

John Fritz Autobiography
CHAPTER XIV CAMBRIA (pages 91/107)

In June 1854 my family and I landed in Johnstown at about nine o'clock at night. It was a dark and uninviting place. Looking down the Conemaugh in the direction of the works the only light that could be seen was the reflection from the coke ovens. We went to a hotel and spent an uneventful night. The next morning while waiting for breakfast, I went out to see how the town looked in daytime, and I can truly say it was the most unattractive place I had ever been in. The streets were of clay, or rather of a dark loam, and organic matter; the sidewalks, with few exceptions, were of boards or plank, and in a great part of the town were of the same material as the streets. Cows, hogs, and dogs, all ran at large; the dogs would get after the pigs, they would squeal, the cows would bawl, the dogs would bark, and fight. I should have been amused if I had not been there to stay. After I had been at Johnstown a short time I met Governor Porter, who told me that he had recently crossed the mountains in a stage, sitting outside with the driver. He said, "In looking forward I saw a number of houses, I asked the driver what place we were coming to. He said it was Johnstown. When we came near to it the driver said it was a darned shame to spoil such a nice piece of ground to build such a town on it."

I next went down to the coke plant, which was on a level with the tunnel head of the furnace, some eighty feet above the valley in which the rolling mill and shops were located. After taking a bird's-eye view of the plant, I went to the mill and found it unfinished and not at all to my liking, but too far advanced to make any changes. Consequently, I concluded to complete it as designed and as early as possible, at the same time well knowing there was trouble in store for us when we came to start. One of the blast furnaces had been in operation for some weeks and there was some pig iron in the metal yard, which I examined and found to be a very inferior metal. I was told by persons who knew something about the reputation of the metal that it was no good, that it could not be sold or given away in Pittsburg, and that it could never be made into a rail. This in connection with my own opinion, was enough to chill the ardor of a veteran.

In starting the mill we made the pile in the usual way, and when it went into the rolls it split in two pieces and went out into the scrap yard. The conclusion was, too much heat. We tried another at a lower temperature; result, it split about halfway. We then turned end for end and passed it through the rolls, which closed it together; sent it back to the furnace and reheated it, and then rolled it into a rail; the result was, flanges on both sides all torn from one end of the intended rail to the other. The rolls were then taken to the lathe and altered, put in place and tried again; result no better. Anticipating trouble, I had a set of new rolls quite ready, put them in the housing, and tried them; some improvement, but the flanges of the rails were still seriously torn and the head of the rail badly cracked on both sides.

It was now evident that my worst fears were going to be fully realized, and that we must have some better iron and devise some plan to get along with the least possible quantity. It was now that my Norristown experience proved helpful, as I had had much to do in getting up the piles for the various classes of work. This required different qualities of iron some cold-short, some red-short, and some neutral, the neutral being the most desirable; to obtain a good quality of it at a reasonable cost was the only way that I could think of to get over the difficulty.

When I told the owners of the trouble and that we must have some good iron to help us out, for a time matters looked serious. They had been told, when they leased the property, that they could make pig iron for about six dollars per ton and the kind of iron that I wanted for the flanges and heads of the rails had to be of a much superior quality, but after being told how small a quantity I thought would help us out, and that it was not possible to make rails without some better iron, they concluded to get it hoping that later we could get along with a less quantity of the superior iron. In this view of the situation I gave them no encouragement whatever, well knowing it would only be waste of time as well as of money to make any further attempts. Consequently, I let the mill stand until we got the better iron.

When the good iron arrived we had it puddled and started up the rail mill to try the experimental pile. So far as the pile was concerned, it was a success and the form was never changed in the least. A sketch of the pile is shown in Figure 5 on page 96, and this method was used as long as the Cambria Works made iron rails. On some orders we

used what was called second-bottom iron, as shown in Figure 6 on page 96. This second-bottom iron was rolled out of the crop ends of rails into bars one and one-half inches wide, and of the same thickness as the puddled iron bars, generally about five-eighths of an inch. We had a pile that was eminently satisfactory so far as making the rail was concerned, if rolled on edge. How well the rail would wear was a very serious problem in my mind. Nothing short of an experiment would demonstrate the wearing qualities of such a rail, and at that time it would have taken too long to make the test. My fear was that the rails would split under the load. I finally made up my mind that if the piles were properly heated and that if the second-bottom iron bars in the rail pile were in contact with iron on its flat with a good heat, no trouble would occur. This in the end proved correct, but my anxiety did not cease until the rails were tested in absolute use.

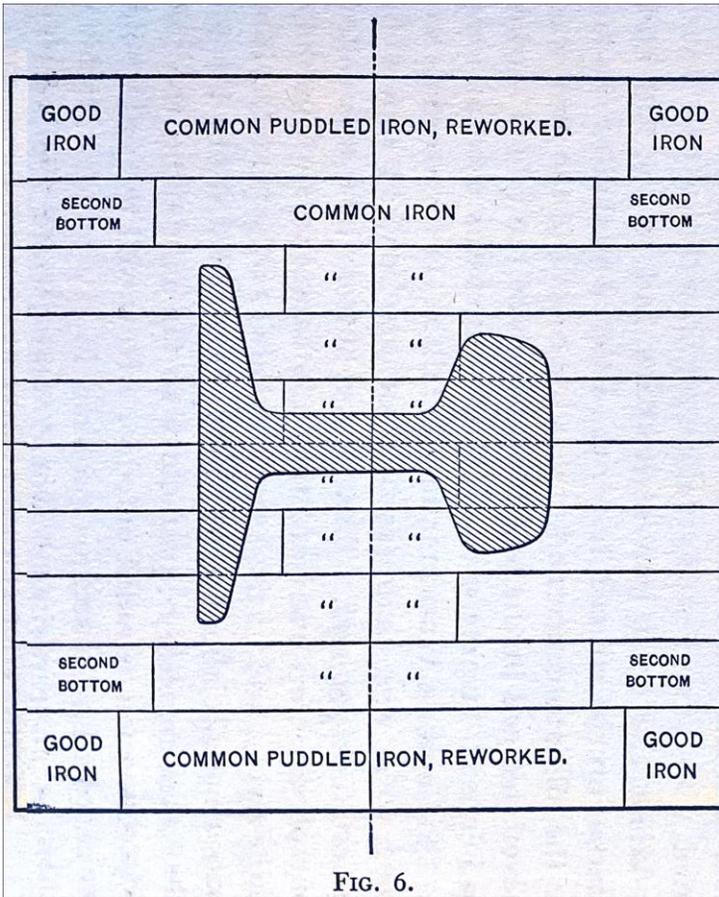


FIG. 6.

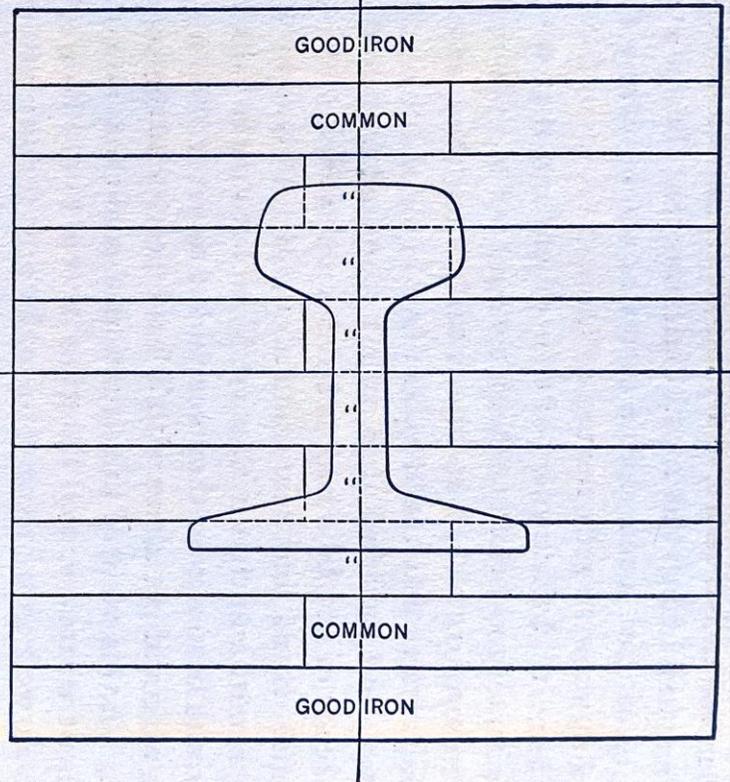


FIG. 5.

I was now satisfied that with a very small quantity of suitable iron for the flange and head an excellent rail could be made out of the iron produced at the Cambria furnaces, and that with such a mill as could be constructed the company would be a great commercial success. But to attempt to run the mill as it was would have been commercial ruin.

We now started the mill again, and while the flanges and heads were much better, the splitting was worse than before, as the strong iron in the top and bottom would bear more heat than the puddled iron in the center of the rail. I again tried with no success, to make a pig iron that would stand more heat, so as to prevent splitting, but having only one kind of ore little could be done. I then had the rolls taken to the roll lathe and the work on the roughing rolls reduced. The result was only a slight improvement, and I felt that I had done all that could be done under the existing conditions.

I had now fully made up my mind that there was but one thing to do and that was to build practically a new mill, making it three high. That would require a large amount of money, which was hard to get in those days. The only thing that could then be done was to start up and do the best we could. As before stated, the reduction of work on the roughing rolls helped slightly, and by careful heating we could get some work out. Consequently, we made what we called a final start.

In the meantime, we had gotten up a heavy buggy which we used as a battering ram and when the pile did not split open too much we would use the buggy to force the piece into the rolls so as to save the time and labor of turning the piece end about, but there were many piles that in the first or second pass would split or that would get too cold to roll and had to go in the furnace again. All this caused much delay, and the amount of patching of flanges that had to be done made me seasick, but the greater the difficulty the more determined I was to fight it out, as I could see in my bed at night, when I should have been asleep, visions of a three-high rail mill, but in the distance. Yet I had faith that it would come, and I was certain in my own mind that it would be a great success, and that Cambria was destined to be the greatest rail plant in the world.

But the road that had to be trodden was long, hard, rough, and dreary, and besides was beset with great danger. But, to use a lawyer's phrase, the Cambria Company was my client, and no lawyer ever worked harder for his client than I did for mine, both mentally and physically. I knew no hours day or night, except time to eat, and but little to sleep, and that irregularly.

This was the time that my all-round practical experience, which I worked so hard for and made so many sacrifices to obtain, came into use, and coupled with courage and a spirit that bears it company, I felt able to meet any contingency that might arise. I did not have long to wait for an opportunity to put my mental, physical, and courageous qualities all to test. The puddle-mill engine flywheel was thirty feet in diameter, with a fourteen-inch-square rim; the segments were held together by double-headed T-bolts, which had been put so close to the end of the segment that the metal pulled off and the ends and the end of a segment went across the mill. Fortunately, no one was hurt.

The mill was stopped at once and made safe. The repairs were made as follows: ten inches from the end of each segment across the face of the wheel grooves were cut in each end of the segment, two and one-half inches in width and of the same depth. There being sixteen segments in the wheel, this made thirty-two grooves. Iron bands, sixteen in number, made out of two and one-half by three inch best wrought iron, were then put in on edge. These bands, or rather links, had to be made in a common blacksmith's fire and without a steam hammer, as the steam hammer and also many other important tools were not in general use at that time. The grooves in the segments had all to be cut by hand. The grooves were first roughed out with a two-handed chisel and sledge and then finished with the hammer and chisel. This was a big job for that period, and I can assure you that I got but little sleep during the time this work was on hand. We double-turned the work, both in chipping the grooves and making the links, and not a single man shirked his duty, but each did all he could to get the job done. We had neither gas nor electricity and had to use the old coffee-pot tin oil lamps to give light.

We got the mill all in operation again but in a short time the rail-mill flywheel, which was built in the same manner as the flywheel on the puddle-mill engine, was considered unsafe to run at a speed that was absolutely essential for rail making, consequently we had to stop and fix it. This was a big, tiresome, and expensive job, and besides it kept the rail mill standing and nothing coming in, which, under the circumstances, was a very serious matter. Finally, we got in operation again and were getting along, making rails about as well as it was possible to do, with the mill as it was, and with the smaller mishaps that were daily occurring. These were not serious when compared with what we had gone through, but were exceedingly annoying, keeping the mill idle so much of the time, when the company was seriously pressed for money, and making it impossible to run the plant with economy; but I kept my temper as near zero as possible, and remained hopeful. Anticipating all shortcomings as far as possible, and being ready for them when they did occur, was the only thing that could be done, and by constant vigilance in all minor details and by making betterments when possible, we made a marked improvement in time of running, increased the output in a greater ratio, greatly reduced the cost of rails per ton, and also improved the quality.

In the midst of all my troubles, the company took a contract to make several thousand tons of rails with hollow heads. It was impossible to make them out of their own iron, and I told them so at once. In reply, Mr. D.J. Morrell, the business manager, told me that hollow-headed rails were at that time being made at Wheeling out of pig iron that was made at Johnstown of the same ore that Cambria was using. I said it was not possible and some one was not telling the truth, and that we would go down to Wheeling at once and see for ourselves what they were doing.

We arrived at Wheeling in the evening. After supper, Mr. Morrell proposed to call and see the proprietor of the mill where the rails were being made. I said, "No, we will call at the works tomorrow morning at about daylight." This we did, and hunted up the roller and found him, and he and I at once recognized each other, as he had worked for me in the Norristown Iron Works. After a few casual remarks, I said to him, in the presence of Mr. Morrell, "How are you getting along with the hollow-headed rails?" He said they had been having terrible trouble with them in trying to make them out of Johnstown iron and found it utterly impossible. He said they then got some better pig iron, which gave fairly good results, and used but little of the Johnstown iron. I asked to see the puddle mill and stockyard and saw they were using about enough of Johnstown iron to say it was a part of the mixture.

At about eight o'clock, I remember, Mr. Stephens, the President and owner of the Wheeling plant, and the inventor of the hollow-headed rail, came into the works and was evidently much surprised to see us there. I told him frankly what I had come for and that we had seen all we wanted, and that they were using but little of the Johnstown iron in their mixture. He said, "You are mistaken about that; you have been wrongly informed." I said, "No, we have seen the mixture in the furnaces and I know the Johnstown iron wherever I see it."

We now returned home and I was feeling somewhat better, and told Mr. Morrell we must have some good iron to start with and find out what we could do, that I thought we could use considerable of our own make of pig iron and that he could rest assured we would use as much as possible of it.

I learned from Mr. Morrell that he was responsible for making the contract for the rails, and he understood from Mr. Stephens that they were using the Johnstown iron to make the rails out of, but he was now satisfied, and I told him I would do the best I could. This seemed to be a great relief to him. When we got well under way in making the rails, we found we could use considerable of the Johnstown iron and got out of the trouble much better than we first thought.

We had now gotten the mill generally in pretty good shape, and running about as well as could be expected, and making some money, when an event occurred which was very serious. Previous to the time that my employers, the lessees of the mill, took the property, as I remember, Mr. Simeon Draper, a banker of New York, had advanced money for a certain railroad company to the original Cambria Iron Company, for rails to be made for them as soon as the mill was completed, and had taken a mortgage on the property to secure the loan. The original company having failed to complete the plant, the railroad company held the lessees liable for the fulfillment of the rail contract; and here appeared the United States Marshal, looking as gentle as a preacher, but we soon found him as firm as a judge. Next came the sheriffs of the adjoining three counties, where the Cambria Iron Company held property, then came the constable with orders to attach anything that was movable, from a goat to a locomotive. We were now up against the real thing, ---want of money,--- and to make rails for the company on their contract without money was simply impossible, and we so told them.

It was a gloomy day for Cambria. The workmen were restless and threatened to quit work, which I thought would help me in a proposition I had in mind to make. In company with the United States Marshal, there was a gentleman whose name I think was Mitchell. He proved to be a very clever man and was to remain there to look after the interest of the railroad company, while their rails were being made. I said to him, "There is, so far as I can see, but one way that you can get your rails. The men are dissatisfied and may quit work at any moment, and as soon as we commence work on your rails, unless there is some provision made that will insure their pay, they will quit work, and I understand there are judgments against this property that can be foreclosed at any time. In that event you will never get a rail or one dollar of your money. If your company will let us roll some rails not merely for you, but for other people so as to obtain enough money to pay the laborers, I think you will eventually get all your rails, and I will promise you to do all I can to help you get them." The proposition was finally accepted.

When we came to start making rails the workmen demanded that the rails be delivered to some person authorized to receive them and be held by him until they were paid. The company appointed their business manager, but the men would not accept him, and asked that I should be appointed; their request was granted. I was also made the agent for the railroad company, and every evening after the day's work was finished I received the rails, first to secure the pay of the men, and secondly, in the name of the railroad company to see that it got them. This plan

seemed to work well and was satisfactory to all parties, and the sky seemed clearer and brighter for the success of the works than I had ever seen it. But at all times it was on the verge of bankruptcy, and the lessee company, tired of being harassed, not only by its own debts, but also by the obligations of the parent company, concluded it must in some way secure more capital. This at that time was no easy matter, especially when the concern was in such a complicated financial position as Cambria then was.

The mill was shut down, and I was ordered to Philadelphia to in a way become a promotor, a new business for me, and I had to do some talking to make some of the party I met believe that there could be any money made out of the works. But I assured them the Cambria Works could be made a great money-making plant if put in proper shape. All this time the three-high mill was uppermost in my mind, but I did not say a word about it, fearing it might provoke discussion; this I did not want at this time, as several of the party were in rather a passive frame of mind and I thought it wise to let them remain so, as it would have proved fatal to my long-cherished idea to have the subject brought up in any way until after the matter now in hand had been settled. I was sure there would be opposition, and my chance for success would be much better then, as I believed the opposition would be in the minority but could not well back out. For several days but little was done beyond some small skirmishes about the propriety of putting more money into a manufacturing business that had made two failures in two years. This seemed to be the knock-down argument, and the fact could not be ignored.

During this time I fortunately made the acquaintance of Mr. Edward Y. Townsend and soon gained his confidence. He was connected with the mercantile house of Wood, Bacon & Company, one of Philadelphia's best-known houses. This gave him a standing with capitalists, the men that were wanted. His firm looked upon the project with favor, which was encouraging. Then came up the question as to the amount of money that would be wanted. Here I was again placed in a vexatious predicament, being called on to name the amount required for the mill, well knowing that if the three-high mill and other all-important improvements that really should be made were named, it would surely defeat the whole scheme. I concluded to make the amount as small as possible. Some of the party were inclined to think well of the property.

We met at Mr. Charles Wood's office to talk over some plan of organization, and see what amount of money could be raised and how it could be done. They had previously decided it would require about one hundred and eighty thousand dollars, that this amount should be divided into six shares of thirty thousand dollars, that each share should have one representative only, but without limit as to the number of persons that it might take to make up each share, and that the name of the firm should be Wood, Morrell & Company, This was a wise arrangement and probably at that time the only way the project could be accomplished.

The six representatives of the shares, who were all the stockholders that were known to outsiders, were the business managers. As I recollect they were Mr. Charles Wood, Mr. David Reeves, Mr. Matthew Newkirk, Mr. Edward Y. Townsend, Mr. Daniel J. Morrell, and Mr. George Trotter. All of them were successful business men and men of high standing and character.

They next went to work to get all the shares fully made up, and in a few days succeeded. We thought everything was completed and that I could soon take the good news with me to Johnstown, and I was planning to go the next day, but we were mistaken. An unexpected trouble about the lease turned up, and for several days the atmosphere was gloomy and it seemed as if all our labor had been for naught. This condition of affairs existed for several days, but on the last day of grace in which they had to make the lease, they got all the six holders of the six shares together and at about nine or ten o'clock at night they agreed to sign the lease, but Mr. R.D. Wood, who was largely interested, despairing of their agreeing to sign It, had previously gone home and gone to bed, and so the others had to go to his house, where all were in bed, call them up, and get Mr. Wood out of bed to approve the lease before twelve o'clock. Otherwise, as I now remember, the property would have been sold the next day by the sheriff.

This was a close call and to me was a period of intense anxiety, not so much on my own behalf, as in the interest and welfare of some three or four thousand men whose existence and that of their families depended upon their daily labor; and for all this time, nearly two weeks, they had been idle. How those men with large families

managed to get along is more than I can tell, but they were sympathetic, generous, and would share the last bite with each other.

The next morning I started for Johnstown as the bearer of glad tidings. The morning after my return, I met the workmen and told them what had taken place (all of which they received joyfully), and further said, by way of encouragement, that I did not see what could happen that would prevent the works from starting and running steadily, but I must confess that in the face of so many setbacks I at times had some misgivings, fearing something unforeseen might turn up. However, I told the men to get their furnaces ready to start up and said, "We must all work together and do our best to make it go. If we do this, success is assured." I was ordered to start the mill, and the workmen and the citizens of the town were all happy. All that could be seen from the Johnstown end was of good omen.

But after I had left Philadelphia for home a very great difference of opinion had shown itself in the new company in regard to the appointment of the officials in Johnstown. This resulted in the appointing of two General Managers, one General Superintendent, and one Assistant Superintendent. The last-named official was not needed. Mr. D.J. Morrell was made General Manager to succeed Mr. James, then the General Manager, and Mr. Wyatt Miller was supposed to be assistant to the Superintendent, but was not so named. I was again placed in a very embarrassing position. Mr. James, having been the General Manager of the previous company, and having been requested by the minority stockholders to remain, had no disposition to resign. The result was that for some weeks we had two General Managers. Mr. James was a very clever man, to whom I had become much attached, and he was a brother-in-law of Mr. David Reeves, who was a good friend of mine. I had been in Mr. Reeves employ for some years, and was sent to Cambria by him, and his uniform kindness placed me under obligations to him, but the majority of the firm were in favor of Mr. Morrell. Consequently, I decided my course should be absolutely neutral. The majority party did all they could to get me to side with them, but I positively refused to do so; in an unguarded moment, however, I said there was no use for two General Managers or an Assistant Superintendent. This was true, but it was not said to be used by them to get Mr. James or Mr. Miller out. This they did however, much to my surprise and chagrin. They put them both out, and it naturally caused a coldness on Mr. Reeves part toward me, which I greatly regretted, and it was some time before I got an opportunity to explain the matter to him. Mr. D.J. Morrell now became the sole General Manager. He was a very clever gentleman, but knew nothing about the iron business, which to say the least, was unfortunate. Mr. Charles Wood was made the head of the firm and Mr. Edward Y. Townsend his assistant.

CAMBRIA Continued THE THREE HIGH RAIL MILL

After the new organization was completed and the officials got well in their places and all was working smoothly so far as they were concerned, the change in the official organization of the company did not remove or lessen the troubles in the manufacturing department, or increase the output, both of which items were absolutely essential to insure success. To continue to run the mill as it was, I could see nothing ahead but a most disastrous failure. Having previously given the whole subject my most thoughtful consideration, even to its most minute detail, I was prepared to submit my plans and recommendations to the new company. My proposal was to build a new train of rolls, three high, and twenty inches in diameter. This involved a new engine that would run with safety one hundred revolutions per minute, and it practically meant an entirely new mill. To this proposition they demurred, saying that it could not be done as the expense was too great; besides, the mill they had was entirely new and was supposed to be the best mill in the country, and they were at loss to see why good rails could not be made on it. After some time and a great amount of earnest talk, I succeeded in convincing some of the representative stockholders that it was absolutely necessary to make some changes and improvements, and that, if my suggestions were adopted, success was sure.

At the next meeting the subject was taken up with a full board, and as I was informed afterwards, the matter was fully discussed, and it was decided to build an eighteen-inch two-high train, geared, to replace the train we had, and I was ordered to go ahead at once with it. This was to me a very severe setback, as I supposed I had Mr. Townsend converted to the three-high direct-driven mill. To this order I replied most emphatically that I would not

build the geared mill, as it would be money thrown away and time lost. In reply to my refusal to build the mill as ordered, they said my position was high-handed and most arbitrary and one I had no right to assume, as I was in their employ on a salary for the purpose of managing their works and had no right to dictate to them what they should do. I in a measure assented to this, at the same time telling them that if they persisted in running their works on the lines they had laid down for me, there would be a humiliating funeral, and I did not want to remain to attend it especially as one of the mourners. In a few days after receiving my reply, they gave me permission to build the mill as I wanted it, but suggested that I make the roll eighteen inches in diameter instead of twenty. I consented, as a compromise, ---- a great mistake, ---- and commenced at once to build the mill, and make other important improvements.

About the time the patterns for the new train and also for the engine were completed, a protest was received at the works in the form of a legal document from the minority partners notifying the managing directors that they would hold them personally responsible for the building of the new mill. This was a most unexpected setback, and all the work on the new mill was suspended for a time, and the directors made another effort to get me to change my plans and build the old two-high geared mill, which the company had previously so earnestly urged me to do. I told them I was tired out trying to make rails on the old mill. They suggested that I could make a better mill two-high that would give less trouble, and consequently do more work. I admitted that it could be done, but the advantage to be gained would not warrant the expenditure, and the only thing that could possibly be done to make the enterprise a success was to build the three-high mill.

The next Sunday morning Mr. Townsend came to the mill, where he found me in the midst of the regular Sunday repairs. After I was pretty well through with them he took me aside and showed me the protest. My hands being greasy, I asked him to read it to me, which he did. After all these years have passed, there is no person other than myself who can fully appreciate the trying position the managers were placed in. On the one hand I was urging them to build a mill, on an untried plan, as a strong minority called it, this minority also legally notifying the managers that they would hold them personally responsible for the result. On the other hand, I was absolutely refusing to build the mill they wanted, and besides all this, they ridiculed the idea of adopting a new and untried method that was against all practice in this and the old country, from which at that time we obtained our most experienced iron workers. Moreover the prominent iron makers in all parts of the country had said to Mr. Morrell that the whole thing was a wild experiment and was sure to end in a failure, and that young determined, cracked-brained Fritz would ruin him. The heaters and rollers all opposed the three-high mill and appointed a committee to see the managers and say to them that the three-high mill would never work, and that they, themselves, would suffer by reason of its adoption, but that if the managers would put in a two-high geared train, which they said was the proper thing to do, the mill would go all right.

As I now look back to that eventful Sunday morning, many long years ago, sitting on a pile of discarded rails, with evidences of failure on every side, Mr. Townsend and myself quietly and seriously talking over the history of the past, the difficulties of the present and the uncertainties of the future, I cannot but feel, in view of what since has come to pass, that it was not only a critical epoch in the history of the Cambria Company, but that as well the future well-being of my life was in the balance. For as Mr. Townsend was about to leave, after a full discussion of the Cambria Iron Company's condition at that time he turned to me and said: "Fritz go ahead and build the mill as you want it." I asked, "Do you say that officially?" to which he replied: "I will make it official," and he did so; and here I wish to say that to no other person so deservedly belongs the credit, not only of the introduction of the three-high-roll train but also of the wonderful prosperity that came to the Cambria Company, as it does to Mr. Edward Y. Townsend, then its Vice President.

Notwithstanding I now had the consent of the company to go on with my plan for the new mill, many of my warmest friends, some of whom were practical ironmen, came to me and urged me not to try such an experiment. They said I had taken a wrong position in refusing to build the kind of mill the company wanted. "By so doing," they said, "you have assumed the entire responsibility, and in all probability the mill that you are going to build will prove a failure, and being a young man your reputation will be ruined for life." To this I replied that possibly

they were right, but that I had given the subject the most careful consideration and was willing to take my chances on the result.

The work was now pushed as fast as possible. In the construction of the rail train I made a radical departure from the old practice, which was to place breaking pieces at dangerous points in the train; these pieces were expected to give way under certain strains so as to save the roll from breaking. One of the previous methods was to make the coupling boxes and spindles light, so that they would break when any extra strain came on them; and the leading spindle had a groove cut around it to weaken it, so that it would be sure to break before the rolls. The result was the constant breaking of some of these safety devices. In addition to all these devices, there was what was called a special breaking box on top of the rolls which held the rolls in place. This was made hollow so as to crush if the strain on the rolls became too great. I directed the pattern maker to make this box solid. The mill manager, seeing the pattern was solid, went to the pattern maker to have it changed and made hollow, as he supposed it had been made solid through a mistake. The pattern maker refused to alter the pattern, saying the old man (as they called me over fifty years ago) had ordered it to be made that way. "Well," said the manager, "the old man has gone crazy; and if that box is put in as it is, the mill will be smashed to pieces, and I am going to see him about it." This he did, and I told him the box was going in solid, as I would rather have a grand old smash-up once in a while than be constantly annoyed by the breaking of leading spindles, couplings, and breaking boxes, to which he replied: "By God, you'll get it."

When it became known that I had abandoned all safety devices another violent storm arose, and it was of such a character as to much annoy Mr. Morrell. He was a very clever gentleman, without experience in the manufacturing end of the business, and being known as the General Manager of the plant, he was naturally worried. This, of course, gave me much trouble, to keep him in line, as every person he would meet that knew anything about the business would tell him of the great failure that was in store for the Cambria Iron Works. Some one told Mr. Wood the President of the company, all about what was going to take place when the mill was started. I was told afterwards that he listened attentively to what they had to say, and then said to them: "Mr. Fritz has done many clever things for us that were said would never work, but always did, and I shall not interfere with him or his plans."

The next and last person to talk to me on the subject was Mr. James Hooven, proprietor of the Norristown Iron Works, one of my dearest friends, with whom I had spent several of the happiest years of my life. He came to pay me a visit and to learn for himself what I was doing. He remained with me for several days and we talked the whole subject over, and like the rest of my friends, he thought I was assuming an unwarrantable risk. "If this is a failure," he said, "your reputation is ruined for life. Have you thought this over?" I told him, "I have and it is my rule not to make a move in any new thing until I have thought it over not only as a whole, but also in all of its details, and I assure you this is no exception, and I now feel that success is assured." While he was with me I took him into the mill so that he could better understand why the change was so important. He at once saw that great results could be gained if the plan could be successfully carried out but he could not see his way clear to indorse it, and thought I had attempted to do too much, all at one time, and thought it very dangerous to do away with all safety devices, as they at times might prevent serious accidents. To this I replied that the only possible good such safety devices could do was the saving of a roll, and that it was very rarely that any roll was broken, except the finishing roll; if the collars were as deep and fitted as closely as they should do to insure good work, and the safety device, or breaking box, as it was generally called, should crush, one end of the roll would go up and it was more than likely that some of the collars would be broken and the roll rendered useless. The loss by delay, caused by the breakage of the safety devices, was not only annoying, but was expensive. The train had to stop; all hands in that end of the mill were idle, heating furnaces damped up, coal and iron wasted in the furnaces. Add to this the loss in production and it became a matter of much importance, not only to the proprietors, but also to the workmen.

The train was now practically completed, with all breaking devices abandoned. The old mill was stopped on the evening of the 3rd of July, 1857, and after the 4th I commenced to tear the old mill out, and get ready to put the new one in, and also to put the new engine in place at the same time. Everything in the rail department was remodeled and the floor line raised two feet. On the 29th of the same month everything was completed and the mill

was ready to start. I need not tell you that it was an extremely anxious time for me, nor need I add that no engraved cards of invitation were sent out, that not being the custom in the early days of iron making; had it been, it would not have been observed on that occasion.

As the heaters to a man were opposed to the new kind of mill, we did not want them about at the start. We secured one, however, out of the lot, who was the most reasonable one amongst them. to heat the piles for us. We had kept the furnace smoking for several days as a blind. At last, everything being ready, we charged six piles. At about ten o'clock in the morning the first pile was drawn, and it went through the rolls without the least hitch of any kind, making a perfect rail. You can judge what my feelings were as I looked upon that perfect and first rail ever made on a three-high mill, and you may know in part how grateful I felt toward the few faithful and anxious men who were about me and who stood by me during all my trials and difficulties, among whom were Alexander Hamilton, the Superintendent of the mill, Thomas Lapsley, who had charge of the rail department, William Canam, and my brother, George.

We next proceeded to roll the other five piles. When two more perfect rails were rolled we were obliged to stop the engine, as the men were all so intently watching the rolls that the engine had been neglected, and being new, the eccentric had heated and bent the eccentric rod so that the engine could no longer be worked. As it would have taken some time to straighten the rod and reset the valves, the remaining piles were drawn out of the furnace onto the mill floor. About this time the heaters, hearing the exhaust of the engine, came into the mill in a body, and from the opposite end to where the rails were. Seeing the unrolled piles lying on the mill floor, they took it for granted that the new train was a failure, and their remarks about it were far from being in the least complimentary. Mr. Hamilton, coming along about that time and hearing what they were saying about the mill, turned around, and in language more forcible than polite told the heaters, who were Welsh, that if they would go down to the other end of the mill they would see three handsomer rails than had ever been made in Wales, where the greater part of the rails used in this country at that time came from, as well as the heaters who were so bitterly opposed to the three high mill.