand dollars is hereby specifically appropriated, to be paid out of the loan hereinafter mentioned."

In the report of the Canal Commissioners for 1831 it is stated that the summit of the Allegheny mountain is 1,398.71 feet above the eastern basin and 1,171.58 feet above the western basin. It was proposed to construct self-acting planes on the eastern slope of the mountains, using bituminous coal as a balance to the westward freight.

In their report the Commissioners estimated the cost of the Portage Railroad with machinery, etc., complete at $1,271,718.18, being about half a million dollars increase over the estimate of the previous year.

The Canal Commissioners were fortunate in their selection of Sylvester Welch for "Principal Engineer," early in 1831, and of Solomon W. Roberts as "Principal Assistant Engineer," shortly afterwards, who with Patrick Griffin, "Surveyor," and twelve assistants, completed the locating party who "pitched their tents near Lilly's Mill, at the head of the Mountain Branch of the Conemaugh, on the 12th day of April, 1831."

W. Milner Roberts joined the corps early in the following month, and was appointed "Principal Assistant Engineer."

During April there was much snow on the

1 The title "Chief Engineer" was not used at that time.
FIRST RAILROAD TUNNEL IN AMERICA, 1832.

mountain and the engineers slept in buffalo robes in tents belonging to the State.

Solomon W. Roberts located and supervised the construction of planes Nos. 1 and 2, the planes nearest Johnstown. The remaining eight planes, Nos. 3, 4 and 5, on the western slope, and Nos. 6, 7, 8, 9 and 10, on the eastern slope, were located by W. Milner Roberts, who also superintended their construction.

In those days the public were in great dread of passing over steep inclined planes, so that the maximum grade on the Portage planes was purposely made less than the six degree grades of the Philadelphia and Pittsburgh Turnpike, which crossed the mountain close by the line of the railway.

The fact that the planes were flatter than many of the grades on the adjacent turnpike was made public at an early day, for political reasons.

The westward line beginning at the turnpike crossing near the pike crossing near the head of the Conemaugh, and continued twenty-one miles along the valley of that stream to the terminus of the western division of the Pennsylvania Canal at Johnstown, twenty-six miles distant.

The eastward line, located in May and June, 1831, extended five miles to Lilly's Mill, near the head of the Little Conemaugh, and continued twenty-one miles along the valley of that stream to the terminus of the eastern division of the Pennsylvania Canal at Johnstown, twenty-six miles distant.

The eastward line, located in May and June, 1831, extended from the same point near Blair's Gap, 103 miles to the eastern terminus of the canal at Hollidaysburg. At this summit, 2,322 feet above mean tide, a cut of only twelve feet was excavated; the old summit is 161 feet higher than the highest point of the main line of the Pennsylvania Railroad, in the tunnel near Gallitzin. A relief map1 twelve feet long and four feet wide, of the territory through the Alleghenies between Altoona and Hollidaysburg on the east and Johnstown on the west, to a horizontal scale of twelve hundred feet to the inch,2 formed a part of the exhibit of the Pennsylvania Railroad Company at the World's Columbian Exposition at Chicago in 1893. On it were located the lines of the Old Portage Railroad of 1832, the New Portage Railroad, laid in 1853-56 to avoid the use of inclined planes, and the present Main Line of the Pennsylvania Railroad Company. This relief map, compiled from data previously inaccessible, attracted much attention from geologists as well as engineers.

The contracts for the grading and masonry on the western line were awarded at the engineer's office at Ebensburg, May 25, 1831. The contract for the grading and masonry on the eastern line was let July 29, 1831. The work on the whole 36½ miles was proceeded with during the following summer and fall.

Referring to the contractors of those early days, in an address delivered forty-two years after the publication of his report of 1836, Mr. Solomon Roberts states: "The Canal Commissioners were politicians, there was great competition for contracts, and work contracted for at low prices often failed to endure the strains to which it was subjected, the laws of nature having no respect for political parties."

The work was begun by clearing a space forty yards wide through the forest of heavy spruce and hemlock timber. As the road was located along the steep slopes of hills of clay soil, careful drainage was necessary.

The embankments were made twenty-five feet wide on top, protected by substantial slope walls where needed, and the bed of the road through cuts was the same width, with wide ditches along the side. Sixty-eight culverts of stone laid in mortar, the average span being seven feet, and eighty-five small drains, two or three feet wide, passed under the railway.

FIRST RAILROAD TUNNEL IN AMERICA.

The tunnel built through the spur of the mountain, at the head of the most western

---

1 Printed by Nathan Kite, 50 North Fourth Street, Philadelphia, 1836.
2 The vertical scale of this relief map is 1 inch equal 400 feet.

---

1 Reminiscences of the first railroad over the Allegheny Mountain, read before the Historical Society of Pennsylvania, April 8, 1878, by Solomon W. Roberts, Civil Engineer.
inclined plane, about four miles east from Johnstown, was the first tunnel constructed in America for railway purposes. It was 901 feet long, twenty feet wide, and nineteen feet high and cost about $37,500. It was arched for 150 feet from each end, the entrances being finished with handsome façades of cut stone. The whole work remains to this day, a monument to careful workmanship and graceful designing by pioneer American tunnel engineers.

Four bridges of hammer-dressed stone were constructed, three over the Conemaugh and its branches and one over a branch of the
Juniata, near Hollidaysburg. The bridge over the Conemaugh, eight miles from Johnstown, was a fine structure for its day. It consisted of a single semicircular arch of eighty feet span, the top of the masonry being about seventy feet above the surface of the stream. The bridge was designed and its erection superintended by Solomon W. Roberts, who thus describes it:

The arch is 3½ feet thick at the springing line and 3 feet at the crown; the arch-stones are of light-colored sandstone, and the backing of silicious limestone, found near the spot.

The sandstone was split from the erratic rocks of great size, which were found lying in the woods on the surface of the ground. The contract price of the masonry was $4.20 per perch of 25 cubic feet, and the work was remarkably well done. The face stones were laid in mortar made from the silicious limestone without the addition of any sand. The work was done by an honest stonemason named John Durno, who was afterward killed by falling from another high bridge.

The bridge cost originally $55,000.

For fifty-five years, until destroyed by the Johnstown flood in 1889, this bridge, known as the Conemaugh Viaduct, was in continuous use as a part of the Main Line of the Pennsylvania Railroad. It has been replaced by a structure of two semicircular arches each of sixty feet span, and is now known as bridge No. 218.

The two bridges completed January, 1890, over the branches of the Conemaugh each had single spans of forty feet; that over the branch of the Juniata, near Hollidaysburg, was a skew bridge with abutments 35° from a right angle; it consisted of two spans of thirty-three feet.

The Philadelphia Gazette of August 1, 1832, contains the following:

The Allegheny Portage Railroad connects with the Juniata Canal, at the town of Holidaysburgh, in Huntingdon County, and passes up the narrow valley of the Conemaugh. In 1831 the principal engineer had prepared a plan for this bridge of two arches, each of 50 feet span, but a single span of 80 feet was afterwards adopted.
THE PENNSYLVANIA RAILROAD COMPANY.

valley of Blair's Gap Run, ten miles, to the summit of the mountain at Blair's Gap, which is passed by a cut of 12 feet deep. The line then runs along the western slope of the mountain to the head of the Conemaugh and follows the valley of that stream to the borough of the Conemaugh, commonly called Johnstown, in Cambria County, where the railroad ends, and the western division of the Pennsylvania Canal commences. This canal is now navigable throughout its whole course to the city of Pittsburgh.

The most important works on the line of the railroad are the following: A stone viaduct over the branch of the Juniata, at Holidaysburgh, which has two elliptical arches, each of 40 feet 4 inches span. As the line crosses the stream obliquely, the arches are skewed so as to vary 35 degrees from right angles with their abutments; these arches are being built of cut stone, the beds of which are warped surfaces. The scenery in the vicinity of the great viaduct over the Little Conemaugh river is of a singularly wild and striking description. The river forms a loop, about two miles in extent, around the base of a mountain, returning almost to the place of beginning; at this point there is a very narrow gap in the dividing ridge through which the railroad passes. In running this distance the river falls about forty-five feet, and as the railroad cuts off the bend, a viaduct seventy feet high above the water becomes necessary. This is now being built of sandstone, in the most substantial manner, with a semicircular arch of 80 feet span.

The tunnel through the spur of a mountain, four and a half miles from Johnstown, will be 800 feet long through rock, and will save about two miles in distance.

When finished, it will be twenty feet wide and nineteen feet high in the middle—it is now cut larger in order to admit of an arch; and about one-half of the excavation of the tunnel is now done.

The following is from the Philadelphia Literary Gazette of September 3, 1832:

Allegheny Portage Railroad.—A friend who has recently visited the western part of this state informs us that this great work, which will connect our eastern and western canals, is progressing with much industry. Many of the sections, where the work was not heavy, are nearly graded; and contracts have been entered into for laying the rails on the whole line. The works of greatest magni-
The railing on high, and cut out of solid rock; and a viaduct of heavy stone across the Little Conemaugh river.

The tunnel is a stupendous work, which a mind unaccustomed to see the efforts of human industry would consider almost impracticable; the quantity of work done by the enterprising contractors, J. & E. Appleton, reflects much credit on their untiring exertion and skill; they drive the work night and day, and are now nearly half through; this tunnel shortens the distance of the road about two miles. Theuling on the portage will be cast-iron, firmly secured to stone blocks; the road is 55 feet wide, calculated for two tracks.

From the present state of the work, we think this valuable improvement will be in operation next summer. Much credit is due to the Canal Commissioners, and to Sylvester Welsh, Esq., the engineer, for the permanent nature of the work, and for the spirited manner in which it has progressed.

The opening of the railroad will form a new era in the annals of Pennsylvania. The cheapness of transportation from Philadelphia to Pittsburgh, by this route, will give an impetus to trade, such as has not been experienced before. May those pioneers who have borne the heat and burdens of our great State improvements reap the reward of their labors.

Five inclined planes were located on each side of the mountain. Their general design was:

1st. To be straight in plan and profile.
2nd. To average less than half a mile in length.
3rd. To have an elevation of about five degrees, so as to overcome a height of about 200 feet each.
4th. To be worked by stationary steam engines and endless ropes.

As finally constructed the total length of the ten planes was 4,411 miles, the total elevation overcome being 2,007 feet; the average grade being 455 feet to the mile, or eight and one-half per cent.

The steepest grade, when completed, was found to be 5° 51', the grades on the other nine planes ranging below that to 4° 09'. The angles of elevation at the lower ends of the planes were slightly rounded off by curves, "eased," in the language of the track builders. The levels between the planes were located with very moderate grades. The following table shows the length and rise or fall of each plane or level numbered from Johnstown eastward:

THE PORTAGE RAILROAD.

<table>
<thead>
<tr>
<th>Level No.</th>
<th>Rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plane No. 1, from Johnstown to Plane No. 1</td>
<td>2,070 feet</td>
</tr>
<tr>
<td>Plane No. 2, ascending</td>
<td>555 feet</td>
</tr>
<tr>
<td>Plane No. 3</td>
<td>1,490 feet</td>
</tr>
<tr>
<td>Plane No. 4</td>
<td>1,260.55 feet</td>
</tr>
<tr>
<td>Plane No. 5</td>
<td>1,010 feet</td>
</tr>
<tr>
<td>Plane No. 6</td>
<td>780 feet</td>
</tr>
<tr>
<td>Plane No. 7</td>
<td>550 feet</td>
</tr>
<tr>
<td>Plane No. 8</td>
<td>390 feet</td>
</tr>
<tr>
<td>Plane No. 9</td>
<td>270 feet</td>
</tr>
<tr>
<td>Plane No. 10</td>
<td>150 feet</td>
</tr>
<tr>
<td>Plane No. 11, to Hollidaysburg</td>
<td>75 feet</td>
</tr>
</tbody>
</table>

A more detailed description of the construction of this very unique railroad appeared in pamphlet form entitled "An Account of the Portage Railroad over the Allegheny Mountain in Pennsylvania, by Solomon W. Roberts, Principal Assistant Engineer thereon," issued January 1, 1836. It is printed in full in the Appendix, and to it the reader is referred.

Each plane was equipped with two stationary engines of about thirty-five horse power each.

These engines, which were built at Pittsburgh, were designed by Edward Miller, who was appointed Principal Assistant Engineer by the State Commissioners upon his return from an inspection tour in England in 1831.

He was then placed in charge of the design and construction of all machinery for the Portage Railroad.

Each engine had two horizontal cylinders, and the pistons were connected to the main shaft by cranks set at right angles to each other. Upon the main shaft were the large grooved wheels around which the endless hemp rope passed and by which the ropes were kept in motion. The "slack" was taken up and the ropes kept "taut" by a sliding carriage at the foot of each plane, which was held to position by a cable and windlass making the tension adjustable.
The engines were arranged to start and stop quickly and were generally regarded as satisfactory.

A complete working model of an inclined plane with engine houses and machinery complete, with cars and sectional boats in transit, formed a part of the exhibit of the Pennsylvania Railroad Lines at the World's Columbian Exposition in 1893 and was much admired.

The track on the planes consisted of strap iron two and one-half inches wide and five-eighths of an inch thick, laid on wooden stringers ten inches by twelve inches, held in position by sawed cross-ties, to which at regular intervals the sheives, over which the endless cables ran, were attached in the middle of the track.

As will be seen from the above table, the steepest grades on the "levels" were on Level No. 1 leading from the canal at Johnstown to foot of Plane No. 1, and Level No. 11, from foot of Plane No. 10 to the canal at Hollidaysburg, being about twenty-five feet to the mile on the former and about forty feet on the latter.

The level from the tunnel at the head of Plane No. 1 to foot of Plane No. 2, about thirteen miles in length, was called the "Long Level."

On this the grade was less than fourteen feet to the mile.

It was on this level that the "Boston," the first locomotive on the Portage Railroad, was put to work in 1834, doing good service from the outset.

The shortest level was No. 7, eight hundred feet long, the first level below the summit on the eastern slope of the mountain. It led from the foot of Plane No. 6 to the head of Plane No. 7; it was the only "dead level" on the road except the short sections of track about 300 feet long at the head and foot of each plane, which were also laid exactly level. The maximum radius of curvature on these levels was 442 feet, but very few of the curves had a less radius than 950 feet.

In designing the superstructure of the Portage Railroad the engineers were imbued with the fact that it should be permanent way, in fact as well as in name.

Intended to endure for generations, no perishable material was to be used. Stone blocks

*The "Boston" was built at Boston, Mass., in 1834.*
and stone cross-ties were carefully imbedded in the ground to support the rolled iron rails, which rested in iron chairs to which they were attached by wrought iron wedges.

The iron rails were imported from England. They were eighteen feet long and weighed forty lbs. a yard—720 lbs. to the bar. The cast iron chairs weighed thirteen lbs. each.

Between the long stone cross-ties which supported the ends and middle of each eighteen foot rail, stone blocks were laid as shown on the accompanying sketch. Thus each eighteen foot rail was supported by chairs placed three feet apart from centre to centre.

Owing to the delay in obtaining stone cross-ties, wooden cross-ties were substituted in some parts of the road; on other portions the rails were laid entirely on stone blocks and kept in line by iron rods attached to the chairs.

With a track thus composed entirely of stone and iron it was believed that the highest type of durable superstructure had been reached and that no renewals would be required for several decades, but in a few years the stone block was replaced by the perishable cross-tie of wood with an endurance of from five to ten years, instead of being everlasting like stone, and from that time to this the timber has proved better adapted for cross-ties than stone, iron or other substances.

The cost of the iron rails landed at Philadelphia was $48.51 per ton, and of the chairs, with wedge complete, thirty cents each. The blocks of sandstone were laid one yard apart from centre to centre imbedded in broken stone. They were two feet long, twenty-one inches wide and one foot deep, and cost fifty-three cents each delivered on the work. All of the iron track material was brought from Huntingdon on the Juniata by boat, thence by wagon; the hauling of 3,000 tons of rails proved to be slow, laborious and expensive.

For while the cost of the track material (not including the expense of carting the rails and chairs from Huntingdon) was about $6,500 per mile of single track, the first twenty-two miles of track on the levels, exclusive of grading and masonry, but including all expenses of rails, track material and hauling, was over $13,000 per mile, thus costing about as much to deliver and lay the material as was originally paid for it.

The second track, thirty-two miles long, with about two miles of sidings and crossings, cost a trifle less than $11,500 per mile, all expenses included.
PHYSICAL CHARACTERISTICS OF THE PORTAGE ROAD.

The importance of perfect alignment on a railroad was not appreciated at that early day, and owing to the scarcity of better instruments the tangents were staked out and the curves were mostly run with the surveyor's compass; as close work had been required on the canals where the water disclosed all errors, accurate levelling instruments were necessary.

Thus the grades of the road were more accurately laid down than the curves or tangents.

If the rails reach Philadelphia in time to be conveyed to Huntingdon before the closing of the canal, a single track of the road can be finished for public use in July next; and the second track may be laid and all work completed early in the summer of 1834.

About $30,000 was added to the estimated cost of the Portage Railroad by the Commissioners in their report for 1833, the amount then being placed at $1,526,029.42.

The Ebensburg Spy in October, 1833, contains the following encouraging notice:

We have lately viewed that part of the Allegheny Portage Railroad which lies between Croyle's Mills and the borough of Conemaugh, and are much pleased with its appearance. It would be worth a three days' ride to see the manner in which skill, industry and science, aided by money, have overcome the difficulties which presented themselves, and broke through the obstructions which nature had thrown in the way, in that rough and rugged section of the country. A few miles below Croyle's Mills, the Conemaugh river bends to the south, and after traversing a sinuous course of more than three miles, is again seen across a narrow hill at the distance of about three hundred feet from its place of departure. At this point the road is cut through the hill and carried over the river on a viaduct, supported on a strong and neatly built semicircular stone arch of eighty feet span, rising from abutments at the height of 20 feet above the river, the whole distance from the water to the arch being sixty feet. The arch is now complete and the centres removed. It presents a grand and bold appearance, and seems capable of resisting anything short of the concussion of an earthquake. This work does credit to the engineer who planned it, and to the worthy contractors, Snodgrass and Dunro, who constructed it. The viaduct is connected with a hill at the west end by an immense embankment, some parts of which are seventy feet in height. The vicinity of this viaduct will be ere long, the site of extensive water works. The whole stream, which is considerable, can be conveyed through the Hog-back by a deep cut or a short tunnel, and thus gain a fall of more than forty feet. A few miles below the viaduct the road passes through a tunnel, nine hundred feet in length, the greater part of which has been excavated out of a solid rock. About one hundred feet at each end of the tunnel is handsomely arched with cut stone, and the entrance will be ornamented with columns of the same.

Many of the rails are laid upon this section of the road which we visited, and preparations for laying the residue are in rapid progress. This is the

Rail weighing 40 pounds per yard. Portage Railroad. 1835.

In the report of the Commissioners for the year 1832 the estimate for the Portage Railroad with double track and machinery is stated to be $1,495,789.51, or about $220,000 more than the estimate for the previous year.

The American Railroad Journal of February 2, 1833, states:

It is now ascertained by estimates founded on experience that the whole road, including road-bed formation, double tracks with sidings and turn-outs, steam engines with ropes, etc., at the planes, and all other things necessary to render it fit for public use, will cost $1,495,789.50.

When the estimate was made last year it was contemplated to use rails weighing 28 pounds to the yard, but since then the size of the rails has been increased to 39½ pounds to the yard, because in England experience has demonstrated that a light rail is insufficient for locomotive engines and heavy traffic; much of the other work has also been proportionally strengthened.

Flat iron bars will be placed on wooden rails on the inclined planes, but on the rest of the road edge rails will be used. These rails will rest in iron chairs, on wooden sills and cross-ties, over high embankments, and on stone blocks where the ground is solid. Each stone block measures about 3½ cubic feet.
case, we are informed, on the whole line of the portage, and the prospect of traversing the whole course from Hollidaysburg to Conemaugh, during the present season, is now very certain.

The gauge of the tracks in 1833 was fifty-seven inches.

Early in the autumn of the year 1833 a committee of the Board of Trade of Philadelphia made a tour of the Western cities, with a view of establishing business relations with the merchants of the Ohio Valley and the Northwestern States as soon as the line from Philadelphia through to Pittsburgh should be opened in the following spring.

On their trip west over the Alleghenies in stage coaches they had stopped to examine the inclined planes then nearing completion, and were promised a ride over the mountain without changing cars on their way back to Philadelphia. The railroad builders worked very hard to keep their promise and accomplished it much to their gratification. W. Milner Roberts thus describes their return journey, November 21, 1833, when the first train of cars (drawn by horses on the levels) was passed over all the planes of the Portage Railroad:

The train of new freight cars had been put upon the road by David Leech. They started in the morning from Johnstown, and about ten o'clock that night our friends, in the midst of a snowstorm, after passing over all the planes, were delivered safely at Hollidaysburg. The railroad and the canals with which it connected were then closed for the season.

Early in March, 1834, a single track was completed on all of the levels on the Portage Railroad. On each of the planes the double tracks required in their operation had been finished during the previous year.

The following letter was published in a Pittsburgh newspaper:

Portage Railway Office,
Hollidaysburg, March 20, 1834.

Dear Sir:—It will, doubtless, be gratifying to the citizens of Pittsburg to learn that the Portage Railroad will be open for public use on Tuesday, the 18th inst. The Western Juniata and Eastern Division of the canal are filled and ready for transportation, therefore, on that day, a line of communication will be opened, uninterrupted between your city and Philadelphia.

The rates of toll to be received on the Portage have been fixed by the road Canal Commissioners at double the amount chargeable on the Pennsylvania canals.

Very respectfully, etc.,
S. Jones, Superintendent.

On March 18, 1834, the Allegheny Portage Railroad was literally "opened to the public," for by the first regulations adopted, any firm or person had the right to put cars upon the tracks and to haul them with their own teams from the canal dock to the foot of the first plane and on the levels between the planes, following the same system of paying toll that had prevailed upon the turnpikes and canals where the stage coaches and boats were owned by individuals or companies. The machinistry upon the planes, however, being owned and operated by the State, a motive power charge was collected for hauling the cars up and down on them.

The following description of the opening of the road is from the Ebensburg Spy, dated Thursday, March 20, 1834:

PORTAGE RAILROAD.

"On Tuesday last, March 18, this most important link in the chain of communication between the East and West was fully united to the other parts. On that day eight covered cars belonging to Leech's Line left the basin at Conemaugh and, accompanied by the principal engineer and assistants and a number of citizens, proceeded eastward. The engines being in full operation, they were drawn up the five planes west of the mountain in fine style and with great rapidity. Yesterday morning they proceeded down the mountain. We saw them let down the two first planes east of the Summit. The operation was simple, safe, and expeditious.

The excellence of the machinery and the plan of passing the planes have been fully tested. There can now no doubt remain of the practicability of passing a vast amount of trade between the two basins by means of this very excellent railroad. The engines are capable of taking up or letting down a train of three cars, with their freight of nine tons, at the rate of about ten miles per hour.

The cars were freighted with about ten tons of bacon. They will return from Hollidaysburg with full loads of store-goods, large quantities of which are now daily arriving at that place. Eight more cars would leave Conemaugh yesterday morning; and in a few days, if the business will require it, of
which there is little doubt, forty-four other cars will be added to this line. Much credit is due to Captain Leech, the enterprising pioneer in our public works, for his exertions in preparing for the first opening of trade upon the railway. His cars are neat and substantial. Property on board will be perfectly secure from the weather and from depreciation, as all will be enclosed under lock.

We wish the members of our Legislature could fully appreciate the great public utility of this road and the necessity of its completion. The second track is indispensable for conveying, with the necessary expedition, the trade which will seek this route. The engines will do their part in passing quickly any number of cars which may be required, but the waiting at the turn-outs will be tedious and vexatious. The difficulty will be increased with the increasing amount of the transportation. We hope the Legislature will authorize immediate contracts for the second line. A number of skillful and enterprising contractors are waiting with anxiety for the job. It will be done cheaply and quickly."

The Conemaugh spoken of in the article was what was known then as "Conemaugh Borough," now the Ninth and Tenth Wards of Pittsburgh, and not Conemaugh Station or East Conemaugh, as some might suppose.

The engines referred to in the article were the stationary engines at the heads of the planes for drawing up and letting down the cars. Locomotive engines were not used upon the road at this time, and they are not mentioned in the article. The cars were drawn by horses.

An advertisement in the same paper informs the public of the formation of the "Pittsburg Transportation Line of Canal Boats and Railroad Cars" for the purpose of carrying merchandise and general freight between Philadelphia and Pittsburgh and all intermediate points, and that goods would be carried through either way in ten days. The last two words are printed in capitals in the advertisement and are evidently intended to startle the public at the rapidity with which goods could be moved by this line. Nothing is said in the advertisement about carrying passengers.

The following advertisement appeared in the *Pennsylvaniaian*, Thursday, May 6, 1834:

---

**PORTAGE RAILROAD.**

Sealed proposals will be received by the superintendent at his office in Hollidaysburgh until sunset of Saturday, the 31st of May next, for furnishing materials and laying a second track of railway upon the Allegheny Portage, and for any other work which may be then ready for letting.

Passenger Car, with shingled gable roof, two longitudinal seats with backs against sides of car. 1834. Old Portage Railroad.

Plans and specification of the work will be exhibited at the superintendent’s office ten days previous to the letting.

Terms of proposals will also be furnished, and bids will be required to be made in conformity with them. In the allotment of work, the superintendent reserves the right of judging as to the ability and capacity of bidders for executing contracts proposed for, as well as their terms.

S. Jones, Superintendent.

Railway Office, Hollidaysburgh, April 22, 1834.

Sherman Day, in *Historical Collections of the State of Pennsylvania*, published in 1843, states that "In October, 1834, this portage was actually the means of connecting the waters of eastern Pennsylvania with those of the Mississippi, and as the circumstance is peculiarly interesting, we here place it on record. Jesse Crissman, from the Lackawanna, a tributary of the north branch of the Susquehanna, loaded his boat, named the 'Hit or Miss,' with his wife, children, beds and family accommodations, with pigeons and other live stock, and started for Illinois. At Hollidaysburg, where he expected to sell his boat, it
THE PENNSYLVANIA RAILROAD COMPANY.

was suggested by John Dougherty, of the Reliance Transportation Line, that the whole concern could be safely hoisted over the mountain and set afloat again in the canal. Mr. Dougherty prepared a railroad car calculated to bear the novel burden. The boat was taken from its proper element and placed on wheels, and under the superintendence of Mayor C. Williams (who, be it remembered, was the first man who ran a boat over the Allegheny mountain), the boat and cargo on the same day began their progress over the rugged Allegheny. All this was done without disturbing the family arrangements of cooking, sleeping, etc. They rested a night on the top of the mountain, like Noah's ark on Ararat, and descended next morning into the valley of the Mississippi, and sailed for St. Louis."

Trade over the road was promptly begun under the auspices of several transportation companies, among them being the Bingham line, the line of D. Leech and Company, and Dougherty's Section Boat and Union lines.

Freight Car used on Leech's Line. 1836. Old Portage Railroad.

The Bingham line cars were brown and those of Leech and Company white, while the rolling stock of the Pennsylvania and Ohio and Union lines were painted respectively yellow and light drab.

Other lines ran individual cars, such as "market cars," "lumber cars," and "coal cars," all built on four wheels. This was the rolling stock of the "Old Portage" for several years.

The Commissioners in their report for 1835 state that the second track on the Portage Railroad was completed and put into use on the 10th day of May, 1835, and that all of the work on this road was then finished except the machine shops at Hollidaysburg and Johnstown. They placed the actual cost of the Portage Road when finished at $1,634.557.699 for thirty-six miles, or $45,400 per mile, not including machine shops.

As has been stated, the commonwealth owned and maintained the stationary engines, ropes and machinery on the inclined planes, while the transporters furnished their own horses for motive power on the levels. When the locomotive was introduced complications naturally took place, and the discovery was soon made that the business could not be properly conducted unless all of the motive power from Hollidaysburg to Johnstown was controlled by the State.

A locomotive built for the Portage Railroad by McClurg, Wade & Co., of Pittsburgh, was put to work in the spring of 1835 on the long level and rendered good service.

During the year four locomotives were contracted for, for use at the levels.

A tourist who left Boston, May 14, 1835, via the Stonington line to New York, traveling over the Camden and Amboy Railroad to Philadelphia, the Pennsylvania Railroad to the Columbia basin, and by canal packet to Hollidaysburg, thus describes his journey over the mountain, and thence to Pittsburgh:

---

1 The cost of moving freight over the Portage road in 1835 was $1.10 per ton over the planes, and $1.12½ per ton by horses owned by individual transporters—$2.31½ per ton for 36 miles.

2 Of the Camden and Amboy Railroad, between New York and Philadelphia, he speaks thus: "I can only say that a most odious monopoly exists there, and I pity those who are thrown within their merciless grasp."
At Hollidaysburg we left the boat and entered the cars by which we were to be borne over the mountain. The Portage Railroad over the Alleghenies is a wonderful work, and exhibits in a surprising manner the amazing power of mind and its vast superiority over the corporeal world. Here we were hurled over a high, rugged mountain, whose toilsome and dangerous ascent and descent it but yesterday required more weeks than it now does hours. . . . The planes are from 3/4 to 1 1/2 miles in length, and the levels from 1 to 16 miles. The short levels are furnished with horse power, the longer ones with locomotives.

The passage is perfectly safe—so it appeared to me—and is full of interest. . . . The scenery is beautiful along the Juniata and Susquehanna.

Now we are drawn up an inclination of 35 degrees, at the rate of 7 or 8 miles per hour by a single plane on the west side we pass through the bowels of the mountain by a beautiful tunnel, which added to the variety and gave life to the scene.

Once more packed in the canal boat, we floated down the Conemaugh, the largest of the head-waters of the Ohio and which is near the spot where we dined, and where it would have run through a gallon keg.

The Kiskininitas and Allegheny river to Pittsburgh, where we arrived on Saturday evening, the 4th day from Philadelphia, albeit the agent promised us a passage of but 60 hours.

Great difficulty in procuring a sufficient supply of water for the stationary engines on the Portage planes developed soon after the planes were put in operation.

In 1835 surveys and estimates were made for a large reservoir with conduits on each side of the mountain.

Over 25,000 passengers were carried over the Portage Railroad in 1836, of which 15,747 were west bound. The amount of freight moved was as follows:

Tons of 2,000 lbs., westward 29,740; eastward, 15,439; coal, local, 7,540. Total, 52,719.

The expense of operating the whole road—planes, locomotives and horses on levels—for the year was $93,436; the receipts from tolls amounted to $70,646.25, leaving a deficit of $22,789.80.
Not long after the road was opened the traffic increased rapidly. Especially was the freight heavy in the early spring when the canals were first opened for navigation after having been ice-bound for four or five months. It was at this season of the year that the defects of the stone block track became most apparent.

The engineer of the Portage Railroad thus describes the damage by frost to that part of the railway laid with stone blocks during the spring of 1839:

The difficulties experienced during the past season were principally felt between the 6th and 13th of February, at which time a continued rain and warm sun caused the frost to leave the ground so suddenly as to derange our operations very materially; the greatest portion of the road being laid upon blocks, and the action of the wheels of the engine being lateral as well as vertical, served to spread the road at all those points where cross-ties had been omitted in its original construction. The engine and cars, as the case might be, would constantly fall between the rails, and before the train could be stopped would inevitably draw others into the same dilemma, much to their own damage as well as destruction to the castings, of which a portion of the superstructure is composed. The surrounding soil having become saturated, afforded little or no support to the blocks, and the same accident was again liable to take place, until effectually cross-tied, which in most cases has been done. While upon this subject, the undersigned would most respectfully recommend the entire suspension of burthen travel during the time at which the frost is leaving the ground, the damage created and the cost of repair being much greater than the amount of tolls received during that period.

The canal is open for navigation generally about the 20th of March, at which time it is requisite to have the railway in good repair, in order to accommodate the Western trade. By suspending the burthen travel for a week or ten days, during the month of February, no inconvenience will be felt, except probably an accumulation of merchandise at the warehouses in Philadelphia instead of those at Columbia and Harrisburg. The passengers could be conveyed over the road by a light engine, by which the least damage would be created, and time for repair afforded before the business season commences. The effect of the usual practice is, that by the conveyance of burthen, at the time that frost is leaving and the snows melting, both the road and machinery become in the worst possible condition, at a time when trade is heaviest, and hence the greatest regularity required in every department.

The loss to the commonwealth would be nothing, as the merchandise must eventually pass over the road, while the saving in the cost of repairs would be sufficient to keep the road in good order during the greatest part of the ensuing season.

Mr. William E. Morris, engineer, in his report under date of November 1, 1840, makes the following statement in regard to the construction and maintenance of the tracks:

The plan of inserting additional cross-ties between the stone blocks, upon which the rail is laid, to prevent the spreading apart of the rails, has to some extent been persevered in during this season. Upon the levels there has been laid, principally for this object, nearly 7,000 locust cross-ties. The action of trains of cars passing in rapid motion over the road, and the effect of frost, require a continuance of the plan.

And in the report upon the motive power used on the road, he says, under the same date:

The motive power is furnished by the commonwealth. The system in operation is a compound one, in which stationary engines, locomotives and horse-power each bear a part. The shortest level upon which locomotive engines are used is between planes No. 9 and 10, the length of which is 1.76 miles, the grade twenty feet per mile. They were first used upon this portion of the road in 1838. The longest level upon which horses are worked as a motive power is between planes No. 3 and 4, a distance of 1.90 miles, with a grade of a little less than 10 feet per mile.

The question, "Upon how short a level it is justifiable to make use of locomotive engines," is one upon which there has been much speculation among the friends of this improvement; and some difference of opinion among the officers heretofore having charge of the road. However plausible the calculations of theory may be, the only certain method of arriving at the truth is the resort to the infallible test of experiment.

If the proper number of horses are employed, upon any section of the road, the cars are kept constantly in motion, and arrive at the planes in separate trains; no car being compelled to wait upon the others. But when locomotives are employed, the foremost cars must always wait for the arrival of the other trains, until a load shall be collected for the engine; and upon their arrival at the other end of the level, the hindmost cars are detained.
until those in advance of them shall have passed the plane. This detention is repeated at each end of every locomotive level; and unless the distance traversed by the engine is sufficient to gain the time thus lost, there will result an actual loss of speed. The velocity of engines upon a two-mile level with burden cars is about ten miles per hour—the speed of horses four miles per hour. The difference of time while actually in motion, then, will be eighteen minutes in favor of the engine. It is seldom in practice that the delay does not exceed that time. In the transit of passengers about four minutes are gained. The conclusion then seems unavoidable, that steam power upon short levels is forbid by sound economy, is of no advantage in the transportation of freight, and but little in that of passengers. The extension of the use of locomotives is therefore deemed inexpedient at present, and a continuance of their use between No. 9 and 10 is only recommended on account of the steepness of the grade.

The following paragraphs concerning the character and great cost of the ropes used on the planes are of the greatest interest:

The last set of ropes procured for the planes bid fair to be of a very superior kind. They are made of the best Russia hemp, the outside strands covering the rope are tarred, the inner part left in its natural state. The coating appears almost impervious to water, while the body of the rope being free from tar, possesses the flexibility of white cordage.

Three new ropes will be required next season, estimated cost, $10,000.

The contract entered into with Smith and Guthrie, rope manufacturers of Pittsburgh, on the 27th day of June, 1839, was fulfilled according to agreement, which amounted to $25,037.04, and has been settled in full from the amount appropriated for the purpose. Another contract was entered into, with the same firm, on the 9th of May, 1840, for ropes for ten inclined planes, which has been complied with, except the delivery of a few coils, which will be sent before the close of navigation this season. This contract amounts to $33,826.80. In my annual report of last year I stated that the ropes furnished were of a superior workmanship and material, and that I expected that they would last at least a season and a half; in this respect my expectations have been fully realized, as you will perceive by a reference to statement No. 8, which shows the time the ropes have been in use, and the time they are estimated to last by the principal rigger.

In addition to the freight lines, the transporters also ran "fast" expresses from Pittsburgh to Philadelphia in eighty-five hours.

Over the mountains "cars with four wheels and without saloons or stoves" were used to convey passengers between Johnstown and Hollidaysburg.

The Pittsburgh Examiner for March 14, 1840, contains the following advertisement:

**PENNcLYVANIA PACKET BOAT CO.**

**EXPRESS AND PIONEER LINES.**

Exclusively for the conveyance of passengers from Pittsburg to Philadelphia, by way of Pennsylvania Canal and Portage and Harrisburg Railroads—through in 3½ days.

The public are respectfully informed that these lines of splendid packet boats and railroad cars will again commence their regular business as soon as the navigation is open. The proprietors of these lines, aware of the great importance of maintaining their well earned reputation, have taken great pains to refit their boats and cars in the most comfortable manner, and are prepared to assure the traveling public that no exertions will be spared to render general satisfaction; a packet boat will always be in port, and travelers are particularly requested to call and judge for themselves. The railroads are passed in daylight. This line is particularly calculated for families and individuals traveling with large quantities of extra baggage, being furnished with a large baggage room below deck. The cabins are large and comfortably furnished, and the packet line on the canal, those to whom economy is an object will find it greatly to their advantage to travel by this line. Time of passage, 5 days—no midship passengers carried on these boats—all baggage at the owner's risk. Passage, inquire at the offices in the Exchange Building, St. Clair Street, and nearly opposite the Pittsburg Hotel, Wood Street, and at the Canal Basin, head of Penn Street. For the proprietors.

D. LEECH & CO.

George B. Kramer, an old employe of the Pennsylvania Railroad Company, lived upon the portage road, being a boy of thirteen when that road was completed. In March, 1805, he communicated the following facts to the author: "The sectional canal boats loaded in three sections, and went over the line from Philadelphia to Columbia the same as though they were cars hauled by locomotives, one boat of three sections being a full load for a small locomotive; but the larger locomotives sometimes took two boats. When they reached Columbia the boats were put on a
IMPORTANT

IMPROVEMENT IN TRANSPORTATION

Via Pennsylvania Canals and Rail Ways.

The subscriber having devoted five years of unceasing attention to the business of transportation on the Rail Roads and Canals of Pennsylvania, and having in that time fully ascertained that the means of transportation, as heretofore in use, must at all times be attended with great expense and subject to various delays in the transit of merchandise, &c., from the Atlantic Cities to the West, owing to the necessity of unloading merchandise from Cars into Boats and vice versa, at three different places of transhipment on the route between Philadelphia and Pittsburgh; in order to the overcoming the difficulties referred to, I have introduced on our Railways and Canals, the use of Boats, built in sections, susceptible of being connected, when in Canal, to form a Boat, and which are passed on to Rail Road Cars by means of Inclined Planes and Lift Locks, are used as Cars; thus not subjecting the cargoes to be unloaded, and continuing the same in the charge, and under the supervision of the Master of the Boat to whose care the merchandise was originally entrusted. To exhibit the advantages of this means of transportation, I shall first state the reasons, why a radical change in the system of transportation ought to be introduced, after which, I shall endeavour to show the advantages which the plan, by me introduced, will eventually confer on the community, and more immediately to the Citizens of the interior of Pennsylvania, and also to the Citizens of Philadelphia, Baltimore and Pittsburgh; and for the furtherance of the same, I have decided to throw open to the public, (with certain restrictions,) the right to build boats in sections, so as to adapt the means of transportation to the growing wants of the community, and thereby endeavor to confer the greatest good on the greatest number.

Objections to the plan heretofore in use on our Railways and Canals, are

Firstly.—The unloading of merchandise at three different points, thereby separating lots of goods, damaging merchandise, and subjects the same to tedious and vexatious delays.

Secondly.—The increased cost of transportation, as the delays at the points of transhipment, and expense of warehouses, &c., are more than equal both in time and cost to an intermediate voyage from Philadelphia to Pittsburgh.

Thirdly.—The necessity of unloading merchandise at different points, requires that companies be formed, and that a large amount of capital be invested for the purpose of transportation.

Fourthly.—Companies cannot compete with individual enterprises, and consequently the cost of transportation to pay a company, must be fully 25 per cent. greater than would be required to pay individuals if the nature of the business would admit of a successful competition by individual enterprise.

Fifthly.—Companies engaged in the transportation, in order to guard from loss in the reduction of rates from competition, must enter into a combination for the purpose of maintaining a rate of freight sufficient to pay the expenses of large companies which must of necessity be at least 25 per cent. higher than would be required if left open to uncontrolled competition.

Sixthly.—All such combinations must prove injurious to the trade, by compelling heavy products to find a more cheap, although more circuitous route.

Circular concerning Sectional Canal Boats, issued by John Dougherty. 1839. (Fac-simile.)
JOHN DOUGHERTY'S PORTABLE BOATS, 1839.

Remarkably.—Combining cannot have the capacity of expediting and contracting the passage of transportation to save the waste of the country. Should they place on the line sufficient Cars, Boxes, Horses, etc., to meet the great wants of the trade at the commencement of Canal Navigation, the surplus stock would remain unused during a large proportion of every year, and great complaints for want of use. My present plan is, to build a sufficient number of Cars, for the purpose of conveying the Bots on the Railways, and place them on the Portage Rail Road, and give to such every person, who may wish to build a boat, the right to build the same; then the Boston can land his Boat at Baltimore, or Philadelphia, and pass throughout the entire route to Pittsburg without the intervention of a company, as I shall have a sufficient number of Cars in readiness to pass over any number of hills that may be required in the course of the Portage Railway. The Bots will be built in 4 sections, and can carry a cargo of about thirty loads on the Portage Railway. The charge for the use of the Cars, and handling the same out of the canal, and including a conductor for each train of Cars will not exceed 71 cents per 100 pounds; for Planes, 15 cents per 100 pounds; and for merchandise, not exceed 121 cents per 100 pounds, for the entire length of the Portage Railway. The cost and expense of Boat and Horses, Horses, etc., on a Boat with 30 tons, from Baltimore to Pittsburg, would not exceed 3 dollars per ton; the Tolls from Baltimore to Philadelphia, via Delaware and Chesapeake Canal and Pennsylvania Canal, would not exceed an average of 81 cents per ton. My charge for 500 tons, Planes, Agents, etc., may be $3.50 per ton; this would amount to transporting a ton of goods from Baltimore to Pittsburg at 70 cents per ton, and so on. The Canal Commissioners subsequently discriminated in favor of Boats carried on State Trucks 41 cents per 100 pounds from Philadelphia to Pittsburg, and on Western produce the rates of Transportation can be maintained at 41 cents per 100 pounds on Bacon, etc., and Planes can be delivered at Baltimore, and pay a profit to the freighter at 81 cents per barrel. The cost of Transportation must draw on to the Canals and Railways an increased amount of freight, and with it an increased amount of business in our principal cities. The difference of transportation by the introduction of the use of this improved mode of transportation, together with the increased expense of the completion of the Susquehannock Canal to tide, will enable us to draw on to the Canals and Railways of Pennsylvania, a vast amount of the trade of the Ohio Valley. Suppose for a moment, that the produce of the Ohio Valley, for the distance of 100 miles farther down than has heretofore passed through this route to be carried, it would entail the entire trade now passing through this avenue, to which the trade from the interior of Ohio, which will reach us by the cross cut canal; and the trade from the West, to which the trade of the cities of Baltimore, Philadelphia, New York, and Boston, which will be passed on its way throughout this route, and all the other passages of that in order to meet the great and growing wants of the trade, that individual companies must be put into use, without which the trade must languish, the only capital required by a young man to qualify him for going into successful competition with the called established lines, would be a boat either of Iron or Wood, as may suit his means; and two Horses, or one Ox. This will be passed on to the Boats at short periods, thus enabling the owner of one Boat to compete with the best established lines at the time, and enable him to freight merchandise, etc., at much less expense than Companies can, for the retention of Creek at a small advance will be established. In submitting these views to the public, I do so with the intention of bringing the public aided to a knowledge of their interest, my first boats being in three months, and the first boats built on this principle, are not such as I am now prepared to have built permanent building boats, will have the advantage of my former experience; and the regulations of the Portage Rail Road restrict the weight of Cargo on each Boat to 5 or 6 tons, consequently, in 4 sections, will carry 20 per cent. more freight than those in 2 sections. As respect portable boats in sections, whether built of Iron or Wood, I must have in mind giving a decided preference to those built of Iron; for, at the same time we have been found our Wood Boats to answer every purpose, the boats, if built of masts, timbers, are not subject to leak, and as boats in sections require less timber to ensure sufficient strength than if built of four times the length, consequently much lighter than boats built the full length of the canal; persons who wish to build boats will be furnished with plans and specifications of the same, and a permit to build the same, prior to their being sold. Portable Boats 81 feet in length, 8 feet 2 inches wide, weight of wood or iron, about 19 tons neat, and carry 20 tons to every foot water, consequently, a Portable Boat with 30 tons (including the weight of Boats), only draw two foot water, those Boats are propelled in Canals with thirty tons of freight by one horse, more readily than two horses can draw the same amount of cargo in a large Pennsylvania Canal Boat, as the resistance of a boat in canals, is in proportion to the cross section of the boat.

Persons wishing to make inquiry respecting the Building of Portable Boats, or the establishment of Agencies at Baltimore, Harre de Grace, or Pittsburg, will please address

JOHN DOUGHERTY,
Inventor of the Portable Boat,
AT HOLLIDAYSBURG, PA.

N. B.—The charges for use of trucks and Planes were gradually reduced so that ten dollars was paid for Boats carried over the A. P. R. Road. The Canal Commissioners subsequently discriminated in favor of Boats on State Trucks 41 cents per trip from Phila. to Pittsburg. Which whilst it helped the trade, destroyed the value of my Trucks and Planes, aroused the opposition of the Transportation Companies, and resulted in breaking down of Gov. Porter's administration! the sale of the Public Works! the defeat of the Democratic party in the State! the election of a Southern Democrat President! the War with Mexico! the free soil party and finally War for the Union! Porter would have been President instead of Polk; I put him on the track, and when his administration robbed me, I defeated his nomination, J. D.
slip and run down into the water. I do not think they were fifteen minutes doing all this work.

"Trains leaving Philadelphia at 7 o'clock in the morning would reach Columbia about 2 or 3 in the afternoon. It required one of these boats from three and a half to four days to go to Hollidaysburg from Columbia.

"The section boats at that time used two horses and carried two—'two in and two out,' changing about every twelve miles. They used horses at that time. At Hollidaysburg they had another slip, and they dropped these trucks into the water again, which required about fifteen minutes to get them to the track again and off. It took a full day to go over the mountain—thirty-six miles—from seven o'clock in the morning until dark. They used horses on the levels for the first few years. The cars or trucks that the boats were carried on were owned by the State. At Johnstown they dropped into the water again. From that point it took two and a half to three days to get to the Allegheny river at Pittsburgh. The canal crossed the Allegheny river at Pittsburgh in an aqueduct, for the canal was on the Allegheny side of the river. Before the section boats ran they had portable cars. The small boats were designed to carry five cars, the maximum capacity of each car being six thousand pounds. The larger boats carried ten cars of the same capacity. These cars were hoisted off from their trucks by cranes on to the decks of canal boats specially constructed for the purpose.

"When the boats reached the Portage Railroad or the Columbia Railroad, these car bodies were again transferred by cranes from the decks of the boats back to car trucks.

"The iron strips around three sides of each end of the body were kept there permanently. These strips had rings on each side of the car into which four hooks from the crane chains were inserted when it was necessary to lift the car from the deck or from the trucks, it taking about thirty minutes to unload a ten car boat. The cranes were operated by four men. The car boats were used before section boats.

"Three section boats were first used by this road, but the Canal Commissioners objected to them and said that they must change their boats to four section boats, so that they would be lighter and make it easier on the track. It seems to me that the three section boats only ran about two or three years when they built the four section boats.

"The west bound freight was principally store goods, such as dry goods, groceries and manufacturing goods. The east bound freight was flour, bacon, tobacco, whiskey, feathers, wool, cheese, and ginseng. They had the best boats on the eastern side of the mountain. I was 11 years on the Public Works, 1839 to 1850. I came with the Pennsylvania Railroad before the new Portage was built, and I ran on the Pennsylvania Railroad at the time that the Pennsylvania Railroad trains made connection with the old Portage at Duncansville, one mile above Hollidaysburg on the Pittsburgh Pike. The Pennsylvania Railroad moved out from Duncansville in 1854. The Pennsylvania built the branch from Altoona to Duncansville, which is now the Hollidaysburg Branch. I ran the passenger train over the Portage Railroad for Leech and Company about 1840 and 1841.

"A passenger took an eight wheel car at Broad and Vine streets, Philadelphia, and was taken by horses to the Schuylkill viaduct, crossing the viaduct to the foot of the Schuylkill plane; thence the car was taken to the head of the plane by stationary engine, ropes, etc., and there hitched on to the locomotive. There were generally about four cars to a train. A passenger leaving Philadelphia about 8 o'clock in the morning reached Columbia about 1 or 2 in the afternoon, making about twelve to fifteen miles an hour to Columbia during the first years. The passengers took another boat from Columbia to Harrisburg, but formerly the passenger took a car at Philadelphia that ran to Dillerville and from thence
to Harrisburg. Leaving Philadelphia at eight in the morning brought the passenger to Harrisburg at three o'clock, and there he took a canal packet. Leaving Harrisburg about 4 o'clock in the afternoon they were two nights on the road, arriving in Hollidaysburg about 10 o'clock in the morning of the third day, running day and night, about three horses furnishing the team for each boat. Relays of horses were stationed twelve miles apart. Horses of the finest kind were used on these boats, they being kept on the trot continually for twelve miles. Sometimes the boats would get on a swell and keep on it for miles and it kept the horses going as hard as they could go to keep ahead of the boats; as long as she was on a swell she would run as fast as the horses could go; it took the very finest kind of a horse to keep ahead of her while she was on a swell. It was very hard on the banks. The passengers would get very much interested and excited over it. Three or four lines ran into Hollidaysburg—the Leech Line, and the ‘Good Intent,’ and then there was what was called the ‘Express Line,’ run by Calders, the Perseverance Freight Line, Pioneer Passenger Line. Then there was a line they called the slow line, which had the passengers at each end and freight in midships. This was a sort of a local mixed line which ran from Harrisburg to Hollidaysburg. Leaving Hollidaysburg at half-past ten in the morning, arriving at Johnstown at half-past three in the afternoon, the passenger was delivered in Pittsburgh about one o'clock the next day. They made five miles an hour on the canal without much trouble.”

In 1840 and previously the trucks used for the transportation of section boats were mostly owned by the larger transportation companies, who, in order to control the traffic, charged a high rate for their use to the individuals who owned single boats.

In order to correct this abuse, John Snodgrass, superintendent of motive power, in his report makes the following recommendation:

I would also urge upon your Board the propriety of purchasing trucks for the purpose of transporting the third and fourth section boats over this road. If the State owned the trucks, merchandise could be carried over the Portage for fifty cents per ton and passengers at fifty cents each, and the produce of the West could be carried at a price much less than that at present charged, which is desirable, owing to the great competition now existing between the New York improvements and those of Pennsylvania, and at the same time afford a large increase of the motive power toils of the road. By the adoption of this plan the way would be opened to individual enterprise, the trade on our improvements would be greatly increased, and this, too, with no other expense to the State than the price of the trucks, and nearly every farmer and mechanic in the West could own one or more boats and transport their produce eastward at about one-half the amount now charged by the companies, and thus prevent them from monopolizing and oppressing the agricultural interests of the State. By these means the number of passengers, and especially persons emigrating to the West, would be greatly increased, being induced to travel by our improvements on account of the cheapness of the fare and the numerous means presented for their accommodation, and thus render our improvements profitable to the commonwealth, which is an object much desired by every public-spirited citizen. The four-section boats are, in my opinion, much preferable to those of three; they are not so unwieldy on the road and are capable of carrying a much heavier burden, and are consequently more profitable to the owners, as each section is prohibited by law from carrying more than a certain amount of tonnage on the railroad. I would therefore recommend to individuals to adopt the four in preference to the three-section boats.

Mr. Snodgrass also recommended the purchase of eight-wheeled cars for the purpose of conveying passengers over the road. “By the present system,” he says, “the cars being in the hands of a company, and starting at irregular hours, interfere very materially with the police of the road. The passenger cars at present in use are four-wheeled cars, and are built very long in the body. When at high speed they not only do serious injury to the road, but endanger the lives of passengers, by the probability of an axle breaking; not an uncommon occurrence with freight cars. The State agent at present employed to see to the proper return of passengers could
have the additional duty of car conductor. By
this means the proposed arrangement would
afford greater safety to the lives of passen-
gers, more uniformity of police on the road,
and a very considerable addition to the in-
come of the commonwealth, without any
great increase of expenditure."

In recommending contract work instead of
day labor the Superintendent states that while
the sawing and splitting of wood on that road,
which had been done in 1839 and in the pre-
vious five years at
An average cost of ..................$8,624.33
Had been done in 1840 by contract for..... 1,333.54
Causing an annual saving of....................$7,290.79

In winter when the canals were closed
freight and passengers were transported by the
Reliance line to Dillerville by the Colum-
bria Road, thence to Harrisburg and Cham-
bersburg via connecting railroads. From the
latter place stages and freight wagons were
drawn to Pittsburgh.

The following card appeared in the Penn-
sylvania, December 16, 1840:

WINTER ARRANGEMENTS.
[Cut of Car.]

THE RELIANCE PORTABLE BOAT LINE
will continue to receive and forward from Philadel-
phia to Pittsburg, and from Pittsburg to Phila-
delphia, during the suspension of canal navigation,
via Columbia Rail Road to Chambersburg, and
from thence by Wagons. All goods or produce
entrusted to their care will be forwarded
with promptness, and at the lowest rate of carriage.

JOHN McFADEN & Co.,
Canal Basin, Penn St., Pittsburg.
JAMES M. DAVIS & Co.,
No. 365 Market St., Phil'a.

In their report of 1841 the Board recom-
mended the repeal of the act of the 15th of
April, 1834, giving individuals the right of
placing cars upon the railroads for the con-
voyance of passengers, and that such business
should hereafter be conducted by the com-
monwealth. The Superintendent of the Port-
age Railroad in his report also strongly urges
the adoption of this measure “as calculated
to afford greater safety to passengers, more
uniformity in the police of the road, and a
very considerable addition to the income of
the commonwealth, as a measure not only of
ultimate benefit to the revenue derived from
tolls, but as giving increased facilities in the
transportation of produce between the East
and West.”

In referring to the surveys made in 1840
by Charles Schlatter for a continuous railroad
from Philadelphia to Pittsburgh, the Board
informs the Legislature how several of the in-
clined planes may be dispensed with as fol-
lows:

It appears from the report of the engineer that
the western descent from the summit of the Alle-
geny mountain, where the middle route crosses
it, can be effected by a line of railroad with no
grade exceeding forty-five feet per mile, using eight
miles of the Portage Railroad, and reaching John-
stown with an increase of distance of one mile only.

Another line has been noticed by the engineer
by which the Inclined Planes Nos. 1, 2 and 3 can
be dispensed with, by making twelve miles of new
road, over ground of a favorable character for the
formation of the roadbed. This line also has the
gradient limited to forty-five feet per mile.

Another route, designated as the northern route,
has been surveyed from Harrisburg, by the valley
of the Susquehanna and the west branch of the
Susquehanna, crossing the Allegheny mountain
about thirty-one miles northeast from Blair’s Gap.
This has an increase of distance over the middle
route.

In 1842 the fare between Johnstown and
Hollidaysburg was two dollars, about five and
half cents a mile, of which amount the transpor-
ters paid seventy-eight cents to the State
for the use of tracks, inclined plane machinery
and locomotives.

The Commissioners in 1843 recommended
an appropriation for an “additional number
of trucks to be purchased for the use of the
railroad service “ in transporting section boats.
In the same year the canal companies were
relieved of Sabbath penalties by act of the
Legislature, and resolutions relating to the
construction of a macadam road from Pitts-
burgh to Erie were passed.

Peter McTammany, an old employé of the
The Commonwealth of Pennsylvania,

To the following named persons for services rendered at Plane No. 10

<table>
<thead>
<tr>
<th>NAMES</th>
<th>OCCUPATIONS</th>
<th>FROM TO</th>
<th>INCLUSIVE</th>
<th>NO. OF DATE</th>
<th>PAYED</th>
<th>REMAINING</th>
</tr>
</thead>
<tbody>
<tr>
<td>James Breastad</td>
<td>Engineer</td>
<td>1st day of July</td>
<td>to 31st</td>
<td>31</td>
<td>175</td>
<td>25</td>
</tr>
<tr>
<td>Abraham Hugg</td>
<td>Asst. Engineer</td>
<td>1st day of July</td>
<td>to 31st</td>
<td>31</td>
<td>1.25</td>
<td>0.75</td>
</tr>
<tr>
<td>John Dasher</td>
<td>Fireman</td>
<td>1st day of July</td>
<td>to 31st</td>
<td>31</td>
<td>1.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Thomas Shaper</td>
<td>Hitcher</td>
<td>1st day of July</td>
<td>to 31st</td>
<td>31</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>James M. Lee</td>
<td>Do.</td>
<td>1st day of July</td>
<td>to 31st</td>
<td>31</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Do.</td>
<td>1st day of July</td>
<td>to 31st</td>
<td>31</td>
<td>1.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

COUNTY, SS.

Personally appeared before me, a Justice of the Peace in and for said county, the above named

Sworn and subscribed before me this day of 184

I CERTIFY that the above named

Sworn and subscribed the above Check Roll, and believe it to be correct.

Dr. [Signature]

Engineer, who on his solemn oath, swears that the above CHECK ROLL, containing

I have employed as Engineer at Plane No. 10, and that I have

Supervision M. Power.
Portage Railroad, a few weeks before his death by accident at Altoona in 1892, communicated the following information to the author:

On the 26th of November, 1833, the first car passed over the entire road. On the 18th of March, 1834, the road was opened as a public highway; that is to say, it was opened to the public. Anybody could run cars on the line that chose to do so, and even run the cars with their own motive power on the levels, and the State furnished the power on the planes. The traffic westward was dry goods and iron; eastward, whiskey, bacon and flour. Coal cars were sometimes pulled by oxen on the main line. The method of mining coal was to drive a shaft into the side of the mountain to strike the coal, just as now, then they loaded the miners' coal by the wagon, twenty-five bushels on a wagon, and four of these wagons loaded a car. Four hundred bushels was a carload. They burned coal in the stationary engines to furnish steam, and burned wood in all of the locomotives. Some of those locomotives were made by Norris, and by Baldwin, and one was built in Pittsburgh by George W. Glass. Mr. Glass was Master Mechanic of the Ohio and Pennsylvania Road, and latterly of the Allegheny Valley Railroad, and had charge of the car shops at Rochester in the meantime. The name of the locomotive was "Kentucky." This engine was a small single driver engine, with no connecting rods or cab. The "Virginia" engine was another. This was a Baldwin engine, and ran on the Columbia road and was pronounced a fast engine. It ran away on the Portage road one Sunday morning, from the foot of No. 8 to the head of No. 9, and there jumped the track and landed in the ditch. When they commenced increasing the size of the engines on the Portage road they used the larger ones between Hollidaysburg and Johnstown and the planes. The traffic westward was dry goods and iron; eastward, whiskey, bacon and flour. Coal cars were sometimes pulled by oxen on the main line. The method of mining coal was to drive a shaft into the side of the mountain to strike the coal, just as now, then they loaded the miners' coal by the wagon, twenty-five bushels on a wagon, and four of these wagons loaded a car. Four hundred bushels was a carload. They burned coal in the stationary engines to furnish steam, and burned wood in all of the locomotives. Some of those locomotives were made by Norris, and by Baldwin, and one was built in Pittsburgh by George W. Glass. Mr. Glass was Master Mechanic of the Ohio and Pennsylvania Road, and latterly of the Allegheny Valley Railroad, and had charge of the car

Looking down Plane No. 6, Portage Railroad. 1842.
Portage road was built by a man at Duncansville, and had a shingle roof. The first passenger cars had four wheels, with seats running along the sides like the street cars, with entrance and a platform at each end. They called that line the "Telegraph Line"; they had not heard of electric telegraph lines at that time. The wheels on these cars were all cast-iron spoke wheels and revolved with the axle. There were eight of these cars to a train. The only passenger accident that ever occurred was on plane No. 4, when they had let their cars down at one time, the straps slipped and they ran into four cars at all, and no appliance for heating. This style of car was used up to 1840.

When they invented the section boat they invented the eight-wheel truck. The standard section boat consisted of four sections, and some few three sections. The boats were coupled in the water. When they ran into the canal-slip they just drew the keys and ran a concave eight-wheel truck under the boat. The bow section, middle section, second middle section and the stern section were each about thirty-two feet long and eight feet wide, the same width as a car. The lading of these boats was about the same as the cars—whiskey, bacon and groceries. These section boats ran from Pittsburgh to Johnstown in the canal, they were taken on trucks from Johnstown to Hollidaysburg over the Portage road, then were dropped in the canal at the boat-slip at Hollidaysburg, coupled together, and towed to Columbia by horses; these horses were sometimes carried in the boats. One horse would pull a boat in the canal. Boats for Philadelphia were taken out of the water again and hauled over the Columbia Railroad into that city. There were lines of these boats owned by companies and firms, one was the "Kier Line,", then a great many of the section boats were owned by individuals. My uncle and Barney McGallan owned the "Mermaid"; Lewis Cassidy ran her. Tom Ridley, I think, ran a boat from Pittsburgh to Philadelphia. John Westfall drove a packet between Pittsburgh and Freeport. The section boats were constructed similar to the ordinary canal boat. A boat which is now at Gallitzin is a correct model of the packet boat. These packets made very last time, about ten miles an hour. The traffic was so great at Pittsburgh that they could hardly find water enough to accommodate the boats, because the canal received no more water from any source after it passed the Allegheny river. Every time they passed a boat through the canal they lost a lock full of water. The locks on the Western canal were all made of cut stone.

Situated between the termini of two canals, the cost of conducting the transportation of freight was largely increased by the expense of transferring bulky goods from boat to cars.
at one end and rehandling from car to boat again, at the other. In addition to the expense great delay was also caused by this double transshipment.

Different methods of overcoming the difficulty were tried by the firms engaged in the shipment of through freight. One method was to make cars with movable bodies that could be hoisted by derricks off the trucks and then dropped down upon the decks of canal boats designed specially for the purpose.

Another plan was the construction of sectional canal boats (that could be separated into three or four parts) to fit trucks with increased in the years immediately following 1843.

The east bound freight weighed at Johnstown in 1844 amounted to 42,921 tons; in 1845, 43,012 tons; in 1846, 59,501 tons. The west bound freight shipped from Hollidaysburg in 1844 weighed 65,871 tons; in 1845, 83,972 tons; in 1846, 86,358 tons.

In 1845, 11,013 passengers were carried at a cost of two and one-third cents a mile for road and motive power. The number of passengers increased in 1846 to 11,581. Fifteen locomotives were in service in that year.

The cars whether they contained passengers, freight, or sections of canal boats were attached to the endless cables, that ran over sheives in the middle of the tracks by what were called "stopper ropes."

These "stops," as they came to be called, consisted of plaited hemp, five or six feet long, with an iron eye enclosed at one end and terminating at the other in two cords. After the "stop" was twisted around the cable a few
times, these cords were tied in a bow knot to hold the “stop” in place. The iron eye was made large enough to slip over a stout iron hook attached to the end of each car.

The men who connected the cars to the main ropes by the stops were called “hitchers”; so expert did some of them become that after a car reached the top of the plane the “hitcher” pulled on one end of the slip knot, the chain uncoiled without held, when he slipped the ring off the hook without stopping the car when it was running at a speed of three or four miles an hour. The hitchers were known from one end of the bottom of the plane, as will be seen in the illustration made from the model in the Pennsylvania Railroad Company’s exhibit at the World’s Columbian Exposition; the “buck” was so constructed that in case of accident the wheels of the nearest car ran up on the two sled-like runners forcing them down upon the rails which, as the “buck” was pushed or dragged, sliding along caused enough friction on a nine per cent grade to insure the stoppage of the train before serious damage was done.

Crude as this device may now appear it rendered valuable service in preventing loss of life and damage to property. During the twenty years it was in use very few serious accidents happened upon the planes, which always maintained a reputation for being safely and carefully operated.

J. King McLanahan, writing to the author from Hollidaysburg, Pa., June 16, 1888, relates the following humorous incident:

To relieve the cold facts with a little warming up, I will relate a little funny fact in the history of running the cars over the mountain. You will find an account in one of the newspapers of the mode of attaching the car to the endless rope up the inclined planes, and of a safety car attached that ran behind
the car on its ascent. The officers and men were changed with every political change made in the State, and there was much rivalry among the old hands and the new ones. At one time there was a new passenger conductor put upon the road. The conductor was a relation of the newly-elected Canal Commissioner and fresh from the forest. One of the old hands, expressing friendship, said to the green one, “Now look out for all sorts of tricks to be played upon you on this your first trip. Do you see that safety car behind your passenger car ascending the plane? Now, on the other side of the mountain, if you do not keep an eye upon it the men there will attempt to put it in front of you.” So sure enough, when he was watching the operation of attaching his car to the rope to make the descent, the men put the safety in front, at which the green conductor said: “Look out now! stop that! That car has been behind there all the way to this point, you must not take me for a damned fool. This car shall not move until the safety is put right where it belongs, behind my car.” It took some persuasion to convince the conductor that his pretended friend was the one who played the trick on him.

During the years 1835 and 1845 a large number of passengers and emigrants were conveyed West over the Portage Road. The Mansion House, a large and commodious hotel where passengers could obtain lodging, food and other refreshments, had been erected at the Summit. The electric telegraph had not been invented at that time and, as the time table of the trains was arranged so that dinner could be taken at the Mansion House, it became necessary to communicate with the landlord, as long as possible in advance, so that a sufficient supply of food would be ready on arrival. Planes Nos. 8, 7 and 6 were so arranged that the signals by flag made from the summit of any one of them could be seen by the employees at the next one. At planes Nos. 8 and 7 high flagstaffs were erected, and when a train approached the head of plane No. 8, the flag was hauled down and up a certain number of times—one for each five passengers who desired dinner. A hitcher at plane No. 7 duplicated the signals, which were seen at the summit of plane No. 6 and communicated to a boy, waiting on horseback, who rode rapidly to the Mansion House and reported the number of passengers who expected to dine at this hostelry. This system was in vogue for many years.

Writing of the Portage Railroad nearly a half-century after work was begun upon it, Solomon W. Roberts said: “In looking back at the location that was thus made about forty-seven years ago, it appears to me that it was about as well done as could be expected under the circumstances as they then existed.
TRANSPORT DEPT., PENNSA. R. R.

Harrisburg, Oct 22, 1850

Mr. A. Dilling

Dear Sir,

I inclose the Mr.

Magazine letter referred to in your J

I wish you & the bearer to pay the amount to

I will send you a copy of the letter

The letters are attached to the ends of each truck

a. 3. C. [somethin]

b. Bolts

C.C. 34 in bolts

They are the usual mode of attachment. The letters can be made by bending a thin 3/4 in flat into the required shape. If you have not time to put on the letter please let me know. I will send you a copy of some letters made of attachments. Here are cars without letters that have been repaired.

There are also to attach to platform to keep the rope from contact with rail.

I think these can be put on or 2.5kg... when the car will remain all night.

End with care...

Will see Col.蛉ing. in company. I want

The friends to see them and know an old

Mr. Bly, a acquaintance. I will meet them

at Columbia.

Affly yours,

W. Utley

P.S. O.R.R.
Railroad construction was a new business and much had to be learned from actual trial; but it was known at the time that the location was too much hurried, which arose from the great impatience of the public. A good deal of curvature might have been saved by a careful revision of the line; but the reduction of the height of the summit by a tunnel, as has since been done, the Legislature had refused to permit.

THE NEW PORTAGE RAILROAD.

The advisability of constructing a line by which the inclined planes upon the Portage Railroad could be avoided was discussed by the managers of the railway and the Canal Commissioners during 1840 and frequently in subsequent years. Finally the Legislature of 1845 appointed a special committee to investigate the question, who after due consideration recorded their belief that the cost of continuing to operate the road by inclined planes would be much less than if locomotives were used as proposed. Their report made in 1846 stated that—

Passenger cars are passed over the Portage Railroad thirty-six miles in three hours and a half, which would be very nearly as fast as they could be taken up the forty-five feet grade to a mile in ascending the mountain; so that the loss of time by this route would not exceed one or two hours. It would be of importance to the commonwealth by putting the Portage Railroad in use for three of the winter months while it is now idle, and give the coal and iron of the mountain an opportunity of reaching the eastern market during the winter.

That there is but little danger in the use of the planes can be best demonstrated by the fact that for the last six or seven years there has not been a single accident upon the Portage Railroad in consequence of their use.

The last objection is the great cost of working planes. The following table from the report of the Superintendent of last year will show the error of this objection. In the cost of planes the wire rope is supposed to be used.

<table>
<thead>
<tr>
<th>Length, miles</th>
<th>Total rise and fall</th>
<th>First cost of machinery</th>
<th>Cost of working with interest</th>
<th>Cost per foot of elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclined Planes</td>
<td>4.36</td>
<td>5,907 ft</td>
<td>$6,824</td>
<td>$42.74</td>
</tr>
<tr>
<td>Locomotive levels</td>
<td>44.00</td>
<td>45 ft</td>
<td>$144,957</td>
<td>$99,996</td>
</tr>
<tr>
<td>Morte levels</td>
<td>7.97</td>
<td>69 ft</td>
<td>$10,770</td>
<td>$6,900</td>
</tr>
<tr>
<td>35.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The inclined planes do not require as heavy a superstructure as the portion used by the locomotives, neither are the repairs proportionally as great.

The report concludes with the statement that "the cost of working the locomotive levels for each foot of elevation is nearly three times as much as on the inclines, and of horse power nearly eight times as much."

Soon after that part of the Pennsylvania Railroad between Harrisburg and Altoona had been placed under construction, arrangements were made to connect it with the Portage road at a point near Duncansville, about the center of what was known as the Hollidaysburg level. The junction point was also two miles from the foot of Plane No. 10, the first plane reached in ascending the eastern slope of the Allegheny mountain. An agreement with the Canal Commissioners was arrived at, by which the Pennsylvania Railroad Company was permitted to forward its freight and passengers over the Portage Road until the completion of the Mountain Division.

The Hollidaysburg branch was completed through to Altoona in the autumn of 1850, and on September 11 the Pennsylvania Central engine Allegheny made the first trip to Y switches connecting with the Allegheny Portage Railroad, and on September 16, 1850, regular trains were started.

Thomas A. Scott, who for some years had been stationed at Columbia basin in the employ of the State works, was appointed transfer agent at that point. It was there in October, 1852, that he entered the service of the Pennsylvania Railroad Company.

The arrangement between the Portage and Pennsylvania Railroad was regarded as a temporary one, since the State continued to own and operate the Eastern and Western Divisions of the canals which had their termini at each end of the Portage Railroad.
In the year 1850 the Legislature of Pennsylvania, in order to compete with the Pennsylvania Railroad Company, which was then building a railroad without inclined planes from Altoona to Johnstown, decided that it would be advisable to dispense with all of the planes on the Portage Railroad. The Legislature of 1850 passed an act, approved May 10, of which the thirty-fifth section specifies that there be “appropriated for extraordinary repairs on the inclined planes on the Allegheny Portage Railroad, the sum of thirty-four thousand dollars, and further the sum of three thousand five hundred dollars to defray the expense of an accurate survey of a route to avoid the five western and as many of the eastern inclined planes as may be practicable. The Canal Commissioners are hereby authorized to employ a competent engineer to conduct said survey and superintend the completion of the Western Reservoir, whose salary shall not exceed $2,000, to be paid out of the last preceding appropriation.”

This legislation led to the construction of a series of loops to avoid as many inclined planes as possible, and the improvement was known as the New Portage Railroad. Owing to the increase of business expected to be thrown upon the road by the Pennsylvania Railroad, three miles of new track were laid on the Johnstown level.

During the summer of 1851, night trains were in service, and extensive preparations were in progress for the operation of the road during the following winter to meet the demands of the “steadily increasing business.” The execution of this work entailed a heavy expenditure of public funds.

A report of Robert Faries, civil engineer, to the Canal Commissioners, on the condition of the work, was read in the House of Representatives on January 22, 1852, in which he said that on June 10 previous, a portion of the new work for the avoidance of the inclined planes on the western slope of the mountain, beginning on the long level of the old road, about one mile below the foot of Plane No. 2, and extending to a point opposite the foot of Plane No. 4, a distance of five miles, together with a mile and a half in the vicinity of the headwaters of Clearfield Creek, was put under construction. The balance of the distance to the western end of the proposed tunnel at Sugar Run Gap was also being worked upon on the first of October; making the whole distance then under contract eleven miles and eighty rods.

Mr. Faries concluded his report by exhibiting a comparative statement of the original and succeeding estimate of the cost of the improvement, which is given below.

**Original Estimate for Single Track with Double Track in Tunnel.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of masonry and grading for part under contract</td>
<td>$140,000.00</td>
</tr>
<tr>
<td>Cost of superstructure</td>
<td>$135,000.00</td>
</tr>
<tr>
<td>Cost of tunnel, 2,300 feet long</td>
<td>$165,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$440,000.00</strong></td>
</tr>
</tbody>
</table>

**Present Estimated Cost.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading and masonry as per contract prices</td>
<td>$181,560.00</td>
</tr>
<tr>
<td>Superstructure (estimated)</td>
<td>$117,500.00</td>
</tr>
<tr>
<td>Tunnel 2,300 feet long estimated 165,000</td>
<td>$165,000.00</td>
</tr>
<tr>
<td>Deduct 300 feet</td>
<td>$35,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$429,060.50</strong></td>
</tr>
</tbody>
</table>

Difference in favor of present line... $10,933.50

The Pennsylvania Railroad was completed from Conemaugh to Portage Viaduct, April 17, 1852, thus avoiding plane No. 1.

By the act approved May 4, 1852, one hundred and fifty thousand dollars was directed to be expended “in the completion of a double track from the foot of Plane No. 4 to the point of intersection of the road, to avoid Planes No. 2 and No. 3, with the long level and with the straightening of the road and laying the north track with a heavy T rail on the long level from the said point of intersection to the point where the Pennsylvania Railroad Company diverges from the Portage Railroad for the purpose of avoiding Plane No. 1.”

It was also provided that “the balance of said appropriation shall be expended at such
Allegheny Portage Tunnel.
Constructed 1831, Western Entrance 1898.
AVOIDANCE OF INCLINED PLANES.

points as the Canal Commissioners may direct, between the foot of Plane No. 4 and Hollidaysburg; provided, that before any of the said balance shall be expended for the purpose herein contemplated, William Milner Roberts and Edward F. Gay, civil engineers, be and they are hereby appointed to act in conjunction with Robert Faries, the present engineer on the said Allegheny Portage Railroad, for the purpose of re-examining the line of said railroad between the foot of Plane No. 4 and Hollidaysburg, with a view to avoid all the planes between said points, or as many as may be deemed most practicable and for the best interests of the commonwealngh.

This board of engineers were also required to determine upon the terms “by which the commonwealth might make use of the Pennsylvania Railroad where it avoided Plane No. 1 of the Allegheny Portage Railroad, fixing the rate of toll to be received by the Pennsylvania Railroad Company for freight transported in cars other than those of the company, and the rates of tolls to be received by the commonwealth for motive power for all freight carried over said portion of the Pennsylvania Railroad Company in said Pennsylvania Railroad Company’s cars.”

The Board of Canal Commissioners were authorized to enter into a contract with the Pennsylvania Railroad Company “for such length of time as may be agreed upon by the parties aforesaid: provided that the Pennsylvania Railroad Company shall lay a double track on this portion of their railroad.”

By the construction of this portion of the main line of the Pennsylvania Railroad Company from Johnstown to the Big Viaduct, afterwards known as the Conemaugh Viaduct, Plane No. 1 had been avoided.

In the Canal Commissioners’ report for the fiscal year ending November 30, 1852, it is said that Plane No. 2, as well as that portion of the new road to avoid Plane No. 3, would be completed in the spring of 1853. It was again suggested that Plane No. 1 might be avoided by using the Pennsylvania Railroad tracks from Johnstown to Conemaugh Viaduct.

Planes Nos. 4, 5, 6, 7, 8, 9, and 10 were reported in good working order, new boilers having been erected at the engine houses of Nos. 5, 6, 9 and 10. The experiment of keeping open the Portage Road during the winter and transporting passengers at night was found to be more expensive than was at first anticipated. The report adds: “The policy of continuing cannot be questioned. To shut up the road for three months and to compel the trade and travel which seeks a market by the Pennsylvania improvements to be transported across the mountain in stages and wagons until the completion of the mountain portion of the Pennsylvania Railroad, would tend to drive in other channels a large portion of the business which we might otherwise retain.”

The tonnage moved in 1852 amounted to 250,000 tons, an increase of nearly twenty per cent over the previous year.

The work of track building in 1853 was prosecuted with energy along the whole line of improvements, considering the limited appropriation, the scarcity of hands, and the failure in the prompt delivery of iron, all of which seriously interfered with the progress of the repairs.

The track-laying on the long level of the western slope was materially delayed, but the work as a whole had been so advanced that the Canal Commissioners reported in November that the entire improvement would be completed by the close of the year 1854, provided sufficient appropriation were made by the State Legislature.

A second track from the intersection of the new work with the long level below Plane No. 4 was completed, a distance of five and one-third miles, exclusive of the branch connecting the new and old road on the eastern slope, avoiding Planes Nos. 9 and 10, which the contractors were unable to finish on account of the scarcity of hands during the summer.

The engineers in charge of the work in
1853 estimated the total cost of the improvements, including the second track, to be $1,982,518, and that “this will cause a saving of annual expenses based on the last two years of at least $250,000. Thus in three years enough will be saved to complete the work.”

The expenditure of so large a sum for a work viewed as unnecessary by many sagacious citizens caused an outcry by the taxpayers throughout the State, who charged the Canal Commissioners with fraud and mismanagement. This action resulted in the appointment of a committee by the Legislature of 1853 to examine the new road to avoid the inclined planes of the Portage Railroad.

Two reports were submitted to the Legislature by this committee. The majority report stated that the charges made against the Commissioners had not been proved, but the minority report declared that upon examination into the manner of allotting the work it was found that the contracts in every instance had been allotted at prices higher than the bids of other good and responsible contractors—for example, Section No. 21 of the Tunnel was awarded at $103,000 when equally good contractors bid for the work at sums varying from $81,000 to $91,000.

The annual report of John Ross, Superintendent of Motive Power on the Portage Railroad, for 1853 contains the following brief but comprehensive statement covering the condition of the Portage Railroad at that time:

In casting a retrospect upon the past the wonder presents itself that so necessary an improvement had been so long delayed. The worn-out and dilapidated condition of the old road, and the heavy expenditure required to keep it in operation, owing to its fraility and the complicated character of its machinery, the evident immense economy of substituting a road without planes in place of one requiring twenty stationary engines, with frequent changes of power, all pointed to the evident policy of abandoning the old line for a new one.

During the last year only a few of the advantages to be derived from an avoidance of the planes were realized.

Plane No. 1 has been avoided by the use of the tracks of the Pennsylvania Railroad from Conemaugh Station, near Johnstown, to the Big Viaduct on the long level, a distance of over four miles.

Planes No. 2 and No. 3 have been avoided by the construction of a new double-track road from a point on the long level about one mile west of Plane No. 2 to the foot of Plane No. 4, a distance of about five miles. There is, therefore, at present a continuous road without planes from Johnstown to the foot of Plane No. 4, a distance of about twenty-two miles.

The great object to be attained in the construction of a road to avoid planes is to obviate changes of power. Necessity has required a change in working these twenty-two miles of road. Only a small portion of the north track of the long level between the No. 2 intersection and the Big Viaduct has been relaid with heavy rail. No part of the south track has been relaid with the heavy bar, the old half-worn light rail being still in use.

It has been found impracticable to use heavy locomotives over those portions of the road upon which the light rail is still in use, for the reason that the rails would bend and break under their great weight.

It has therefore been found necessary to use the lighter locomotives between Johnstown and the No. 2 intersection and confine the heavier ones to the new track between the intersection and the front of Plane No. 4.

Nor can this difficulty, resulting from this necessary change of power, be obviated until heavy rails shall have been laid on both tracks of the long level. . . .

The same reasoning points to the necessity of a new track with heavy rail between Johnstown and Conemaugh Station.

From the foot of Plane No. 4 to Hollidaysburg the old track is used, seven of the inclined planes remaining in operation. The funeral dirge of this worn-out, rickety structure has been annually sung for the last ten years; but strange to say, it still maintains a lingering existence.

It is not to be denied that year after year it is gradually approaching a necessary abandonment. The rail, originally very light, is becoming from long use so weak that it now bends under the weight of a locomotive of the lightest class. The machinery by which the planes are worked is going rapidly into decay.

As a consequence there arises an unavoidable necessity that some substitute for this antiquated structure should be provided. . . .

I think that I can safely say that no one of my predecessors ever entered upon the discharge of the duties incident to the station of Superintendent of the Motive Power of the Allegheny Portage
Railroad under more embarrassing circumstances than those with which I was surrounded on my induction into office. The financial operations in both the motive power and repair departments were clogged by an onerous debt that had been accumulated from year to year.

The working of the line was seriously impeded in consequence of a want of power commensurate with the requirements of the improvement.

Three of the inclined planes on the western slope of the mountain had been avoided. Of course the elevation previously overcome by the planes was under this arrangement surmounted by increased grades upon the new track. As a natural result, the stationary power by which these planes had been previously worked should have been substituted by an increase in the number of locomotives. No such facility for transporting the trade over the road had been supplied. I was therefore compelled to commence operations with the old locomotives at a time when the opening of the canals threw an immense amount of freight upon the line, and even these were in a dilapidated condition.

In conclusion, I would respectfully urge upon the Board the propriety of ordering a suspension of transportation upon the Allegheny Portage Railroad from the first day of February next to the opening of the usual navigation in the spring.

The repairs to the machinery at the planes, which have become of absolute necessity and which cannot be effected while in operation, demand a short cessation of active business upon the line. Being fully impressed with the importance of this suggestion, I trust the members of the Board will give it their earliest attention.

The total cost, revenue, and expenditures of the public works of Pennsylvania to the close of the fiscal year, November 30, 1853, was reported by the Auditor General as follows:

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Revenues</th>
<th>Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philadelphia and Columbia</td>
<td>$5,077,378</td>
<td>$4,000,273</td>
<td>$5,850,391</td>
</tr>
<tr>
<td>Eastern Division of the Canal</td>
<td>1,737,368</td>
<td>9,321,571</td>
<td>893,912</td>
</tr>
<tr>
<td>Juniata Division of the Canal</td>
<td>3,873,666</td>
<td>1,498,119</td>
<td>1,932,687</td>
</tr>
<tr>
<td>Allegheny Portage Railroad</td>
<td>6,878,673</td>
<td>3,290,507</td>
<td>4,104,798</td>
</tr>
<tr>
<td>Western Division of the Canal</td>
<td>2,473,420</td>
<td>2,810,312</td>
<td>2,340,531</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$16,479,068</td>
<td>$19,781,999</td>
<td>$14,059,241</td>
</tr>
</tbody>
</table>

The engineers reported, November 30, 1855, that the work on the new road was so far completed as to admit of the transportation of freight over it. Also that the tunnel was being rapidly finished.

The Board of Commissioners in their report expressed the feeling that they would fail to discharge their duty to themselves did they withhold the expression of their deep regret that the cost of this work should have so far exceeded the original as well as the subsequent estimates and that its completion should have been delayed so much longer than was anticipated, and called attention to the fact that when the project for building the new road was first suggested the estimated cost for double track was fourteen hundred and ninety-five thousand dollars.

The actual cost with but a single track, with the exception of eight miles, according to the engineer’s report, amounted to two millions one hundred thousand and twenty-seven dollars. Besides there were over six miles of the road contemplated in the original estimates yet to be built. To complete these six miles and lay the second track over the balance would, should it ever be done, cost at least five hundred thousand dollars, which, if added to what has already been expended, would make two million six hundred thousand dollars; thus showing an excess of cost over estimate of one million one hundred and five thousand dollars.

The Board expressed the conviction that “had the Legislature been told at the outset that this road would have cost over two and one half millions of dollars, as it certainly will if the six miles referred to be made and the second track laid over the whole distance, it may well be doubted whether such an enterprise would have been embarked in.”

The Board were of the opinion that “it would have been much better to have required the Pennsylvania Railroad Company to grade a single track road for the State alongside of their road, or to carry the canal freight between Hollidaysburg and Johnstown over their own road at fair rates.”
It was confidently believed that there would be an annual saving in the working expenses of the new road, as compared with the old, of many thousands of dollars. This it was thought would in some measure compensate for the enormous outlay in its construction.

The entire line of the New Allegheny Portage Railroad was opened for traffic with the beginning of navigation on April 7, 1856. The late opening caused diminished receipts. Some interruption was experienced in the early part of the season from the falling in of the slopes at the deep cuts. It was said that the construction of this road had been fully tested and "proved to be equal in stability to any road in the country." It was then completed to the junction with the Pennsylvania Railroad at the south fork of the Conemaugh (beyond which it was not proposed to extend it).

The arching of the tunnel, which had been discontinued in the winter of 1855, was not resumed until the beginning of July, 1856, owing to the difficulty of access to it in consequence of the slopes in the earthwork. There were nine first class, six second class and one third class engine in use during the year.

The amount paid the Pennsylvania Railroad Company by the State for the use of their track from Conemaugh Viaduct to Johnstown for the year 1855 was twelve thousand five hundred dollars.

The annual inspection of fuel on hand on December 1, 1855, showed coal and wood on hand to the value of $45,201. A change in Superintendents occurred early in the year 1856, and the same fuel in being remeasured was reported as being worth only $24,000, hence it was stated that "this quantity could not have been consumed in the first fifteen days of December and by a single engine running five and one-eighth miles from that period to the reopening of the road, April 7, 1856."

In the report of the State Engineer for the fiscal year ending November 30, 1856, Edward F. Gay says that: "This road [the New Allegheny Portage Railroad], or rather that part of it extending from Hollidaysburg to Conemaugh, was found in good running order and trains daily and regularly passing over it. From the latter place to Johnstown, the western terminus of the road, about two miles of the old track remain. This is excessively rough and in a bad condition. It should be relaid with T rail, of which there is believed to be a sufficient quantity on hand."

The debt of Pennsylvania, which had amounted to $39,216,707 on January 1, 1852, had increased to $41,698,596, and although at the close of the year 1856 it had been somewhat reduced, the total was still upwards of forty millions of dollars. The amount spent on the New Portage Railroad by the State was nearly two and a half million dollars, and the expenditure of this immense sum of money caused great dissatisfaction among the taxpayers. It was the "last straw placed on the camel's back" and it led to the enactment of laws relating to the sale of the State Works which have been fully discussed elsewhere in this book. It was these laws that culminated ultimately in the purchase of the Main Line by the Pennsylvania Railroad Company for the sum of seven and a half millions of dollars. Thus it happened that all of the money expended by the State on this improvement was literally wasted, for the Pennsylvania Railroad Company acquired all of the rails and other track material laid on the New Portage Railroad when it purchased the State Works. And the fact remains that although the Pennsylvania Railroad Company was cognizant of the expenditure of the sum previously mentioned by the State, it made no larger bid than the minimum price called for by law, namely seven and a half millions of dollars.

The taxpayers of Pennsylvania paid well for their experience and they were wise in disposing of the venture at the time that they
did, even if it was at a loss, as will be seen further on in this work.

Finally, by the act approved January 26, 1859, it was decided that "from and after the passage of this act the office of Canal Commissioner and State Engineer of this commonwealth be and the same is hereby abolished, and the Canal Commissioners are hereby required and directed to deliver up to the custody of the Auditor General all books, papers and records and other property belonging to said department, whose duty it shall be to take charge of and preserve the same."

The executive body which for over thirty years had been engaged in constructing and operating the canals and railroads belonging to the State of Pennsylvania thus passed out of existence, leaving behind them a debt of $40,000,000, an amount that exceeded the entire national debt of the United States on January 1, 1857, by some twelve millions of dollars.