Report of Edward Miller, Esq., Ch. Eng., upon the Western Connexions and Extensions of the Pennsylvania Railroad.

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SIR:—In accordance with the instructions of the Board of Directors, I have endeavored to procure the most accurate information concerning the different extensions of the Pennsylvania Railroad westward; and have verified it by personal examination of the maps, profiles, and estimates of the respective companies, where I was able to do so. I cannot, however, pretend to have done this universally, nor to have passed over the numerous lines of railroads in Ohio, having a bearing on this subject. The Board are fully aware that to have done so with a view of examining these lines professionally, would have required more time than it has been possible to spare from my pressing and immediate duties upon the Pennsylvania Railroad.

Boston, New York, Philadelphia, and Baltimore, are now striving to obtain the trade of the West; and all these cities have constructed railroads for the purpose. New York alone possesses two of these avenues, one by the Hudson River and Albany and Buffalo Railroads, and the other the New York and Erie. The Albany and Buffalo line, together with the Western and Worcester roads of Massachusetts, form the Boston route. Philadelphia has constructed her road to Pittsburg, and Baltimore her own to Wheeling. The latter city is also engaged in the construction of the Parkersburg branch, of which the present road to Wheeling will form the main stem as far as Three Forks. The topographical features of the country appear to forbid the construction of any great leading line within the limits of the United States, independent of these, and within their range, with one exception, the Sunbury and Erie Railroad.

It is not unusual to speak of the West as if it were practicable to divert its entire trade to a single city by a single railroad. It is, however, a great commercial reservoir, which even now is able to fill all the channels constructed to carry off its surplus, and which will require all of them soon to be increased in capacity and stretched to their utmost limits, to carry away its treasures as rapidly as they accumulate. The enterprise of our western neighbors, the aid they have received from eastern capital, and the facilities of construction, are rapidly covering Ohio, Indiana, Illinois, Kentucky, and Southern Michigan, with a net-work of railroads, which appear on the map at first view as a confused mass of competing and interfering lines. Some of these will prove failures, and others projected as leading lines will sink into the position of branches and feeders to those better placed and supported. But it is certain that the keen competition produced by their number, and the remarkable facilities afforded by them, will stimulate agricultural productions to the utmost; and that those lines which become either by intrinsic merit or adaptation, the leading thoroughfares, will be very profitable. A close investigation of the map will show that various causes have concentrated upon certain points several railroads, which appear to radiate from these places in dif-

ferent directions. The principal of these are Pittsburg, Wheeling, Cleveland, Cincinnati, St. Louis, Chicago, Columbus, and Indianapolis. Of these, nature and art have combined to make Pittsburg, Cleveland, Cincinnati, Chicago, and St. Louis, great centres of trade; and divergent lines are now in progress, or completed, which will connect Philadelphia by direct routes with all these places, and also with Lexington, the central point of Eastern Kentucky. Western Kentucky will be best reached through Cincinnati.

It is not my intention to enter into a discussion of the relative merits of the different seaboard cities, or of their lines of communication with the interior, being satisfied that all these cities will reap the rich harvest of their laudable enterprise, and that all these avenues will find full and profitable employment. In a commercial point of view, however, there can be no doubt that the interests of Philadelphia require her to be connected by ties of sympathy with those railroads which will afford the best and most direct communication with the important points just named; and that she should not be wholly dependent for any portion of her trade upon such routes as pass through rival cities, or are subjected to their caprice, influence, and interference.

Taking the leading routes which may be considered as dependent mainly upon Philadelphia, and commencing at the north, we have the Ohio and Pennsylvania Railroad, now upon the point of completion, which commences at Pittsburg, the western terminus of the Pennsylvania Railroad, and passing through the great wheat belt of Ohio, by way of the important towns of Salem, Canton, Massillon, Wooster, and Mansfield, terminating at Crestline on the Cleveland and Columbus Railroad. It is crossed by lines running west of north to Cleveland and Sandusky, which are completed, and is extended by the Ohio and Indiana road to Fort Wayne, on the direct route to Chicago; and by the Bellefontaine and Indiana roads to Indianapolis and Terre Haute, on the way to St. Louis.

On the south it is now connected by the way of Columbus with Cincinnati, and will soon have a more direct communication with that city by the Mount Vernon road to Springfield.

These lines, the construction of which is now rendered secure by the aid and countenance of the Pennsylvania Railroad Company to the Ohio and Pennsylvania, Ohio and Indiana, and Mount Vernon roads, will give access to a country of immense production, by routes sufficiently favorable to afford a vast advantage to the Pennsylvania Railroad even for that trade which seeks New York as its market.

Of the propriety of granting this aid, and of the beneficial results which must follow it, I do not entertain a doubt; the full advantage, however, will not be realized, until by a branch line and bridge over the Allegheny river the two roads are brought side by side, and the present charges for drayage abolished, which operate as a tax in favor of New York and Baltimore. The gauge of these lines is four feet ten inches.

The next line to be considered commences also at Pittsburg, and passes through Steubenville and Coshocton to Newark, where it connects with the Central Ohio road to Columbus. It is intended hereafter to extend it by an independent line to that point, where it will join the Co-

lumbus, Piqua, and Indiana road. All these roads have the Pennsylvania gauge of four feet eight and a half inches, and will connect us with the Indiana roads of the same gauge, which will thus be unbroken from Philadelphia to St. Louis, on a very direct and feasible route.

The Pittsburg and Steubenville Company have not yet succeeded in obtaining the right of constructing their road through the narrow neck of Virginia, but hope to do so this winter. After obtaining this, should they need aid, they will possess strong claims upon Philadelphia for assistance. The gradients upon this line correspond with those of the Western Division of the Pennsylvania Railroad.

The next line which requires attention is the Hempfield Railroad, commencing at Greensburg, thirty-one miles east of Pittsburg, and extending through Washington to Wheeling. From this point two roads diverge; the central Ohio road through Zanesville and Newark to Columbus; and the Marietta and Cincinnati road through Marietta and Chillicothe to Cincinnati. The first is completed from Zanesville to Columbus.

The Central Ohio road, at Zanesville, intersects the Wilmington road, passing through Lancaster, Circleville, Washington, and Wilmington, to the Little Miami road, by which it is connected with Cincinnati. This is the shortest line from Philadelphia to Cincinnati, but its gradients are less favorable than those of the Ohio and Pennsylvania, Steubenville, and Marietta lines. Its projectors have hitherto looked towards Baltimore for assistance and sympathy, but it will be an important feeder to Philadelphia. The Central Ohio and Wilmington roads have the four feet ten inch gauge.

The Marietta and Cincinnati road is the most southern extension of the Pennsylvania road now in progress. The Company asks for aid from Philadelphia, and looks to the Pennsylvania Railroad Company for efficient assistance and countenance. It is of special importance to us, as being the only route by which the trade of Southern Ohio and Eastern Kentucky can reach Philadelphia, except through Baltimore. The gauge is undetermined, but will be made to correspond with that of Pennsylvania, if Philadelphia aid be obtained; otherwise the weakness of the Company may force a union with the Hillsborough road, on which the gauge of four feet ten inches has been laid down. In this case the Wheeling connexion will be necessarily abandoned. This Company possesses the only single charter covering the entire ground from Wheeling to Cincinnati. Knowing the interest felt in this road by many of the most intelligent merchants of Philadelphia, on account of their business relations with Southern Ohio, Kentucky, and Tennessee, and feeling very doubtful myself about the propriety of affording the amount of aid which would be required from Philadelphia to secure the early completion of the Hempfield and Marietta Railroads, I considered it necessary to look more fully into this case than either of the others, and have become satisfied that the commercial interests of Philadelphia require their prompt construction. I certainly did not expect to arrive at this conclusion when I entered into the examination you required.

The Marietta road is in progress of construction from Marietta to the vicinity of Blanchester. About seventy-seven miles will be completed

next fall—the funds and iron for the same being now procured; the determination of the gauge should therefore be made at once. The Company is constructing their road in a permanent manner, and the masonry of the bridges and culverts is of superior quality. The maximum gradient is fifty feet per mile, the minimum radius of curvature two thousand eight hundred and sixty-five feet. The Sciota and Hocking road on the south connects it with Portsmouth, from which point the Maysville and Big Sandy road, now advertised for contract, extends to Maysville. From Maysville, railroads are in progress through Lexington to Danville, which will soon be connected with Nashville and Knoxville.

The line passes through Chillicothe, the former capital of Ohio, and the county seat of Ross, of which the agricultural productions are said to be greater than any county in Ohio, and probably in the United States. To this point the Virginia Central Railroad is aiming, and in a late report of the Chief Engineer of that road upon their proposed extension through Gallipolis to Chillicothe, he speaks of intersecting the Marietta road at that point, “as the key to the whole interior commerce and traveling of the State.”

I can see no mode by which Southern Ohio, Eastern Kentucky, and Tennessee, can be made tributary to Philadelphia, except through the Hempfield and Marietta Railroads; and the aid and countenance of Philadelphia appear to be essential to the prompt construction.

The amount which the respective companies ask is \$500,000 for the Hempfield, and \$750,000 for the Marietta road. With the funds already secured, and the prestige arising from the approval and adoption by Philadelphia of these roads as a part of her grand plan, I believe that these subscriptions will be sufficient to insure the completion of both these roads—the aggregate cost of which will be over eight millions of dollars.

Statement of distances from Philadelphia to Cincinnati by different routes :

No. 1, via Pittsburg, Crestline, and Columbus,	717 miles.
2, via Pittsburg, Loudenville, Mount Vernon, and Springfield,	697 “
3, via Pittsburg, Steubenville, Coshocton, Newark, and Columbus,	662 “
4, via Greensburg, Wheeling, Zanesville, Newark, and Columbus,	657 “
5, via Wheeling, Zanesville, Wilmington, and Circleville,	646 “
6, via Wheeling, Marietta, Athens, Chillicothe,	651 “

From the above tabular statement, it will be seen that the length of the Marietta line to Cincinnati is less than any of the others, except No. 5, by Wheeling, Zanesville, and Wilmington, which is only five miles shorter; it is six miles less than Central Ohio; eleven miles less than Steubenville and Indiana; forty-six miles less than Mount Vernon and Springfield; and sixty-six miles less than Ohio and Pennsylvania. Pointing in a different direction and diverging widely from the Ohio and Pennsylvania road, it is not even a competitor for the great legitimate business of that company. For the trade of Cincinnati, it will necessarily be a rival to the other lines, and for this purpose is not essential to Philadelphia; but, as has already been shown, none of the others can give us access to Southern Ohio, Kentucky, and Tennessee—and a good connexion with these is indispensable.

Three railroads appear to be necessary to secure the ends pointed out

in the commencement of this report, and, in my judgment, these are: the Ohio and Pennsylvania, with the Fort Wayne extension to Chicago, and connexions with Sandusky and Cleveland; the Pittsburg and Steubenville to Columbus, Indianapolis, and St. Louis; and the Marietta to Cincinnati and Kentucky. With these Philadelphia will have nothing to fear from any quarter. The Cleveland and Pittsburg Railroad Company are about to commence an important extension of their line from Wellsville, the present terminus on the Ohio river, to Wheeling and Rochester; thus forming with the Ohio and Pennsylvania road, and the Marietta and Cincinnati road, a continuous line on the northwestern bank of the Ohio from Pittsburg to Marietta, 160 miles. This may well be called a Grand Junction Railway, as it will connect all the lines I have described with the Pennsylvania Railroad and the Baltimore and Ohio Railroad, uniting no less than nine important railroads at their termini. The gradients and curvatures are extremely favorable, and in case of accident to any of the bridges or ferries proposed, it will be inestimable. I consider it a very important road, both for Philadelphia and Pittsburg.

I have said nothing on the subject of railroad bridges across the Ohio river at Wheeling and Steubenville. The question is of too much magnitude to be summarily disposed of, and in this communication I can only deal in generalities. At Wheeling, five railroads will meet, two on the East bank and three on the West bank. I think there can be no reasonable doubt that the magnitude of the interests involved will produce a harmonious arrangement, by which all these will be accommodated; and I hope the same will be the case with Steubenville.

Referring to the reports and exhibits of the different corporations for more minute details than can be embraced in a general report of this character, I have the honor to subscribe myself,

With great respect,

EDWARD MILLER,

Chief Engineer, Pennsylvania Railroad.

Philadelphia, Jan. 27, 1853.

*Hodge's Self-Lubricating Axle Box.**

This important invention was thus described, in a paper read before the last general meeting of the Institution of Mechanical Engineers, held at Birmingham, at which Mr. Robert Stephenson, M. P., the President, presided:

No part of the machinery of the railway requires constant lubrication more than the axle journals of locomotives, tenders, and carriages, as the heating of one journal in the whole train is sufficient to produce the most serious results, not only in delay to the traffic, but endangering the lives of the passengers in the train.

Notwithstanding the great attention this point has received, scarcely a train that passes over our roads (in the summer more particularly), but some one or more of the axle journals heat. In one instance the writer experienced, the whole train had to be passed into a siding for more than two

* From the London Mechanics' Magazine, December, 1852.