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# The Tredegar iron works : 1865-1876

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THE TREDEGAR IRON WORKS: 1865-1876

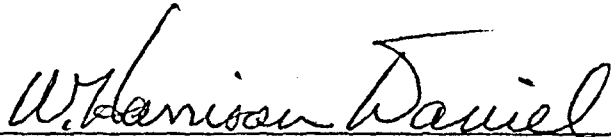
BY

DENNIS MAHER HALLERMAN


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APPROVED BY



W. Harrison Daniel  
W. Harrison Daniel, Thesis Director  
Professor of History



Richard Barry Westin  
Richard Barry Westin  
Professor of History



Emory C. Bogle  
Emory C. Bogle  
Assistant Professor of History

C  
R

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## CHAPTER I

### INTRODUCTION

The Tredegar Iron Works rose to prominence during the Civil War as the chief armorer of the Confederacy. That four-year period represents the focal point of the company's existence, however, the Civil War experience of the Tredegar should not be regarded as a singular industrial monument to the Confederacy but as a maturation process for the company itself. The focus of this thesis is the rebirth and subsequent growth and contraction of the Tredegar in the ten years following the Civil War.

The Tredegar Iron Works was established in Richmond, Virginia in 1836 and is still in operation today at a site in Chesterfield County just south of the city. The Tredegar was named in honor of its builder, Reev Davis, who had worked at the famous Tredegar factory in Wales.<sup>1</sup> Joseph R. Anderson became the dominant personality in the antebellum success of

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<sup>1</sup>Kathleen Bruce, Virginia Iron Manufacture in the Slave Era (New York: The Century Co., 1931), p. 151.

the Tredegar. A descendant of Scotch-Irish forebears, Anderson was born in Fincastle, Botetourt County, Virginia in 1813.<sup>2</sup> He graduated from West Point in 1836 and served for a little over a year before resigning his commission in 1837. He was employed as the chief engineer of the Valley Turnpike Company from 1838 to 1841, building the road between Staunton and Winchester. In 1841 he commenced his fifty-one year association with the Tredegar Iron Works when he was appointed the commercial agent of the company. In that position he obtained the respect and financial support of Richmond bankers. In 1843 Anderson leased the works from its directors for a five-year period at an annual rate of \$8,000. Anderson was thus given full charge in carrying out the company's business.<sup>3</sup> In 1848 he bought the firm, and the Tredegar, which had been floundering financially in the years before his association with it, soon became more stable.<sup>4</sup> Government contracts for cannon and complete propulsion machinery for the frigates, Roanoke and Colorado, enhanced the Tredegar's antebellum

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<sup>2</sup>For the Genealogy of the Anderson Family, see the Anderson Family Genealogical Notes. Virginia State Library.

<sup>3</sup>Bruce, Virginia Iron Manufacture, p. 176.

<sup>4</sup>Ibid., pp. 158-172.

reputation. The company also made just about everything for the railroad industry from spikes to locomotives. By 1860 the firm, employed over 1,500 free and slave laborers, had a capital investment of \$800,000 and annually manufactured nearly \$1,500,000 worth of finished iron.<sup>5</sup>

With the advent of the Civil War the Tredegar had already assured itself of a favored position in the manufacture of Confederate arms. Anderson, however, felt that that was not enough of a personal effort, so he entered the service and was commissioned a brigadier general in the Confederate Army in 1861. After being wounded at Frazier's Farm in June 1862 he was asked by General Robert E. Lee to return to the Tredegar to manage its all out war effort. He complied and although hampered by shortages of raw material operated the Tredegar throughout the war. He bought or leased ten blast furnaces in western Virginia to supply his works with vital pig iron. He purchased the Dover Coal Mines and leased the Tuckahoe Coal Mines. He also bought and maintained a fleet of canal boats to bring the pig iron and coal to Richmond.

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<sup>5</sup>Charles B. Dew, Ironmaker to the Confederacy (New Haven: Yale University Press, 1966), p. 3.

He totally controlled his enterprise from raw material to finished product.<sup>6</sup>

The city of Richmond had the dubious honor of symbolizing the end to the Confederate dream. Richmond fell on April 3, 1865 when Union troops occupied the city. On Sunday morning, April 2, Lee's message to evacuate Richmond was received by President Jefferson Davis at St. Paul's Church in the city.<sup>7</sup> The Confederate staff, its valuable papers, and gold supply were loaded on trains destined for Danville, Virginia. The policy of the Confederate high command directed by General Richard S. Ewell to destroy the fully stocked tobacco and cotton warehouses in the Shockoe Slip area of the city in order to keep those prizes from the Union.

The Tredegar escaped serious damage from the fire which destroyed Richmond. The principle reason for the Tredegar's good fortune was the Tredegar Battalion. This Battalion had been formed as a local defense unit in May 1861, being divided into three

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<sup>6</sup>Walter S. Grant, "Joseph Reid Anderson," Dictionary of American Biography, Vol. I, pp. 268-269. The Tredegar's Civil War period is most aptly discussed in Charles B. Dew's Ironmaker to the Confederacy (Yale University Press, 1966).

<sup>7</sup>Virginius Dabney, Richmond, The Story of a City (Garden City, New York: Doubleday and Company, Inc., 1976), p. 189.



companies and composed of 350 white Tredegar workers commanded by Tredegar department heads under the overall command of Joseph R. Anderson.<sup>8</sup> Although the battalion stopped drilling regularly because of heavy work demands within a year and half of its formation, it was still prepared to withstand the attack of the raging mob on April 3, 1865. The mob was dispersed by the battalion and other Tredegar workers. Fires that had been kindled by the mob were quickly put out.<sup>9</sup> That enabled the Tredegar to face the future, even though the immediate future appeared to be bleak.

The Tredegar Works were located on a five acre site with the James River serving as its southern boundary. Its northern boundary which separated it from the foot of Gambles Hill was the James River and Kanawha Canal.<sup>10</sup> Damage to the plant had been minimal as noted above during Richmond's evacuation. However, an earlier fire on May 15, 1863 had severely

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<sup>8</sup>Alexander W. Weddell, Richmond, Virginia in Old Prints (Richmond: Johnson Publishing Company, 1932), p. 152.

<sup>9</sup>David B. Sabine, "Ironmonger to the South," Civil War Times (October 1966), 5, p. 19. The Richmond Whig, April 12, 1865.

<sup>10</sup>Acts of the [Virginia] General Assembly, 1866-67 (Richmond: James E. Goode, Printer, 1867), pp. 356-357.

hampered the Tredegar's operations. In that blaze, caused by a fire originating in the nearby Crenshaw Woolen Factory, the locomotive and engine shops, the gun foundry, the old blacksmith shop, the pattern shop, and most of the machine shop were destroyed.<sup>11</sup> Most of the buildings were never rebuilt. At the close of the war the Tredegar was composed of the following buildings: one rolling mill with an adjoining smith's shop, a spike shop, three foundry buildings, a shed utilized as a carpenter and pattern shop, two machine shops, two blacksmith's shops, one boiler shop and an office building. The rolling mill appeared to be in the best condition, but excessive wear on machinery was evident throughout the works. The works still showed a strong potential for the manufacture of iron for railroads, rolling stock, machine and general iron work.<sup>12</sup>

The South was devastated both physically and psychologically by the ravages of the Civil War. In 1865 industrial society was nearly dormant in the

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<sup>11</sup>Charles B. Dew, Ironmaker to the Confederacy (New Haven: Yale University Press, 1966), pp. 193-194.

<sup>12</sup>U. S. Department of War, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, 128 vols. (Washington: Government Printing Office, 1880-1901), Series I, Vol. 46, Part iii, (1894), pp. 1007-1010.

South.<sup>13</sup> A methodical crippling of the South's productive capacity had taken place. "One of the greatest calamities which confronted Southerners was the havoc wrought on the transportation system."<sup>14</sup> Water transport was hampered by broken levees and blocked channels. On land roads and bridges were heavily damaged, but railroads bore the brunt of wartime destruction. Throughout the South lines had been torn up and rolling stock had been vastly depleted. A major task facing the Richmond region was rebuilding. In this process the Tredegar was to be one of the most active participants.

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<sup>13</sup>Julian A. C. Chandler, et al., eds., The South in the Building of the Nation, 12 vols. (Richmond: The Southern Historical Society, 1909), 6, p. 1.

<sup>14</sup>John S. Ezell, The South Since 1865 (New York: The Macmillan Company, 1963), p. 27.

## CHAPTER II

### THE REORGANIZATION OF THE TREDEGAR IN THE IMMEDIATE POSTWAR PERIOD

From 1859 to 1867 the Tredegar Iron Works was a wholly owned subsidiary of Joseph R. Anderson and Company, with Anderson serving as president.<sup>1</sup> The responsibility of guiding and reinvigorating the Tredegar immediately after the Civil War fell upon that company. Anderson's main problem concerned the raising of capital to keep his organization viable. He achieved only limited success in obtaining funds in the short run. However, in the long run his reorganization of the Tredegar Iron Works as the Tredegar Company in the form of a joint stock company proved to be the most stabilizing influence on the postwar fortunes of the Tredegar.

Anderson had a strong supporting cast which immensely aided his efforts. His nephew Francis T. Glasgow, a Scotch-Irish descendant educated at Washington College--now Washington and Lee--ably

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<sup>1</sup>J. R. Anderson's other partners included: John F. Tanner, Robert Archer, and Robert S. Archer.

managed five blast furnaces in Botetourt and Rockbridge Counties during the war. Today he is more popularly known as the father of the novelist, Ellen Anderson Gholson Glasgow.<sup>2</sup> One of Anderson's sons, Archer, also played a prominent role. He was educated at the University of Virginia, traveled and studied in Europe for two years, and returned to the University of Virginia to earn his law degree. He only practiced law for two years before being employed by his father at the Tredegar. During the Civil War he served as an adjutant general attaining the rank of lieutenant colonel.<sup>3</sup>

Two other important individuals in this family oriented business were Anderson's father-in-law, Dr. Robert Archer, and his son, Robert S. Archer.<sup>4</sup> Anderson while serving at Fort Monroe, Virginia had

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<sup>2</sup>J. R. Raper, Without Shelter, The Early Career of Ellen Glasgow (Louisiana State University Press, 1971), pp. 15-19.

<sup>3</sup>Egbert G. Leigh, Jr., Colonel Archer Anderson Memorial Pamphlet (Richmond: The Tredegar Company, 1918), Anderson Family Genealogical Notes, Virginia State Library.

<sup>4</sup>In line with the family nature of the Tredegar management it is noteworthy that the first full-length history dealing primarily with the Tredegar, Virginia Iron Manufacture in the Slave Era, was written by Joseph R. Anderson's granddaughter, Kathleen Bruce.

met Dr. Archer, an assistant surgeon at that installation, and married his daughter Sally in 1837. Dr. Archer moved to Richmond, abandoned his medical career, and became head of the Armory Rolling Mill which adjoined the Tredegar and was a subsidiary of the Tredegar. Robert S. Archer served as his father's assistant at the Armory Rolling Mill.

The only exception to the close knit Anderson-Archer management line was John F. Tanner. Tanner, a native Virginian, held the office of superintendant of the works before and during the war.<sup>5</sup> However, he left the company in the 1870's.

Besides its plant in Richmond, Joseph R. Anderson and Company also had considerable holdings in other parts of Virginia in the immediate postwar period. Among these were six blast furnaces in the western part of the state. The Cloverdale, Grace, Catawba, and Rebecca blast furnaces were situated in Botetourt County while the Australia furnace was in Allegheny County and the Mount Torry furnace was in Augusta County.<sup>6</sup> The Cloverdale furnace property was

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<sup>5</sup>Kathleen Bruce, Virginia Iron Manufacture in the Slave Era (New York: The Century Company, 1931), p. 173.

<sup>6</sup>The term, immediate postwar period, as used here denotes the era from April 1865 to January 1867. Tredegar Company Records (Ms. in Virginia State Library, Richmond, Virginia), Corporate Holdings,

approximately seven miles from Buchanan and included about 900 acres. Grace furnace was located on Craig Creek about eight miles from the James River, and the property consisted of about 5,000 acres. Both Cloverdale and Grace pig iron were successfully used for ordnance during the Confederacy. The Catawba furnace property located twenty miles from Buchanan on Catawba Creek and the Rebecca property, lying one mile from Dibrell's Sulphur Springs and sixteen miles from Buchanan, contained 8,000 and 5,000 acres respectively. Australia furnace, situated about two miles from Goshen Depot, and Mount Torry furnace, located about ten miles from Waynesboro, included approximately 6,000 and 10,000 acres respectively. None of these furnaces were in blast in the immediate postwar period, but they represented a valuable asset and it was felt that the war damage could be repaired.<sup>7</sup>

Joseph R. Anderson also had interests in two coal mines in the Central Virginia coal basin. This bed extended from the mouth of the North Anna River to the Appomattox River at Tidewater, passing through

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1866, pp. 16-23. All Tredegar items used in this study are in the Virginia State Library, unless otherwise stated.

<sup>7</sup>Tredegar Company Records, Corporate Holdings, 1866, pp. 16-23.

Goochland, Henrico, Powhatan, and Chesterfield Counties.<sup>8</sup> In Henrico County the company leased the Tuckahoe or Trent Coal Pits, the lease being due to expire in January 1868. The Tuckahoe Mines, containing 266 acres, were twelve miles from Richmond and three miles from the James River and Kanawha Canal to which they were connected by a railroad. Situated near Tuckahoe Creek the mines contained four shafts.<sup>9</sup> The Tuckahoe Mines did not play an important part in the Tredegar realignment, the lease being allowed to expire in 1868.

In Goochland County about twenty-five miles from Richmond the company owned the Dover Coal Mines property which had a total acreage of nearly 1,100 including good farm land. The James River and Kanawha Canal flowed through the property affording easier access to Richmond than the Tuckahoe Mines. The Dover Coal Pits were located two and one-half miles from Dover Creek and near the village of Manakin.<sup>10</sup> The Dover Mines played an important role in the

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<sup>8</sup>Sabine, "Ironmonger," p. 13.

<sup>9</sup>Tredegar Company Records, Corporate Holdings, 1866, p. 9. William M. E. Rachal, ed., "The Occupation of Richmond, April 1865," Virginia Magazine of History and Biography (April 1965), 73, p. 193.

<sup>10</sup>Tredegar Company Records, Corporate Holdings, 1866, pp. 102-106. Rachal, "The Occupation of Richmond, April 1865," p. 190.



Tredegar's reconstruction. However, like the Tuckahoe the Dover Mines were not immediately worked after the war.

Other assets of Joseph R. Anderson and Company in the second half of 1865 included a canal boat fleet and farm land in Goochland County.<sup>11</sup> Beaverdam Farm, the company's real estate, was about twenty-four miles above Richmond on the north side of the James River and contained approximately 939 acres. River Road bisected the property, and the James River and Kanawha Canal was on its southern perimeter.<sup>12</sup> In 1866 Beaverdam Farm was supplemented by the purchase of three adjoining tracts in Goochland County; "Lewis" containing 150 acres, "The Forest" containing 276 acres, and "Pleasant Green" containing 351½ acres.<sup>13</sup> These tracts were used for investment or security.

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<sup>11</sup>The following eight boats were held by the Tredegar immediately after the war: the Grace, the Cloverdale, the Glasgow, the Tredegar, the Catawba, the Imogen, the Fawn, and the Rebecca. Tredegar Company Records, Tredegar Ticket Book, January 1864-August 31, 1865. Part one of this volume is the Tredegar Canal Boat Ledger, pp. 166-167.

<sup>12</sup>Goochland County, Deed Book 39, 1859-1863. Reel 18, pp. 684, 684a, 685. Deed of Beaverdam Farm from Corbin Warwick to Joseph R. Anderson, recorded December 11, 1862. Virginia State Library.

<sup>13</sup>Goochland County, Deed Book 40, 1863-1868. Reel 18, pp. 530-532. Deed of John M. Trevilian to Joseph R. Anderson, recorded April 15, 1867, Virginia State Library.

The federal government occupied the Tredegar Works from April 3 to August 2, 1865, the result being a complete work stoppage.<sup>14</sup> Anderson and his partners did not remain idle during that period. Their twofold objective entailed obtaining pardons for themselves and resuming work at the Tredegar. Pardons were granted by President Andrew Johnson in the summer of 1865, and Anderson's property was restored.<sup>15</sup> He had argued that the works should be reopened so that the Tredegar could help partake in the rebuilding of southern railroads. He also pointed out that the works were being vandalized and being reduced in value.<sup>16</sup> Anderson, with the assistance of several other Richmond industrialists, was able to reopen the plant in August 1865.<sup>17</sup>

Although Anderson would have the reviving southern railroads as customers for his renascent business, in

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<sup>14</sup>Tredegar Company Records, Tredegar Company Ledger #3, January 1867-October 1881, p. 415.

<sup>15</sup>Dew, Ironmaker, p. 300.

<sup>16</sup>Tredegar Company Records, Copies of Letters, Clippings, etc., Involving the Company, J. R. Anderson and Partners to Major General J. W. Turner, Richmond, July 3, 1865.

<sup>17</sup>Tredegar Company Records, Copies of Letters, etc., William McFarland, President, Clover Hill Railroad Company, Thomas Dodamead, Superintendent, Richmond and Danville Railroad Company, et al. to President Andrew Johnson, Washington, D. C., July 6, 1865.

the short run he faced a serious lack of capital. Cotton speculation by Anderson during and immediately after the war had reaped a \$190,000 return in greenbacks from the London firm, John K. Gilliat and Company. These funds helped in the initial Tredegar revamping.<sup>18</sup> However, by July 30, 1866 all of the cotton had been sold and the London account was closed.<sup>19</sup>

Realizing the limited return of his cotton account, Anderson sought several other methods to obtain liquid capital for operating expenses. Anderson felt that relief could only be obtained by the sale of some of J. R. Anderson and Company's property which would help keep the Tredegar financially viable.<sup>20</sup> This was especially true in light of the fact that most Tredegar railroad customers did not feel obliged to pay their prewar debts, and those that did would only pay 50 per cent.<sup>21</sup> The "constant effort" of

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<sup>18</sup>Dew, Ironmaker, p. 304.

<sup>19</sup>Tredegar Company Records, Tredegar Letter Book, July 1866-September 7, 1866, J. R. Anderson and Company to John K. Gilliat and Company, London, July 30, 1866.

<sup>20</sup>Anderson Family Papers (University of Virginia Library, Charlottesville, Virginia), J. R. Anderson to F. T. Anderson, December 1, 1866. All Anderson Family Papers used in this study are in the University of Virginia Library, unless otherwise stated.

<sup>21</sup>Anderson Family Papers, J. R. Anderson to F. T. Anderson, November 24, 1866.

converting their blast furnaces in western Virginia and the Dover Coal Mines into ready capital achieved mixed results.<sup>22</sup> The selling of the Dover Coal Mines proved quite helpful to the Tredegar, but buyers for the blast furnaces could not be easily obtained.

Cognizant of the lack of credit in Virginia and the South as a whole, Anderson attempted to lure buyers for the Dover Mines among the entrepreneurs of the Northeast. In January of 1866 he succeeded in attracting the interest of the New York financier, William H. Aspinwall, in the Dover property. Aspinwall, who had made his fortune prior to the Civil War in such enterprises as the Pacific Railroad and Panama Steamship Company and the Pacific Mail Steamship Company, decided to invest in the proposed Dover Company.<sup>23</sup> Aspinwall, having acquired 4,000 shares at \$25 a share representing an investment of \$100,000, became the largest shareholder in the Dover Company. More capital was furnished by other prominent northeastern investors while Joseph R. Anderson and Company

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<sup>22</sup>Tredegar Company Records, Tredegar Letter Book, February 14, 1867-January 27, 1869, J. R. Anderson and Company to Dilworth Porter and Company, Pittsburgh, September 14, 1867.

<sup>23</sup>Richard J. Purcell, "William H. Aspinwall," Dictionary of American Biography, Vol. 1, p. 396.

retained 2,000 of the 10,000 shares issued by the Dover Company. Joseph R. Anderson and Company realized nearly \$200,000 from the sale of the Dover Mines and its adjoining property.<sup>24</sup>

Converting the blast furnace holdings of Joseph R. Anderson and Company into liquid capital proved to be rather difficult. Anderson contracted with the Richmond real estate firm of Atkinson Ten Eyck and Company to sell the six blast furnaces for him at a 5 per cent commission.<sup>25</sup> No buyers could be immediately induced into purchasing the properties primarily because of the poor conditions of the blast furnaces. With that in mind Catawba Furnace was put in operation in late 1867 under a manager paid by the Tredegar, but by January of 1868 blast operations were ordered shut down because the furnace proved to be

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<sup>24</sup>Other investors included the former Union General, Charles P. Stone, Nathaniel Thayer and Joel Parker of Boston, and John C. Brown of Providence. Tredegar Company Records, Memo of Stockholders of the Dover Company, April 12, 1866, Tredegar Contract Book, September 1, 1865-November 29, 1866. Memo of Dover Company Stockholders, June 1866, Tredegar Petty Cash Book, January 1866-December 31, 1866.

The first source appears to be a preliminary list of 27 investors whereas the second source cites seven investors for the 10,000 shares.

<sup>25</sup>Tredegar Company Records, Tredegar Contract Book, September 1, 1865-November 29, 1866, J. R. Anderson and Company to Atkinson, Ten Eyck and Company, Richmond, November 27, 1865.

uneconomical and the quality of the pig iron had declined.<sup>26</sup>

Another option in lieu of selling the properties was renting them. Catawba, Mount Torry, and Cloverdale were all rented for a time after the war but of these three only Mount Torry was put in blast. Other resources on the furnace properties were utilized. At Cloverdale manganese ore was mined, and at Catawba coal was mined. The rental agreements established a percentage of the raw material or product to be paid to J. R. Anderson and Company. The lessees of Mount Torry agreed to furnish 15 per cent of their total annual output of pig iron while the Catawba lessees acquiesced to give 10 per cent of the coal mined at the property. The Cloverdale lessees agreed to pay one-tenth of the net cash proceeds from their manganese enterprise to J. R. Anderson and Company.<sup>27</sup>

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<sup>26</sup>Tredegar Company Records, Tredegar Letter Book, July 5-September 10, 1867, Joseph R. Anderson to Watkins James, [Bonsacks Depot, Virginia], August 7, 1867-March 21, 1868, Joseph R. Anderson to Watkins James, Bonsacks Depot, Virginia, January 15, 1868.

<sup>27</sup>Tredegar Company Records, Contract Book, September 1, 1865-November 29, 1866, J. R. Anderson and Company to Oswald J. Heinrich and Company, Richmond, October 18, 1866. J. R. Anderson and Company to Shaw and Brooks, Augusta County, Virginia, February 1, 1866. Contract Book, April 1870-October 1880, J. R. Anderson and Company to Francis Collins and James Prisk, January 13, 1871.

In 1867 Mount Torry furnace was sold to John Wissler and Son who already owned Columbia furnace in Shenandoah County, Virginia.<sup>28</sup> The furnace stayed in blast and supplied the Tredegar with pig iron. Anderson consulted another real estate firm, William H. Beck and Company of Alexandria, in 1869 in an attempt to sell the five other furnaces. Anderson again offered a 5 per cent commission on sales.<sup>29</sup> Australia and Cloverdale were sold in 1869 and 1873 respectively. The Cloverdale property was divided and sold to three people.<sup>30</sup>

Besides trying to sell some of Joseph R. Anderson and Company's holdings in the immediate postwar era in order to raise capital, Anderson also introduced a very ambitious proposal known as the "Tredegar Scheme." In the latter half of 1866 Anderson sent letters to the leading southern railroad presidents and also sent

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<sup>28</sup>Tredegar Company Records, Tredegar Letter Book, February 14, 1867-January 27, 1869, J. R. Anderson and Company to John Wissler and Son, Columbia Furnace, Virginia, November 17, 1867.

<sup>29</sup>Tredegar Company Records, Tredegar Letter Book, February 1, 1869-March 27, 1872, J. R. Anderson and Company to William H. Beck and Company, Alexandria, Virginia, February 15, 1869.

<sup>30</sup>Tredegar Company Records, Tredegar Letter Book, August 27-November 12, 1869, Joseph R. Anderson to William S. Keen, Covington, Virginia, September 15, 1869. Tredegar Letter Book, May 1873-April 12, 1877, J. R. Anderson and Company to Captain William T. Patton, Richmond, July 17, 1873.

his vice-president, John F. Tanner, on a tour through the South to explain the merits of Anderson's plan.<sup>31</sup> Anderson stressed the southern appeal of his plan to such firms as the Central Railroad Company of Georgia. ". . . we have prepared a programme for appropriating the Tredegar Works and all their appendages to the use of the Rail Road Companies of the country in order that the companies may thus manufacture their own rails, machinery and by united efforts."<sup>32</sup>

The scheme was not limited to cooperation between the Tredegar Works and southern railroads. Anderson also encouraged Colonel Sam Tate, president of the Shelby Iron Works of Alabama, to join in the Tredegar effort. Anderson desired Tate's influence in the Deep South in promoting his scheme.<sup>33</sup> He also approached R. R. Bridgers, the president of the Wilmington and Weldon Railroad. Bridgers had thought of starting

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<sup>31</sup>Tredegar Company Records, Tredegar Letter Book, July 1866-September 7, 1866, Joseph R. Anderson to Charles T. Pollard, Montgomery, August 1, 1866.

<sup>32</sup>Tredegar Company Records, Tredegar Letter Book, September 22-November 19, 1866, J. R. Anderson and Company to the President and Directors of the Central Railroad Company [of Georgia], October 31, 1866.

<sup>33</sup>Tredegar Company Records, Tredegar Letter Book, September 22-November 19, 1866, J. R. Anderson and Company to Col. Sam Tate, Memphis, September 25, 1866.



his own rolling mill in North Carolina, but Anderson discouraged that idea by stressing the uncertainties involved in that sort of enterprise as experienced by Anderson himself. For example, he pointed out that Bridgers' raw material market would not have been very accessible.<sup>34</sup> It actually appears that in this case Anderson was consciously trying to limit any competition with the Tredegar. Cooperation with the Shelby Works was considered feasible, but encouraging the establishment of a new rolling mill so near to the Tredegar was beyond Anderson's wishes. The scheme itself never aroused enough interest to become a viable organization because the rebuilding railroads did not have any excess capital to invest so by late 1866 the project was abandoned.

Anderson's other proposal in the immediate postwar period regarding the Tredegar Works was corporate reorganization. This provided a more efficient operation of the works and also brought in much needed capital. It proved to be the best alternative as opposed to the selling of property and the railroad scheme for infusing capital into the

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<sup>34</sup>Tredegar Company Records, Tredegar Letter Book, July 1866-September 7, 1866, Joseph R. Anderson to R. R. Bridgers, Wilmington, North Carolina, August 11, 1866.

company. As early as February 23, 1866 Anderson and his partners secured corporate status in the name of the Tredegar Company. The company was to be established as a joint stock company, capitalized at not less than a million dollars and not more than two million dollars with the stock issue valued at \$100 per share.<sup>35</sup> By early 1867 the reorganization had been completed, and the Tredegar Company officially started business.

In January of 1867 Joseph R. Anderson, acting on behalf of Joseph R. Anderson and Company, conveyed the Tredegar Works to the Tredegar Company. Despite the reorganization Joseph R. Anderson and Company continued as a viable entity as it still held blast furnace properties in western Virginia and farmland in Goochland County, Virginia. Dr. Robert Archer and Robert S. Archer also conveyed the Armory Rolling Mill to the Tredegar Company at the same time. The Armory Rolling Mill was actually leased from the state for ten years commencing in 1866 by permission of Governor Francis H. Pierpont. The lease involved a payment of \$1,500 per year. The Tredegar Rolling Mill and Armory Rolling Mill were thus completely united whereas before they

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<sup>35</sup>Acts of the [Virginia] General Assembly, 1865-66, (Richmond: Allegre and Goode Printers, 1866), pp. 356-357.

had been separate but mutually supporting establishments.<sup>36</sup>

The capital stock of the company was valued at one million dollars. The Tredegar Works represented \$500,000, the Armory Rolling Mill represented \$100,000, and a working capital of \$400,000 was kept on hand for a combined total of \$1,000,000. The four partners of J. R. Anderson and Company and Archer Anderson amassed most of the original 10,000 issued shares while members of their immediate families subscribed to the rest. Joseph R. Anderson held the controlling interest by virtue of his owning 6,950 shares.<sup>37</sup>

The Tredegar Company with the assimilation of the Armory Rolling Mill then owned 12 acres of land between the canal and the James River.<sup>38</sup> The Tredegar Company was officially organized on February 27, 1867 by the

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<sup>36</sup>Richmond City, Hustings Deeds, 84-A (Ms. Vol. Richmond City Courts Building, Richmond, Virginia), pp. 250-258. Deed of Joseph R. Anderson, Robert Archer, and Robert S. Archer to the Tredegar Company, recorded March 14, 1867.

<sup>37</sup>Anderson Family Papers, Box 3 (Virginia State Library), Prospectus of the Tredegar Company, February 8, 1867. The remaining shares were held by John F. Tanner 500, Robert Archer 700, R. S. Archer 800, Archer Anderson 500, J. W. Archer 50, Sarah E. Anderson 200, Edward R. Archer 50, Fannie A. Hobson 200, and D. S. W. [Watson] 50.

<sup>38</sup>Acts of the [Virginia] General Assembly, 1866-1867 (Richmond: James E. Goode, Printer, 1867), pp. 595-596, 662-663.

partners of Joseph R. Anderson and Company and Archer Anderson. Joseph R. Anderson was elected president. John F. Tanner and Archer Anderson were elected vice-president and secretary-treasurer respectively. Archer Anderson, Robert Archer, Robert S. Archer and William H. Aspinwall were elected to the board of directors, but Aspinwall resigned in March. For management purposes the company was divided into two departments with R. S. Archer heading the Rolling Mill Department and Francis T. Glasgow supervising the Foundry and Machinery Department. Glasgow also replaced Aspinwall on the board.<sup>39</sup>

The Tredegar reorganization enabled the company to expand its plant in order to be better prepared to take part in the rebuilding of the South, particularly its railroads. Management was especially aided since its role was better defined. The merger of the Tredegar Rolling Mill and the Armory Rolling Mill allowed for a greater diversification of product and a more efficient use of resources. Put more succinctly an economy of scale had been achieved. The veiled competition between the Tredegar Rolling Mill and the Armory Rolling Mill no longer existed. The Tredegar's immediate postwar confusion ended, and it

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<sup>39</sup>Tredegar Company Records, Tredegar Company Minutes, 1867-1930 (Ms), pp. 17-20.

entered into its boom period from 1867 until 1873. However, Anderson still felt one more important ingredient was necessary for the viability of his newly chartered company.

Anderson felt that the infusion of northern capital would give his company a sounder base, especially in view of the postwar economic conditions in the South. He took as his precedent the investment of northern money in the Dover Mines. He approached several of the Dover investors and other northern financiers and encouraged them to buy stock in the newly formed Tredegar Company. His persuasive overtones presaged the New South rhetoric of the post-Reconstruction period as can be seen in his words concerning a subscription to Tredegar stock to William E. Dodge, who had made his fortune in the China trade and metal industry.<sup>40</sup> ". . . it will be uniting men of the north and of the south and thereby aiding in the pacification in which all good men should feel concern and besides we would be aided by your large experience and comprehensive mind in case we want advice." Dodge must have been sufficiently impressed by that statement for by 1868 he owned 200 shares or \$20,000 interest

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<sup>40</sup>William B. Shaw, "William E. Dodge," Dictionary of American Biography, Vol. 5, pp. 352-353.

in the company.<sup>41</sup> He also probably assumed that advice alluded to aid in expanding the Tredegar market.

Several Dover Company investors such as William H. Aspinwall, Nathaniel Thayer, and Joel Parker also bought Tredegar stock. This gave rise to a strong interrelationship between these two companies. By 1869 other northern investors in the Tredegar included such men as the New Yorker, A. A. Low, another China merchant and a backer of the Chesapeake and Ohio Railroad, and John F. Winslow.<sup>42</sup>

Winslow, subscribing to 1,020 shares for a total value of \$102,000, was the largest Tredegar stockholder having a northern residence. Winslow, a resident of Poughkeepsie, New York, had been an iron magnate before and during the Civil War, but retired from the iron business in 1867. In 1865 he established the first Bessemer steel plant in the country. During the war his company financed and constructed the iron-clad, Monitor.<sup>43</sup>

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<sup>41</sup>Tredegar Company Records, Archer Anderson Private Letter Book No. 1, April 1860-June 28, 1870, Joseph R. Anderson to William E. Dodge, New York, May 21, 1867. Tredegar Stock Ledger, 1867-1944 (Ms), p. 51.

<sup>42</sup>Richard B. Morris, "Abiel A. Low," Dictionary of American Biography, Vol. 11, pp. 444-445.

<sup>43</sup>Carl W. Mitman, "John F. Winslow," Dictionary of American Biography, Vol. 20, pp. 399-400.

Aside from being a prominent investor in the Tredegar, Winslow was also the only other northerner besides Aspinwall to serve on the Tredegar Board of Directors in the period from 1865 to 1876. Aspinwall only sat for an inactive month, but Winslow served from May 1870 through April 1873.<sup>44</sup> It is assumed that even Joseph R. Anderson did not expect that much cooperation from a northern source. In their alliance the two manufacturers of the iron plates for the Merrimac and the Monitor were no longer competing in open battle but were actively united in promoting the iron industry's well-being.

With the influx of northern capital the Tredegar reorganization was all but complete. Joseph R. Anderson wore two hats after the reorganization, serving as the president of the Tredegar Company and Joseph R. Anderson and Company. Joseph R. Anderson and Company continued to play a vital role in the affairs of the Tredegar. As late as 1873 J. R. Anderson and Company still held the Catawba, Grace, and Rebecca blast furnaces in Botetourt County which could not be converted into ready capital by sale or rental due to a lack of interested customers. J. R. Anderson and Company deeded the Grace and Rebecca furnaces to the Tredegar

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<sup>44</sup>Tredegar Company Records, Tredegar Minutes, pp. 40, 43, 49, 53.

Company on May 24, 1873 as the only remaining alternative regarding the disposition of the furnace properties. The Rebecca tract also included the defunct Jane blast furnace.<sup>45</sup> The Catawba and Rebecca furnace properties were abandoned for blast furnace use in 1874 and 1875 respectively.<sup>46</sup>

However, the Grace Furnace because of the fine reputation of its pig iron was put back in blast by Anderson. After it had been deeded to the Tredegar Company, Anderson by June of 1873 was contemplating resumption of operations at the furnace.<sup>47</sup> The primary purpose in restarting the furnace was the need to obtain good car wheel iron for the Tredegar. The furnace reopened in mid-1874 under the management of Captain William T. Patton. The rebuilt hearth collapsed after a week of operations, and pig iron production did not resume until October 1874.<sup>48</sup>

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<sup>45</sup>Botetourt County, Deed Book 37 (Ms. Vol. in Botetourt County Court House, Fincastle, Virginia), pp. 289-290. Deed of Joseph R. Anderson and Company to the Tredegar Company, recorded July 26, 1873.

<sup>46</sup>John D. Capron, "Virginia Iron Furnaces of the Confederacy," Virginia Cavalcade (Autumn 1967), 17, p. 12.

<sup>47</sup>Tredegar Company Records, Tredegar Letter Book, May 29-July 39, 1873, F. T. Glasgow to William Bryan, Staunton, June 3, 1873.

<sup>48</sup>Tredegar Company Records, Tredegar Letter Book, June 14, 1873-February 29, 1876, F. T. Glasgow to E. R. Archer [Richmond], May 15, 1874. F. T. Glasgow to Captain William T. Patton, Grace Furnace,



However, Grace Furnace then stayed in blast and produced good quality pig iron until mid-1876 when it was closed.<sup>49</sup>

Other transactions involving the Tredegar Company and J. R. Anderson and Company were a bit more complicated than the above transfer of property from one company to another. Anderson was forced to assert priorities when a third company in which Anderson also had an interest tended to interfere with the management of his two companies. A quick glimpse at the Dover Mines failure reveals Anderson's selective discretion in regard to his different investments. The Dover Mines Company was beset by a number of unfavorable circumstances in the later 1860's from which it never really recovered. First of all the expectations of using the coal for manufacturing illuminating gas proved to be erroneous. A slate fracture at the mines had caused that material to be mixed with the coal and consequently lowered the coal's value. In fact one third of the Dover coal product was considered to be of very little value. A severe fire and a flood

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September 25, 1874. Joseph R. Anderson to Captain William T. Patton, Grace Furnace, October 17, 1874.

<sup>49</sup>Tredegar Company Records, Tredegar Letter Book, April 6-May 16, 1876. F. T. Glasgow to Captain William T. Patton, Grace Furnace, May 6, 1876.

in one of the shafts in 1867 had hampered mining efforts in that year. The company tried to alleviate its problems by expanding rather than retrenching.<sup>50</sup>

In 1868 the Dover Company purchased the Westham Furnace, five miles above Richmond on the James River and established a subsidiary, the Westham Iron Works. The furnace had been worked before but the previous company did not have much success in the enterprise. Such familiar names as William H. Aspinwall, Joel Parker, Charles P. Stone, and others served on the board of the new company. Joseph R. Anderson also served as a member of the board of directors.<sup>51</sup>

J. R. Anderson and Company also bought \$2,500 worth of the stock of the Echols Company, an ore mining company established in Rockbridge County, Virginia which served as a subsidiary of the Dover and Westham Companies.<sup>52</sup> The same investors such as William H. Aspinwall, Joel Parker, and others who had invested in the Dover, Westham, and Tredegar Companies also subscribed to the Echols Company stock. Thus all four

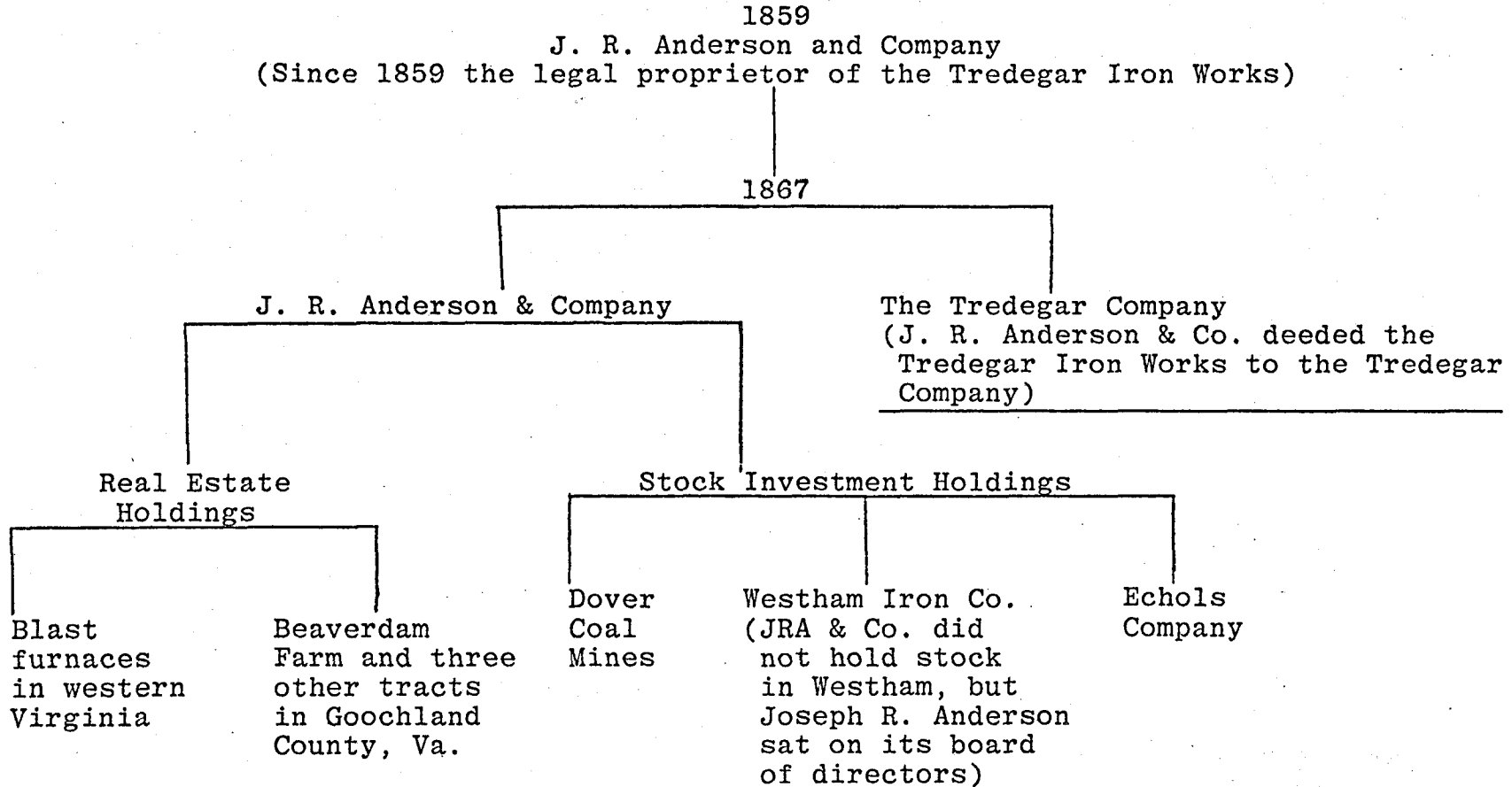
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<sup>50</sup>Anderson Family Papers, Annual Report of the Dover Company for the year 1868, presented February 12, 1869.

<sup>51</sup>The Richmond Whig, January 22, 1868.

<sup>52</sup>Anderson Family Papers, Joseph R. Anderson to F. H. Wolcott [New York], February 23, 1869.

Flow Chart Depicting the Management of the Tredegar Iron Works from 1859 to the Reorganization in 1867



companies were interrelated by their stockholders. J. R. Anderson and Company held stock in the Dover and Echols Companies while its contribution to the Westham Iron Company consisted of Joseph R. Anderson sitting on its board.

The interaction between J. R. Anderson and Company and the Tredegar Company as one entity and the Dover Company as another offers an interesting example of conflict in regard to interlocking boards of directors. Anderson's attitude revealed an approach to the situation which naturally favored J. R. Anderson and Company and the Tredegar Company. The Dover Mines were managed by Charles P. Stone, a former Union general who had already faced adversity during the Civil War. He had been accused of neglect of duty during a skirmish near Leesburg, Virginia in 1861. He later resigned his commission after being released from prison.<sup>53</sup> His overall management concept of hard work was not successful because he was caught in the Joseph R. Anderson and Company, Tredegar Company, and Dover Company conflict of interest struggle.

Anderson even though holding assets in the Dover Company under J. R. Anderson and Company exhibited a

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<sup>53</sup>Thomas M. Spaulding, "Charles P. Stone," Dictionary of American Biography, Vol. 18, p. 72.

partiality toward his Tredegar Iron Works. As early as 1867 Anderson subtly hinted to William H. Aspinwall that he would order more Dover coal if Aspinwall and his friends would subscribe to some of the stock issue of the Tredegar Company. Between 1866 and 1869 J. R. Anderson and Company sold three of its canal boats to the Dover Company.<sup>54</sup> It appears that Anderson was using the interrelationship of the two companies strictly for his own advantage as especially pertained to the Tredegar. This is more readily apparent when the role of the primary Dover product, coal, is examined as a source of controversy.

The Tredegar had successfully used Dover coal since the Civil War period. However, when slate was found mixed with the coal Anderson sought a better coal source for Tredegar use. In 1869 he obtained coal from the Clover Hill Coal Company in Chesterfield County, Virginia at \$4.75 a ton even though Dover

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<sup>54</sup>Tredegar Company Records, Archer Anderson Private Letter Book No. 1, April 1860-June 28, 1870, Joseph R. Anderson to William H. Aspinwall, New York, February 28, 1867.

Dover Company Papers (Ms. in University of Virginia Library, Charlottesville, Virginia) Dover Company Letter Book. The three boats sold were the Grace, Rebecca and Catawba. All Dover Company items used in this study are in the University of Virginia Library, unless otherwise stated.

coal was selling at \$4.25.<sup>55</sup> The Dover coal simply did not measure up to the quality of other mines in the area. Anderson had already stated his case in March 1867 when he wrote to one of his engineers, E. R. Archer. "But you are certainly mistaken in supposing that our owning the Dover property is to weigh a feather in deciding whether we will use it for any operation for which it is not the equal to any other coal considering the quality and the price."<sup>56</sup> Anderson sought the optimum goals of good quality and good price.

Anderson's attitude caused a discordant note among stockholders having shares in both the Dover and the Tredegar companies. Joel Parker of Boston assumed the leadership for persuading the Tredegar to buy Dover coal. He felt that the Tredegar was a "natural customer" because J. R. Anderson and Company had so many shares of its stock. He further stipulated that since J. R. Anderson and Company owned one-fifth of the Dover stock and that other Dover members owned

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<sup>55</sup>Dover Company Papers, Dover Company Letter Book, C. P. Stone to Joel Parker, August 17, 1869.

<sup>56</sup>Tredegar Company Records, Tredegar Letter Book, March 4-May 18, 1867, Joseph R. Anderson to E. R. Archer, Engineer Factory and Foundry Machine Shop, March 9, 1869.

five-sixths of the Tredegar stock it would aid the Tredegar to buy Dover coal at \$4.25 per ton. He realistically admitted that certain Tredegar members, i.e., J. R. Anderson and Company, may have certain interests, but that they would not discriminate or hurt the whole Tredegar operation.<sup>57</sup> In the fall of 1869 Anderson contracted to obtain Dover coal since he could not get it very cheap anywhere else. However, by mid-1870 the Dover Company had amassed such a debt that General Stone resigned as chief superintendent, and Archer Anderson took over as a caretaker president of the Dover Company as it was liquidated, all its stock being worthless.<sup>58</sup> The imminent marketing of Kanawha coal by the recently constructed Chesapeake and Ohio Railway also spelled doom for the Dover Company.

The failure of the Dover Company was in marked contrast to the activities of the Tredegar itself. Anderson expanded his plant and simultaneously improved

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<sup>57</sup>Dover Company Papers [Joel Parker], Cambridge to General Charles P. Stone, Dover Mines, Virginia, August 5, 1869, Joel Parker, Cambridge to General Joseph R. Anderson, Richmond, August 16, 1869.

<sup>58</sup>Dover Company Papers, Joseph R. Anderson to Charles P. Stone [Dover Mines, Virginia] September 17, 1869. Tredegar Company Records, Tredegar Letter Book, February 1, 1869-March 27, 1872; Archer Anderson, President of the Dover Company to Allan Campbell, New York, April 27, 1870.

his already established product line. The Tredegar faced the period from 1867 to 1873 with an air of confidence in its future. Anderson completely controlled the whole situation and avidly tried to improve it even more. The improvement was primarily concerned with the Tredegar product.



## CHAPTER III

### THE TREDEGAR PRODUCT AND PRODUCTION TECHNIQUES

The Tredegar line in the post-bellum period offered a variety of products from railroad spikes to horseshoes. However, the company's essential interest was in the production of manufactured goods for the railroad industry. The Tredegar also produced such items as cast iron pipe and portable and fixed engines. However, in this ten-year period the Tredegar's fortune was tied to the exigencies of the railroad companies.

An analysis of Tredegar iron commences with an overview on the refinement of charcoal iron, which was the mainstay of its finished product. Charcoal iron is iron that is smelted by charcoal fuel in a blast furnace. The charcoal was usually prepared from wood in the area surrounding the blast furnace.<sup>1</sup> One can thus see the necessity of the large tracts of land varying from approximately 5,000 to 10,000 acres which

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<sup>1</sup>W. H. Dennis, Foundations of Iron and Steel Metallurgy (Amsterdam: Elsevier Publishing Co., Ltd., 1967), pp. 20-21.

were included in a typical charcoal blast furnace enterprise. Most of these tracts were comprised primarily of forest land whose trees served as the source for the charcoal. When the forested land eventually became denuded, operations at a blast furnace became impractical and were terminated.

The processing of charcoal from timber required two major operations. The first consisted of chopping down acceptable trees, trimming the trees and arranging them in cords. Hickory and oak trees received primary consideration, but pine, chestnut and ash were also satisfactory for preparing charcoal.<sup>2</sup> The wood was transported to a designated area where it was prepared for burning. The site for burning was a circular area from about thirty to forty feet in diameter. The cordwood was stacked around a center post leaving a hollow chimney in the middle. The wood was stacked high in the center and tapered towards the sides giving the appearance of a mound-like structure. The whole structure was covered with leaves and charcoal dust from previous burnings. Kindling was stuffed into the chimney and was ignited. The object was not to burn the wood completely but to retain pieces of

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<sup>2</sup>Ibid., p. 20.

pure carbon. Thus the fire had to be watched and controlled so that it only smoldered.<sup>3</sup>

The time required to finish burning a mound varied from about four days to two weeks. Circumstances such as the weather, season, type of wood used, amount of dust used to smother the mound, and the overall quality of work exhibited by the coalers all entered into the total time factor incurred in producing charcoal. The best season for making charcoal was usually from May through October.<sup>4</sup> As the charcoal was formed it was raked away from the pile and allowed to cool; later it was transported to the blast furnace where it would be used to smelt iron.

The element iron (Fe) does not exist in an independent state, but is found in several types of iron oxide compounds. Commonly known as iron ores there are four distinct ore classifications. Magnetite ( $\text{Fe}_3\text{O}_4$ ) contains about 72 per cent iron whereas hematite ( $\text{Fe}_2\text{O}_3$ ) includes approximately 70 per cent iron. The other two categories are the iron hydroxide limonite ( $\text{Fe}_2\text{O}_3\text{H}_2\text{O}$ ) which has a 59-63 per

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<sup>3</sup>Robert A. Rutland, "Men and Iron in the Making of Virginia, Part I," The Iron Worker (Summer 1976), 40, p. 7.

<sup>4</sup>Frederick Overman, The Manufacture of Iron (Philadelphia: H. C. Baird, 1850), pp. 108-117.

cent iron composition and the iron carbonate siderite ( $\text{FeCO}_3$ ) which is comprised of 48 percent iron.

Although magnetite is the richest ore it is found in very limited quantities, but hematite is and has been quite plentiful making it the mainstay of the iron industry.<sup>5</sup>

The purpose of the blast furnace in the iron industry is to obtain a purer form of iron than that which exists in the ore state. The blast furnace accomplishes its task by "reducing" the iron oxide ore to an iron with a lesser degree of impurities. The reduction process simply entails the removal of oxygen from the iron ore which occurs because of the heat generated by the charcoal or coal fuel.

The nineteenth century charcoal blast furnace had changed very little from its eighteenth century predecessor. It consisted of a hollow masonry structure, commonly known as a stack, having the form of a square truncated pyramid with its sides sloping inward as it rose.<sup>6</sup> The base varied from about twenty to twenty-five square feet and the height of the stack

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<sup>5</sup>Edwin O. Gooch, Iron in Virginia (Charlottesville: Virginia Department of Conservation and Development, 1954), p. 1.

<sup>6</sup>Peter Temin, Iron and Steel in Nineteenth Century America (Cambridge, Massachusetts, 1964), p. 58.

ranged from approximately twenty-five to forty feet. A chimney was mounted on top of the structure. The stack was usually erected next to a hill in order to have one side reinforced and also to facilitate loading the materials or charge into the open top of the furnace.<sup>7</sup> The charge was stored in a stockhouse which was connected to the stack's top by means of a bridge. Wheelbarrows were implemented in transferring the materials from the stockhouse to the stack. In some cases a hoist system was used to move the charge to the stack's top. The stockhouse served the purpose of protecting the workers and material from inclement weather.

The interior description of the stack commences with a glimpse at the hearth. The hearth was a large flat stone which rested at the bottom of the stack. Molten iron and slag collected in the hearth area. Rising above the hearth for several feet was a vertical well or crucible. Above the well the hollow stack widened to form the boshes. Towards the top the boshes gradually narrowed but the diameter was still about twice the size of the well. The boshes were

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<sup>7</sup>Joseph G. Butler, Jr., Fifty Years of Iron and Steel (Cleveland: The Penton Press Company, 1923), p. 19.

usually about nine feet in diameter at their widest point.<sup>8</sup> The whole interior was lined with firebrick. In summary a rough conception of the interior of a stack can be had by picturing the configuration of the glass in a hurricane lamp with the bottom portion being narrower than the neck.

The sides of a blast furnace were not uninterrupted from top to bottom but had recesses in their lower portions. These recesses, commonly called arches, were about fifteen feet wide and nine feet high. Although the arches had the same basic design when viewed from the outside, they served two distinct purposes. The working or casting arch of which there was only one allowed the worker to observe the production of molten iron and to give him ready access to the tap plugs for the slag and molten iron. The tuyere arch's purpose was to conduct a blast of air to the charge through the tuyere, usually a copper nozzle like apparatus.<sup>9</sup>

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<sup>8</sup>Walter K. V. Gale, The British Iron and Steel Industry, (Newton Abbot [Devon]: David and Charles, 1967), p. 49.

Gale was used as the source for the greater portion of this paragraph.

For statistics regarding the height of stacks, diameter of boshes, etc., of Virginia blast furnaces please see Thomas Dunlap, ed., Wiley's American Iron Trade Manual (New York: John Wiley and Son, 1874), pp. 107-110.

<sup>9</sup>Overman, The Manufacture of Iron, pp. 417-421.

The air blast aided in the combustion of the charge. A water wheel usually powered two alternating bellows so that a continual blast could be maintained. A blast pipe connected the bellows to the tuyere. The tuyere nozzle entered the stack in the vicinity of the well. The tuyere arch gave access for repairs to the tuyere and blast pipe. The number of tuyere arches varied according to the type of fuel used.<sup>10</sup> For example, a charcoal furnace usually had one tuyere entering at the side of the hearth, whereas a coke or anthracite furnace had at least two or three tuyeres and sometimes five or six.<sup>11</sup> Since there could only be three tuyere arches, the work arch being on one side of the furnace and a tuyere arch being on each of the other three sides, then two tuyeres were placed in each tuyere arch when, for example, six tuyeres were implemented.

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<sup>10</sup>For a better perspective in regard to a nineteenth century blast furnace, the writer recommends visiting Glenwood Furnace in Rockbridge County, Virginia which the writer did on November 9, 1976. Glenwood was operated by Francis T. Anderson, Joseph's brother, during the Civil War and was leased by him after the Civil War. The furnace is in remarkably good condition although there is deterioration evident in the hearth. This charcoal furnace contains a work arch and a single tuyere arch.

<sup>11</sup>Frederick Overman, A Treatise on Metallurgy (New York: D. Appleton and Company, 1852), pp. 519-520.

In 1874 there were thirty-four charcoal blast furnaces operating in Virginia, and one furnace which had been converted for use with anthracite fuel.<sup>12</sup> However, by the mid-1870's Virginia's charcoal furnaces were being phased out and anthracite and coke furnaces which had been used in the north prior to the Civil War were being adopted.

A brief look at a furnace in operation will complete this overview of a blast furnace. The charge which consisted of the iron ore, fuel, and a flux were dumped in alternating layers from the top of the stack. "The fuel in a blast furnace has three functions: it provides the carbon for reducing the ore; by burning it gives the heat necessary for the reaction to take place; and it supports the charges in the stack and boshes of the furnace, allowing them to fall as it burns away and reduces and melts the iron."<sup>13</sup> Since iron ore is composed of earthy materials in addition to iron and oxygen the necessity for a flux arose. A flux, usually limestone, promoted the melting of these earthy materials such as

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<sup>12</sup>Thomas Dunlap, ed., Wiley's American Iron Trade Manual (New York: John Wiley and Son, 1874), pp. 107-110.

<sup>13</sup>Gale, British Iron, p. 51.



phosphorous and thus helped in their removal from the iron ore.<sup>14</sup>

As the reaction proceeded the carbon of the fuel removed oxygen from the ore in the form of escaping gases. The molten iron with a high carbon content sank to the bottom of the hearth while the limestone flux and earthy waste material floated on top in a mixture known as slag. The slag was tapped off first, and when a suitable quantity of molten iron was obtained it was also tapped. The molten iron was run into a series of parallel sand mold channels where it cooled and solidified. The configuration of the sand moulds roughly resembled a nursing litter of pigs, hence the origin of the term pig iron.<sup>15</sup> Pig iron was continuously tapped from a blast furnace until the furnace had to undergo repairs.

Pig iron constituted an intermediate stage in iron production. It was known as cast iron when it was used for iron castings without further refinement of the cast iron.<sup>16</sup> However, cast iron exhibits a very brittle texture and thus lacks a malleable quality necessary for intricate castings. The high

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<sup>14</sup>Overman, Manufacture of Iron, p. 68.

<sup>15</sup>Dennis, Foundations, p. 12.

<sup>16</sup>Temin, Iron and Steel, p. 16.

carbon presence in pig iron was mainly responsible for its brittleness. By reducing the carbon content in pig iron a strong fibrous iron commonly known as wrought iron could be obtained. The puddling process provided nineteenth century ironmakers with a method for removing most of the carbon from pig iron.

The puddling furnace, sometimes also known as a reverberatory furnace, was employed to refine pig iron into wrought iron. The site of the puddling furnaces was usually removed from the blast furnace site to a location which had more accessible transportation facilities. Compared to the blast furnace, the puddling furnace presented a rather squat profile. Its dimensions were about twelve feet in length and about five feet high with a thirty to forty foot stack on one end of it. The outside of the furnace was composed of cast iron plates while its interior was lined with fire brick. The interior consisted of two chambers, the fireplace and the hearth. The fire place had a fire door through which bituminous coal was shoveled through onto a fire grate. The fireplace was separated from the hearth by a wall known as the firebridge. The firebridge prevented the pig iron charge in the hearth from coming in contact with the fuel. Thus coal instead of charcoal could be used because most of the impurities in coal would

not be imparted to the iron as it melted. Iron was introduced into the furnace through the working door. The roof of the puddling furnace sloped downward from the fireplace towards the stack thus creating a strong heated draft which passed over the pig iron charge in the hearth.<sup>17</sup> The flames were reflected downward from the ceiling, hence giving the name reverberatory furnace.<sup>18</sup>

Two men, the puddler and his helper, operated the puddling furnace. A double puddling furnace had two working doors opposite each other in the hearth chamber. Before charging the cold pig iron into the furnace the hearth was lined with cinder which helped in retaining heat in the furnace. "One complete working cycle in a puddling furnace from charging the cold pig to tapping the cinder after taking out the wrought iron was called a heat, and it lasted about two hours."<sup>19</sup>

After the iron melted it began to react with the oxygen in the cinder lining. The iron commenced

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<sup>17</sup>Overman, Manufacture of Iron, pp. 260-264. Overman was used as the source for the greater portion of this paragraph.

<sup>18</sup>Gale, British Iron, p. 44.

<sup>19</sup>Ibid., p. 71.

to lose some of its carbon since the carbon was being oxidized. This reaction was known as the boil and was evidenced by scattered flames or puddler's candles on the surface of the molten iron. The candles signified the burning off of carbon monoxide and the escaping of carbon dioxide. During the boil the puddler and his helper alternated in stirring or puddling the iron which by that time had reached a pasty consistency. The puddling prevented the iron from becoming too stiff and it also kept the iron in a manageable mass. A cast iron rod or rabble was used for the actual puddling. It was about seven feet long and had a chisel at one end and a rounded knob at the handle end. After the boil the iron had come to nature and was separated into about four balls weighing about seventy-five to one hundred pounds each. These balls were removed and placed on carts to be transferred to the next station. After the iron balls were removed the puddler then tapped the slag from the furnace, and the furnace was prepared for the next heat.<sup>20</sup>

Although most of the slag separated from the iron balls a small amount still remained. This lowered the

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<sup>20</sup>Gale, British Iron, pp. 72-74. Gale was used as the source for the major portion of this paragraph.

overall quality of the wrought iron so it had to be removed. The iron balls were carted to either the hammer or squeezer apparatus in order to reduce their slag content. The hammer simply beat or forged the iron into a manageable size. The iron was placed on an anvil on which the hammer applied a number of strokes which compacted the iron and removed the slag. Squeezers of the period were of two types: the lever action kind and the rotary squeezer. The lever squeezer was simply a pincer like apparatus which grasped the iron ball and subsequently reduced it in size. The rotary squeezer was operated by placing the iron ball in its outermost circle and letting it pass through gradually diminishing diameters.<sup>21</sup> After the squeezing or hammering had been completed the wrought iron was introduced to the rolling mill. The term, shingling, applied to both the hammering and squeezing process, and the puddled ball which had become somewhat elongated by shingling became known as a bloom.

At the rolling mill the bloom is transformed into a finished product by the action of the rolls. "Basically the rolling of iron (and for that matter,

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<sup>21</sup>Overman, The Manufacture of Iron, pp. 341-344.

any other metal) is the act of passing it between two rolls which are rotating in opposite directions, and are so set that the space between them is a little less than the size of the piece of iron to be rolled."<sup>22</sup> The bloom first passed through the roughing rolls. The rolls which were usually steam powered elongated the bloom while simultaneously reducing its thickness. The iron then resembled long bars which gave it the description bar iron. Usually after passing through the roughing rolls the iron was reheated and then run through the finishing rolls. The finishing rolls were grooved in order to make the iron conform to a specific shape. For example, in making an iron rail each groove formed by the upper and lower rolls would impart a more precise configuration on the bar iron as it passed between the rolls. Approximately five to seven passes, depending on the number of paired grooves on the rollers, were necessary in turning out a finished rail. Thus the iron would pass successively from groove one to groove seven as it was being formed into a rail.<sup>23</sup>

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<sup>22</sup>Gale, British Iron, p. 79.

<sup>23</sup>Overman, The Manufacture of Iron, pp. 360-362.

"Any row, or more than one set of rollers, is called a train."<sup>24</sup> The brief description above concerns a two-high train. In other words one roller was placed directly over another one. Usually two or more trains were placed in line, and then the arrangement was known as a rolling mill. In the nineteenth century an improvement on the two-high train was also widely used. Known as the three-high train, this train had three sets of rolls in vertical alignment. The main advantage of the three-high train lay in the fact that the iron could be passed through rolls one and two and make a return pass between rolls two and three. The two-high train afforded a pass in only one direction, thus causing a waste of time as compared to the three-high train.<sup>25</sup> A train was described by the diameter of the rolls and the number of rolls in vertical alignment. Thus an eight inch two-high train presents a concise picture of the machinery used at a rolling mill.

In addition to reorganization in 1867, the Tredegar embarked on another ambitious venture in that same year. It involved a variation in its standard product line in the immediate postwar period. As early

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<sup>24</sup>Ibid., p. 345.

<sup>25</sup>Gale, British Iron, pp. 81-83.

as July 1866 the company had expressed a desire to reestablish itself as a rail manufacturer. The Tredegar had last made rails in the 1850's, but by early 1867 it resumed their production.<sup>26</sup> The company desired to obtain as much of the rejuvenated rail market as possible. Its timing proved to be fortunate as most of the damaged southern railroads were reestablished by 1867.<sup>27</sup>

The rail mill was set up in the refurbished Armory Rolling Mill and was operating by March 1867.<sup>28</sup> It had a successful start and offered encouraging prospects for the company. However, a few problems were encountered by the Tredegar in regard to rail manufacture. In 1867 Tredegar rails were produced on a two-high train which was not the most efficient for rolling rails and consequently did not result in a superior product. Also the finishing processes applied

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<sup>26</sup>Tredegar Company Records, Tredegar Letter Book, June 12-July 31, 1866, J. R. Anderson and Company to Joseph Jackson, Richmond, July 14, 1866. Dew, Ironmaker, pp. 14, 18.

<sup>27</sup>John F. Stover, The Railroads of the South, 1865-1900 (Chapel Hill: The University of North Carolina Press, 1955), p. 60.

<sup>28</sup>Tredegar Company Records, Tredegar Letter Book, March 4-May 18, 1867, J. R. Anderson to P. V. Daniel, President, R. F. and P. Railroad, March 16, 1867.



to the rails such as sawing the ends at angles did not exhibit quality workmanship.<sup>29</sup> In February 1868 a new three-high train which was most conducive to manufacturing rails was installed in the rail mill, and the overall efficiency and quality of the mill's output increased. Soon the company confidently announced a three-year guarantee on its rails from breaking or laminating.<sup>30</sup>

The prospects for success of the Tredegar rail seemed unlimited. In 1869 the rail mill had a maximum capacity of from fifty-five to sixty-five tons of rails per day. Virginia charcoal pig iron was the main ingredient in the Tredegar rail.<sup>31</sup> However, a limit was quickly being reached in the life of the Tredegar rail. With the emergence of Bessemer steel in the United States in 1865 a stronger and more durable

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<sup>29</sup>Tredegar Company Records, Tredegar Letter Book, May-July 5, 1867, J. R. Anderson to Col. William Wadley, Savannah, June 15, 1867.

<sup>30</sup>Tredegar Company Records, Tredegar Letter Book, December 9, 1867-March 21, 1868, R. S. Archer to Col. William Wadley, February 11, 1868. Tredegar Letter Book, August 27-November 12, 1869, J. R. Anderson to Minor Meriwether, Marion, Alabama, September 22, 1869.

<sup>31</sup>Tredegar Company Records, Tredegar Letter Book, August 27-November 12, 1869, R. S. Archer to D. Lynch, Troy, New York, September 7, 1869. Tredegar Letter Book, December 9, 1867-March 21, 1868, Joseph R. Anderson to Col. A. Terry, Knoxville, December 21, 1867.

rail could be produced. In 1867 steel rails were first rolled commercially by the Cambria Iron Company in Johnstown, Pennsylvania. Steel rails gradually increased their share of the American rail market with iron rail output having peaked in 1872.<sup>32</sup> Steel rails could last ten times longer than iron rails and so they became the mainstay of the railroads.

In September of 1870 the Tredegar ended the career of its postwar rail manufacture. The last rail shipment was sent out on September 10, 1870, and the rail mill was discontinued.<sup>33</sup> Thus rail manufacture at the works enjoyed a brief revival for nearly four years. No other railroad connected product, however, was terminated by the Tredegar during this ten-year period. In fact with the exception of nails, none of the rest of its regular product line was discontinued. Several other exceptions which were one shot production

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<sup>32</sup>Stephen L. Goodale, ed., Chronology of Iron and Steel (Pittsburgh: Pittsburgh Iron and Steel Foundries Company, 1920), pp. 167, 180.

<sup>33</sup>Tredegar Company Records, Tredegar Sales Book, January 1, 1868-December 18, 1871, Petersburg Railroad Company order for 52 rails on September 10, 1870, p. 351.

efforts will be described shortly, but they did not belong to the standard product line.<sup>34</sup>

Another important Tredegar product was the railroad chair. The Tredegar had manufactured chairs in the antebellum period and continued to produce them during the ten year period of this study. A chair secured a rail to the wooden tie. It had two slots on either side of it which conformed to the lower bulging configuration of the rail.<sup>35</sup> Since many different kinds of rails existed, chairs for each type of rail had to be made. That fact necessitated the stocking of a varied supply of rolls which could be installed in the rolling mill for each particular style of chair. The rolls could be removed, and another set would be placed on the roll train for the next order. Rails were identified by a three digit number or a brand name such as the "Pennsylvania," so corresponding chairs could be precisely matched. Chairs

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<sup>34</sup>The writer could find no reason stated by the company for the discontinuance of rail manufacture. However, it appears that Anderson realized the impact of steel rails and most likely due to financial matters he could not convert his plant to steel manufacture so rather than compete with iron rails he abandoned that endeavor.

<sup>35</sup>Dew, Ironmaker, ftn., p. 14. For a diagram of a chair please see Tredegar Letter Book, December 7, 1874-February 7, 1875, R. S. Archer to M. Stanton, Selma, Alabama, February 2, 1875.

were also used as joints for attaching rails to each other. However, that application of the chair was being phased out during the 1870's.

The Tredegar also installed a new chair mill in the Armory Rolling Mill in 1867 to complement its rail mill in that same structure. The firm invested \$75,000 in its new rail and chair mills in 1867.<sup>36</sup> A Welshman, David Eynon, proved to be very beneficial to Tredegar chair production. While serving as manager of the rail and chair mills he designed the grooved rolls for the two-high chair train and received a patent for them on September 24, 1867. His design included seven successive grooves for rolling a chair with its best feature being the fact that the lips of the chair, the parts that conformed to the sides of the lower part of the rail, did not bend or crack as happened in previous processes.<sup>37</sup> Eynon's other invention concerned a method of slotting the lips of a chair by implementing a hooked cutter which slotted the chair in one stroke. Previous to that a chisel

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<sup>36</sup>Tredegar Company Records, Tredegar Letter Book, December 9, 1867-March 21, 1868, Joseph R. Anderson to Nathaniel Thayer, [Boston] January 13, 1868.

<sup>37</sup>Tredegar Company Records, Tredegar Letters of Patents, Correspondence, Agreements, 1867-1941, U. S. Patent Office, Letters Patent No. 69,085, issued to David Eynon on September 24, 1867.

was used which took several strokes to slot the chair, and it also left a burr on the inside of the lip which had to be removed. Eynon's invention resulted in the burr being left on the outside of the chair which made the removal task easier. Eynon assigned both of his chair inventions to the Tredegar since that was the company policy concerning inventions by its employees.<sup>38</sup> The overall efficiency of the chair mill resulted in a production capacity of 500 or more chairs per day.<sup>39</sup>

The Tredegar spike held the most esteemed position in the company's product line. Although the railroad spike sizes varied, the Tredegar spike of  $5\frac{1}{2} \times 9/16$  inches was its most important and popular spike produced both before and after the Civil War. The  $5\frac{1}{2} \times 9/16$  inches was the standard spike used by most railroads in the United States. The company manufactured spike rods on its eight-inch train in the Tredegar Rolling Mill and finished them in the

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<sup>38</sup>Tredegar Company Records, Tredegar Letters of Patents, U. S. Patent Office, Letters Patent No. 69,786, issued to David Eynon on October 15, 1867.

<sup>39</sup>Tredegar Company Records, Tredegar Letter Book, May-July 5, 1867, Joseph R. Anderson to Capt. W. J. Ross, Memphis, July 2, 1867.

nearby spike factory where they were packed for shipment in wooden kegs.<sup>40</sup> The Tredegar had leased its two spike machines from a firm in Pittsburgh, but in 1868 it bought both of them for \$12,000 with the rights to use their patents and make any renewal without paying royalties.<sup>41</sup>

The innovative David Eynon also made a contribution to Tredegar spike manufacture. The spike machines used by the Tredegar were patented in 1861 by James H. Swett of Dilworth, Porter and Company of Pittsburgh. Eynon's essential improvement to the Swett machine consisted in cutting the spikes directly from the rolls without reheating the rods. Several elements were involved in his combination improvement such as a trough for guiding the rod to the spike machine and adjustable nippers and shears for cutting specific spike lengths. Eynon received a patent for his combination process in 1871 and assigned the rights to the Tredegar.<sup>42</sup>

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<sup>40</sup>Tredegar Company Records, Tredegar Letter Book, May 25-August 10, 1870, J. F. Tanner to James McDavid, Philadelphia, June 13, 1870.

<sup>41</sup>Tredegar Company Records, Tredegar Letter Book, March 23-May 2, 1868, Joseph R. Anderson to Porter, Rolfe, and Swett, Pittsburgh, April 15, 1868.

<sup>42</sup>Tredegar Company Records, Tredegar Letter Book, August 27-November 17, 1869, Joseph R. Anderson to Messrs. Howson, Patent Agents, Philadelphia, October 6, 1869. Tredegar Letters of Patents,

However, the improved spike machine patent was not granted to Eynon and the Tredegar without difficulty. James H. Swett, the inventor of the original machine, claimed that he had also made the same type of improvements for his company, Dilworth, Porter of Pittsburgh. Anderson proposed to withdraw Eynon's application and permit Swett to apply for it with the understanding that each party would have unrestricted use of it and not let other parties use the patent without paying the proper royalties.<sup>43</sup> However, the patent was issued to Eynon, and Howson, the Philadelphia patent agent, implied that Swett would have had difficulty obtaining the patent since other parties were also beginning to make claims for the same patent.<sup>44</sup> Thus both companies benefited as the Tredegar received the patent but allowed Dilworth, Porter and Company unrestricted use of it.

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U. S. Patent Office, Letters Patent No. 110,756, issued to David Eynon on January 3, 1871.

<sup>43</sup>Tredegar Company Records, Tredegar Letter Book, August-November 9, 1870, Joseph R. Anderson to James H. Swett, Pittsburgh, September 27, 1870.

<sup>44</sup>Tredegar Company Records, Tredegar Letter Book, August-November 9, 1870, Joseph R. Anderson to A. B. Stoughton, Solicitor of Patents, New York, November 7, 1870.

In the midst of the patent controversy Eynon left the Tredegar in October 1870. He went to St. Louis with the hope of resuming his iron career in that section of the country.<sup>45</sup> The Tredegar lost a valuable employee with his departure, but his contributions were still felt. For example, the firm was making approximately 2,800 kegs of spikes per week in 1871. The spike output had also been helped by the construction of a third Swett spike machine in 1869.<sup>46</sup> Anderson exuded pride whenever he mentioned the Tredegar spike. He claimed that in the history of American manufactures the consistent superior quality of the Tredegar spike could not be matched by any other product.<sup>47</sup>

Another aspect of the railroad fastenings output was the manufacture of fishbars, bolts and nuts. Fishbars were bars that joined two rails together.

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<sup>45</sup>Tredegar Company Records, Tredegar Letter Book, August–November 9, 1870, Joseph R. Anderson to D. Eynon, Richmond, October 24, 1870. Tredegar Letter Book, November 1870–February 1871, Joseph R. Anderson to David Eynon, St. Louis, February 1, 1871.

<sup>46</sup>Tredegar Company Records, Tredegar Letter Book, November 1, 1871–April 6, 1872, Joseph R. Anderson to [E. A.] Wickes, New York, November 15, 1871. Minutes, p. 35.

<sup>47</sup>Tredegar Company Records, Tredegar Letter Book, February–May 1870, Joseph R. Anderson to Gest and Atkinson, Cincinnati, May 14, 1870.



They were attached in pairs on both sides of the thinner or middle part of the rail. A fishbar usually had one or two holes punched in both ends of it which matched the holes punched in the adjoining rails. Bolts were used to make the fishbar joint secure. During this ten year period fishbars were gradually being used more than chairs for rail joints. Tredegar chair production steadily decreased while its fishbar production increased. For example, in 1868 4,113,601 pounds of chairs and 1,071,369 pounds of fishbars were produced while the figures for 1875 reveal 560,035 pounds of chairs and 4,835,844 pounds of fishbars.<sup>48</sup> In summary railroad fastenings represented a huge volume of accessories. A Tredegar estimate for ten miles of railroad included 400 kegs of spikes (about 250 spikes per keg), 9000 fishbars (4500 pairs), and 18000 bolts (about 200 bolts per keg).<sup>49</sup> Although these fastenings were all made of iron they were well adapted for use with steel rails. The Tredegar's huge volume of railroad fastenings helped to offset the discontinuance of its iron rail manufacture.

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<sup>48</sup>Tredegar Company Records, Tredegar Sales Book, January 1, 1868-December 31, 1871, p. 135. Tredegar Sales Book, September 1875-January 1876, p. 83.

<sup>49</sup>Tredegar Company Records, Tredegar Letter Book, August 23-October 30, 1871, Archer Anderson to Col. J. C. Winder, Wilmington, North Carolina, August 25, 1871.

Continuing with the Tredegar's rail industry output is a description of its cast iron wheels. The Tredegar wheel was primarily directed towards rolling stock as opposed to locomotive wheels. The most commonly produced wheel sizes manufactured by the company included 20", 24", 26", 28", 30", and 33" diameter wheels. The 30" and 33" wheel represented the top of the line as those were the standard sizes used for rolling stock.<sup>50</sup>

The Tredegar wheel remained essentially the same during this period. The main ingredient of the wheel was cold blast charcoal iron which was best exemplified by the pig iron produced at the rebuilt Grace Furnace in the early 1870's.<sup>51</sup> The wheels were given added strength by chilling. In other words, after being heated the iron was poured into cold iron wheel molds and allowed to cool. The process imparted a strong outer hardness to the wheel. The Tredegar specified a cooling period of about ten days, and in

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<sup>50</sup>Tredegar Company Records, Tredegar Sales Book, January 12, 1865-December 31, 1872, Car wheel summary for 1872, p. 783. Tredegar Letter Book, August 12, 1874-August 13, 1875, F. T. Glasgow to Perkins, Livingston, Post and Co., New York, April 5, [1875].

<sup>51</sup>Tredegar Company Records, Tredegar Letter Book, August 12, 1874-August 13, 1875, Archer Anderson to [New York Office], March 27, 1875.

1869 guaranteed their finished wheels for 45,000 miles. By 1875 the guarantee was increased to 60,000 miles.<sup>52</sup>

In the second half of 1872 the company experimented with a new wheel manufacturing process. This involved the so called steel process or Hamilton process named after its inventor, William G. Hamilton. Bessemer steel, bought by the Tredegar, was mixed with pig iron to produce a "steel wheel."<sup>53</sup> The Tredegar achieved satisfactory results with the Hamilton process, but the product did not measure up to the charcoal iron wheel which the company had been producing. It did not have the uniform chilling quality which the charcoal iron wheel exhibited so the Tredegar resumed its charcoal iron wheel production in 1873.<sup>54</sup> The "steel process" was the only case when the Tredegar

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<sup>52</sup>Tredegar Company Records, Tredegar Letter Book, December 7, 1874-February 7, 1875, Archer Anderson to Thomas W. Godwin and Co., Norfolk, January 7, 1875. Tredegar Letter Book, January-May 1869, F. T. Glasgow to Col. E. T. D. Meyers, (n.p.), April 1, 1869. Tredegar Letter Book, July 6-August 23, 1875, J. R. Anderson to Perkins, Livingston, Post and Co., New York, August 11, 1875.

<sup>53</sup>Tredegar Company Records, Tredegar Letter Book, December 2, 1872-February 17, 1873, Joseph R. Anderson to W. G. Hamilton, New York, December 7, 1872.

<sup>54</sup>Tredegar Company Records, Tredegar Letter Book, November 1, 1873-February 6, 1874, F. T. Glasgow to S. S. Solomons, Charleston, South Carolina, December 27, 1873.

experimented with steel during this period, even though it did not make the steel.

The railroad market also provided the Tredegar with one of its few outlets for structural iron. In fact railroad bridge iron appears to be the only structural iron in which the Tredegar produced on a large scale during this period. The company made irons for Finks, Bollmans and Howe Truss bridges.<sup>55</sup> All three of these bridge designs were originally known as composite structures in the pre-Civil War era. They combined wood and iron in their fabrication with wood being used for compression and iron for tension. The tension of the iron could be adjusted on these bridges as wear demanded.<sup>56</sup> Later on an all iron format for these bridges was introduced. Of the three designs the Howe Truss was more popular in the South than in other sections of the United States.<sup>57</sup> The Tredegar primarily manufactured Howe Truss bridges.

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<sup>55</sup>Henry V. Poor, Manual of the Railroads of the United States, 1869-1870 (New York: H. V. and H. W. Poor, 1869), Tredegar advertisement in front of this volume, no pagination.

<sup>56</sup>David Plowden, Bridges, the Spans of North America (New York: The Viking Press, 1974), pp. 38, 63-64.

<sup>57</sup>Llewellyn N. Edwards, A Record of History and Evolution of Early American Bridges (Orono, Maine: University Press, 1959), p. 109.

The Tredegar also manufactured railroad rolling stock in its car shops. This enterprise constituted a new division for the company and was gradually expanded. It appears that the first boxcar order filled by the firm occurred in January 1866.<sup>58</sup>

The company made and sold separately trucks, sometimes called car irons. A truck included four wheels, two axles, springs, and the frame in which they were mounted and on which the car itself would be attached. Two trucks were used per car. The Tredegar produced charcoal rolled axles for all of its trucks as it felt that they were better than hammered axles. With the exception of springs which were ordered from northern concerns, the Tredegar manufactured all the materials used in its trucks.<sup>59</sup> The same applied to its cars with the main exceptions being the raw materials lumber, paint and tin.

In 1875 the Tredegar faced a problem concerning its truck manufacture. Most of the trucks made by the

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<sup>58</sup>Tredegar Company Records, Tredegar Letter Book, January-March 13, 1866, J. R. Anderson and Company to O. M. Avery, Pensacola, January 22, 1866.

<sup>59</sup>Tredegar Company Records, Tredegar Letter Book, May 9-July 31, 1874, Joseph R. Anderson to R. H. Havener, Alexandria, July 9, 1874. Tredegar Letter Book, August 23-October 30, 1871, F. T. Glasgow to Union Car Spring Company, New York, October 18, 1871.

company were custom made according to the specifications of individual railroads. In filling a truck order for the Chicago and Northwestern Railroad, the Tredegar soon found itself to be the defendant in a patent infringement claim. C. F. Allen of Aurora, Illinois claimed that the Tredegar built trucks for the Chicago and Northwestern violated his patent while the Tredegar in turn appealed to the railroad saying that it had assumed the railroad had all the rights to the truck.<sup>60</sup> However, the Tredegar's fears were quieted as Allen's claim against some other western roads had been rejected, and the Western Railroad Association stated that Allen's claim was invalid.<sup>61</sup> This patent controversy appears to be the only time in this era that a Tredegar product became involved in litigation with the exception of the previously mentioned patent dispute which involved improvements to the spike machines.

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<sup>60</sup>Tredegar Company Records, Tredegar Letter Book, November 4-December 6, 1875, F. T. Glasgow to B. C. Cook, Attorney for Chicago and Northwestern Railroad, Chicago, November 24, 1875.

<sup>61</sup>Tredegar Company Records, Tredegar Letter Book, November 4-December 6, 1875, F. T. Glasgow to W. B. Mathews, Richmond, November 27, 1875. Tredegar Letter Book, November 15-November 30, 1875, (Incoming), George Payson, Attorney Western Railroad Association, (n.p.), to B. C. Cook, Chicago, November 18, 1875.

The firm made several types of cars for the railroad industry including boxcars, flatcars, gondolas, coalcars, cattlecars and construction cars. Construction cars and cattlecars represented the bottom of the line whereas the other four types constituted the bulk of the company's freight car business with the boxcar being the biggest seller.<sup>62</sup> The typical Tredegar boxcar was thirty feet long and eight feet eight inches wide, with a tin roof, and rubber or steel springs; the whole body being mounted on Tredegar trucks. The gondola car was equipped with sides and drop bottoms and was twenty-eight feet long and 8½ feet wide.<sup>63</sup> Flatcars and coalcars were manufactured in eight wheel and four wheel styles. The construction car had a length of fourteen feet and a width of eight feet. The Tredegar did not make passenger cars because it did not have the facilities for rolling thin sheet iron.<sup>64</sup>

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<sup>62</sup>Tredegar Company Records, Tredegar Sales Book, January 12, 1865-December 31, 1872, Car Production for 1872, p. 783. Tredegar Sales Book, January 1873-January 13, 1876, Car Production for 1873, p. 116.

<sup>63</sup>Tredegar Company Records, Tredegar Letter Book, November 1870-February 1871, F. T. Glasgow's Boxcar Specification Memo, December 22, 1870. Tredegar Letter Book, May 29-July 30, 1873, F. T. Glasgow to John S. Barbour, Alexandria, June 19, 1873.

<sup>64</sup>Tredegar Company Records, Tredegar Letter Book, August 21-October 25, 1875, F. T. Glasgow to Bigelow and Johnson, New York, September 25, 1875. Tredegar Letter Book, May 30-July 31, 1872, F. T. Glasgow to John T. Shanks, (n.p.), June 15, 1872.

In 1872 the company, confident in the success of its freight car line, expanded its plant by building a new car shop. The structure contained two stories and was built of brick with a slate roof. It had dimension of 235x125 feet.<sup>65</sup> The car shop represented a strong division of the Tredegar with peak production occurring in 1871, 1872 and 1873 with 862, 992, and 869 cars respectively.<sup>66</sup>

In the early 1870's the Tredegar expanded its product even further by producing horseshoes and muleshoes. The company again had the good fortune of having an innovative person, John H. Snyder serving as head of the Rolling Mill Department, to help in its

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<sup>65</sup>Tredegar Company Records, Tredegar Letter Book, September 27-December 2, 1872, F. T. Glasgow to Pancoast and Maule, Philadelphia, October 29, 1872.

<sup>66</sup>Tredegar Company Records, Tredegar Sales Book, January 12, 1865-December 31, 1872, Compilation of car production for 1871. Tredegar Sales Book, January 12, 1865-December 31, 1872, Car production for 1872, p. 783. Tredegar Sales Book, January 1873-January 13, 1876, Car production for 1873, p. 116.

Note in relation to Tredegar postwar car production the annual production of freight cars is frequently reported as 2,000 by many sources. For example, please see p. 255 of The South During Reconstruction, 1865-1877 by E. Merton Coulter. As can be seen from the Tredegar Sales Books the peak annual production only reached about half the 2,000 figure. The misinterpretation stems from a Tredegar memo of May 11, 1872 (Tredegar Letter Book, March 18-May 13, 1872) which states an annual capacity of 2,000 freight cars.



horseshoe endeavor. . . As early as 1871 the firm approved of the horseshoe machine, invented and patented by Synder, and soon constructed a horseshoe factory. After a trial period for Snyder's machine a horseshoe mill was constructed, and Tredegar shoes entered the market in 1873.<sup>67</sup> However, the horseshoe machine had to be constantly repaired, and in its first year of production it did not operate for two and a half months because of a breakdown. Despite that setback the company had another horseshoe machine made in 1874, and kegs of horseshoes and muleshoes continued to be shipped out by the Tredegar as the quality reputation of the shoes increased.<sup>68</sup>

The Tredegar also catered to a strong commercial segment besides railroads in its regular product line. Its machinery shop produced portable and stationary engines complete with boilers ranging from 20 to 120 horsepower models. For example, the firm made complete saw mill engines although it did not make the actual

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<sup>67</sup>Tredegar Company Records, Tredegar Letter Book, May 2-July 19, 1871, Joseph R. Anderson to J. H. Snyder, Richmond, May 12, 1871. Horseshoe and Rolling Mill Sales Book, June 2, 1873-August 31, 1875, p. 116.

<sup>68</sup>Tredegar Company Records, Tredegar Letter Book, July-October 1873, R. S. Archer to J. H. Snyder, Richmond, August 16, 1873. Tredegar Letter Book, February 1-May 8, 1874, F. T. Glasgow to J. H. Snyder, Richmond, February 20, 1874.

circular saw.<sup>69</sup> Cast iron pipe was produced for gas and water mains. Nails were manufactured until 1869, but by 1870 the Tredegar was referring nail orders to the Old Dominion Iron and Nail Works on nearby Belle Isle in the James River.<sup>70</sup> In the Tredegar Rolling Mill bar iron was rolled on its merchant iron mill. Also variations of bar iron such as angles, flats, channels and other shapes were manufactured.<sup>71</sup> Agricultural implements represented the only conspicuous absence in the company's product line. The firm did not express an interest in agricultural equipment.

Several other miscellaneous items in the postwar Tredegar product inventory deserve mention. Only once during this period did the company return to ordnance production. In 1868 the firm produced a twelve pound Dahlgren gun for the Maryland Oyster Police Force.<sup>72</sup>

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<sup>69</sup>The Richmond Whig, May 31, 1867. Tredegar Company Records, Tredegar Letter Book, August 27–November 12, 1869, Archer Anderson to Henry Dishan and Son, Philadelphia, October 21, 1869.

<sup>70</sup>Tredegar Company Records, Tredegar Letter Book, January–May 1869, Archer Anderson to J. P. Minetree, Petersburg, March 9, 1869. Tredegar Letter Book, August–November 9, 1870, Archer Anderson to George A. Peck, Wilmington, North Carolina, October 7, 1870.

<sup>71</sup>Tredegar Company Records, Tredegar Letter Book, January–May 1869, Archer Anderson Memorandum, March 18, 1869.

<sup>72</sup>Tredegar Company Records, Tredegar Letter Book, June 26–October 10, 1868, F. T. Glasgow to Capt. Hunter Davidson, Cambridge, Maryland, September 3, 1868.

The company also produced frogs and switches for the railroad market. Frogs were used when rails intersected and allowed the wheels on one track to cross the intersecting rail. The firm had made switches as early as 1868 and continued to make them even after it discontinued its rail production. In 1875 it arranged to manufacture the patented switch of R. A. Rash of Petersburg and acquired half the rights of the patent.<sup>73</sup> One of the more ambitious projects of the Tredegar involved the construction of a cotton press used for processing cotton bales. It was made for the Compressing Company of New York City in 1875. The press and attachments weighed approximately sixty tons with the bedplate casting alone weighing twenty tons. A steam engine and boiler were also included with the cotton press machine.<sup>74</sup>

Two other important items made by the Tredegar in this period included the construction of three boats for the State of Virginia and the manufacture of a

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<sup>73</sup>Tredegar Company Records, Tredegar Letter Book, June 26-October 10, 1868, F. T. Glasgow to R. C. McCalla, Morristown, Tennessee, July 22, 1868. Tredegar Letter Book, December 7, 1874-February 7, 1875, Tredegar Agreement with R. A. Rash of Petersburg, Virginia, February 18, 1875.

<sup>74</sup>Tredegar Company Records, Tredegar Letter Book, October 5-November 4, 1875, F. T. Glasgow to Col. E. T. D. Meyers, General Superintendent, R. F. and P. R. R. (n.p.), October 14, 1875.

locomotive for its own use. Besides fabricating the armor plate for the Merrimac during the Civil War, the Tredegar had also been involved in shipbuilding during the antebellum era. It made the revenue cutter, Polk, for the U. S. Navy and also furnished the boilers and propulsion machinery for the frigates, Roanoke and Colorado. In 1867 the contract for the three Virginia boats originally called for the Tredegar to provide plates and propulsion machinery while William A. Graves of Norfolk would make the hull and all necessary equipment.<sup>75</sup>

F. T. Glasgow notified the State Auditor, William F. Taylor, that the Tredegar could make the three boats for \$19,600. The proposed boats had a length of sixty feet and a beam of twelve feet and were to be used for patrol duty.<sup>76</sup> The original Tredegar estimate proved to be too low as the final cost for the three boats totaled \$25,000. The boats successfully entered service in early 1868, however, Glasgow was disappointed

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<sup>75</sup>Tredegar Company Records, Tredegar Contract Book, February 5, 1867-June 23, 1868, Contract of William A. Graves and F. T. Glasgow, May 30, 1867.

<sup>76</sup>Tredegar Company Records, Tredegar Letter Book, May-July 5, 1867, F. T. Glasgow to William F. Taylor, Auditor, Richmond, May 27, 1867. Tredegar Letter Book, March 4-May 18, 1867, F. T. Glasgow to William A. Graves, Norfolk, May 11, 1867.

at losing money on the contract.<sup>77</sup> The three boats represented the firm's only endeavor in complete boat construction during this period although it still made propulsion machinery. For example, in 1871 it provided the propulsion machinery for a boat for the Virginia Steamship and Packet Company of Richmond and also the propulsion machinery for a gunboat for the State of New York.<sup>78</sup>

In 1872 the Tredegar embarked upon the manufacture of a single locomotive. The firm had made over forty locomotives prior to the Civil War but had not made any since that time.<sup>79</sup> In a joint effort with M. Baird and Company of Philadelphia, the successors to the Baldwin Locomotive Works, the Tredegar commenced building a locomotive. The engine was a small switching

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<sup>77</sup>Tredegar Company Records, Tredegar Letter Book, October 28-December 7, 1867, F. T. Glasgow to William F. Taylor, Auditor, Richmond, November 9, 1867. Tredegar Letter Book, December 9, 1867-March 21, 1868, F. T. Glasgow to W. H. C. Lovitt, Inspector, Norfolk, February 12, 1868.

<sup>78</sup>Tredegar Company Records, Tredegar Contract Book, April 1870-October 1880, Contract of Joseph R. Anderson and David J. Burr, President Virginia Steamship and Packet Company, May 1871. Tredegar Letter Book, February-May 1871, Joseph R. Anderson to George H. Reynolds, New York, March 20, 1871.

<sup>79</sup>Walter S. Grant, "Joseph Reid Anderson," Dictionary of American Biography, Vol. I, p. 268.

engine known as an 11x16 because of its cylinder size. M. Baird and Company designed the engine and forwarded the plans to Richmond. Most of the parts were made by M. Baird and Company and other northern concerns with the Tredegar also making some castings and being responsible for the complete assembly of the engine.<sup>80</sup>

The locomotive was running by early 1873 and was named the Tredegar.<sup>81</sup> It was used primarily for moving rolling stock in the Tredegar yards on the Tredegar railway system. It did not signify a large scale return by the Tredegar to the locomotive market. However, it remains a fact that the company did make one locomotive after the war. Joseph R. Anderson did not think it was practical to return to locomotive manufacturing even though the Tredegar engine proved to be a success. He expressed satisfaction with his product line as it was.<sup>82</sup>

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<sup>80</sup>Tredegar Company Records, Tredegar Sales Book, January 12, 1865-December 31, 1872, Parts List for the Tredegar Locomotive, p. 778.

<sup>81</sup>Tredegar Company Records, Tredegar Letter Book, March 26-May 28, 1873, F. T. Glasgow to Col. E. T. D. Meyers, General Superintendent, R. F. and P. R. R. (n.p.), April 19, 1873. Tredegar Sales Book, January 1873-January 13, 1876, p. 31.

<sup>82</sup>Tredegar Company Records, Tredegar Letter Book, September 27-December 2, 1872, Joseph R. Anderson to General Mansfield Lovell, New York, November 18, 1872.

The company exhibited a very strong railroad product and also a varied product line for other customers during the postwar period. Expansion represented the general trend of the company until the end of 1873. The firm contained three rolling mills by that time. The new rolling mill was constructed in 1868 on a site in the upper yard adjacent to the Tredegar Rolling Mill at a cost of nearly \$25,000.<sup>83</sup> The three rolling mills together had twenty heating furnaces and twenty-five puddling furnaces, five trains of finishing rolls, and one three-high forge train. The rolling mills had an estimated yearly capacity of 30,000 tons of finished iron. The three foundry shops, including the car wheel foundry, had an estimated capacity of 20,000 tons of castings. The whole plant covered an area of a little over fifteen acres and also included various machine shops, a company store and a general office building.<sup>84</sup> As of 1872 the Tredegar stated that the actual production was about five times the prewar production.<sup>85</sup> Although the bulk of its product was consumed by the railroad

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<sup>83</sup>Tredegar Company Records, Minutes, p. 31.

<sup>84</sup>Richmond City Directory, 1873-74 (Richmond: B. W. Gillis Publisher, 1873), pp. xi-xii.

<sup>85</sup>Tredegar Company Records, Tredegar Letter Book, March 18-May 13, 1872, Tredegar Memorandum, May 11, 1872.

industry, this corresponded to national standards as almost half of the iron market in the country in the early 1870's was utilized by the railroad industry.<sup>86</sup>

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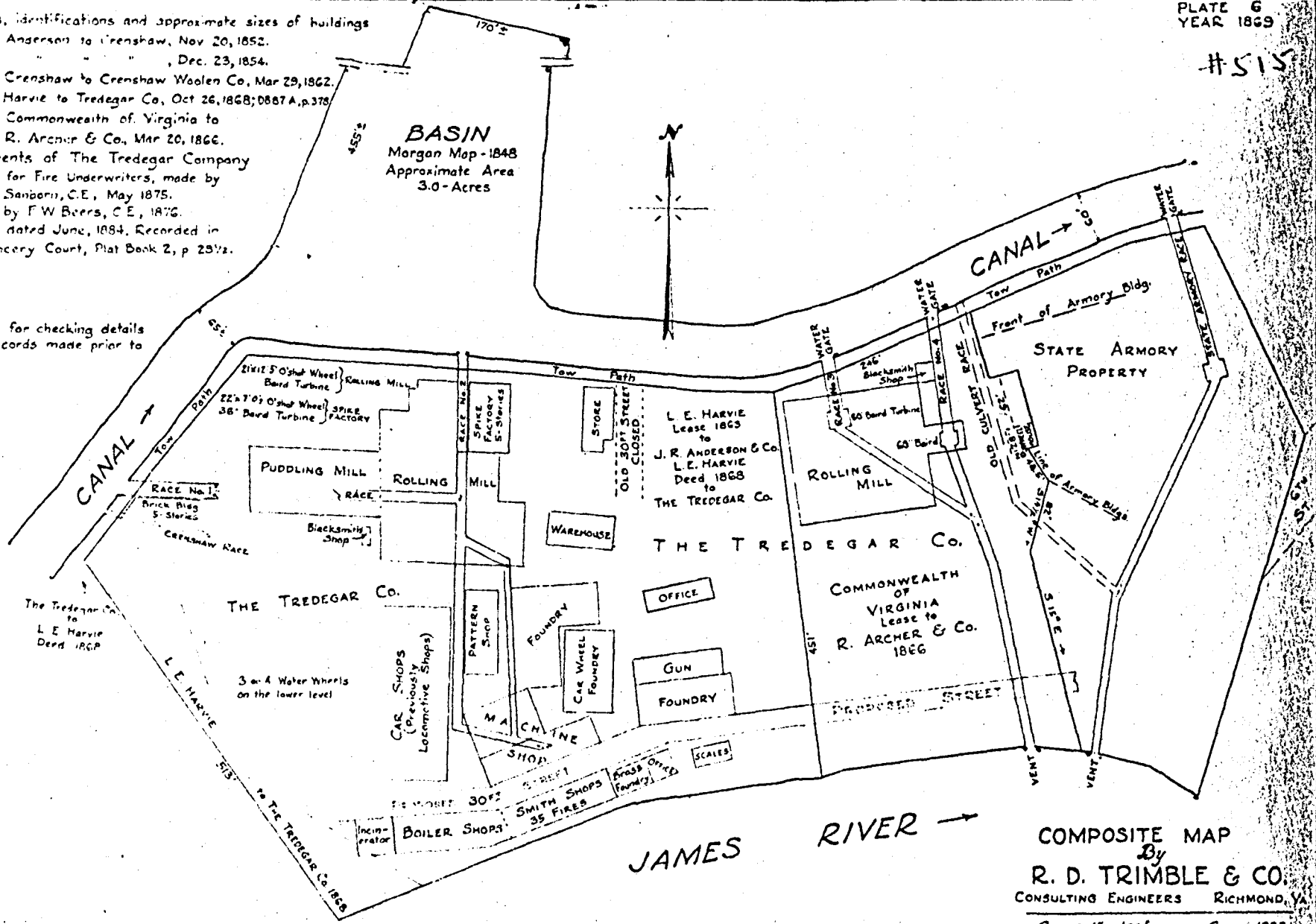
<sup>86</sup>Victor S. Clark, History of Manufactures in the United States, 3 vols. (New York: McGraw-Hill Company, 1929), 2, p. 89.



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- Locations, identifications and approximate sizes of buildings
- Deed - Anderson to Crenshaw, Nov 20, 1852.
  - Dec. 23, 1854.
  - Crenshaw to Crenshaw Woolen Co, Mar 29, 1862.
  - Harvie to Tredegar Co, Oct 26, 1868; D867 A, p.378
  - Lease - Commonwealth of Virginia to R. Archer & Co, Mar 20, 1866.
  - Documents of The Tredegar Company
  - \* Map for Fire Underwriters, made by D. A. Sanborn, C.E, May 1875.
  - \* Map by F.W. Beers, C.E, 1876.
  - \* Plat dated June, 1884. Recorded in Chancery Court, Plat Book 2, p 29 1/2.

\* Used for checking details in records made prior to 1869.



COMPOSITE MAP  
By  
R. D. TRIMBLE & CO.  
CONSULTING ENGINEERS RICHMOND, VA.  
SCALE 1" = 100' SEPT. 1933

## CHAPTER IV

### THE TREDEGAR WORKER AND HIS ENVIRONMENT

The working environment of the Tredegar laborer revealed a good rapport between labor and management. Joseph R. Anderson was firm and also considerate in his relations with his employees. Some of his efforts and that of the Board of Directors contributed directly to the employees' welfare. Soon after the company was reorganized in 1867 the Board appointed Dr. D. S. Watson, Anderson's son-in-law and also a company shareholder, as the company surgeon and physician. In order to keep a doctor on the payroll full time, the company made a one percent assessment on its employees' salaries which also helped in defraying costs for medical supplies.<sup>1</sup> Personal security for the workers and the plant also entailed some extra effort by the management. By 1869 a gate watchman was hired to prevent any undesirable persons from entering the Tredegar plant. Thus only Tredegar employees could actually enter the property.

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<sup>1</sup>Tredegar Company Records, Minutes, p. 24.

Other individuals could enter if they had a pass signed by the manager or a member of the Board. The watchman had the authority to examine all packages carried though the gate. The use of a watchman also served to hinder any stealing by employees and helped to dissuade the vandalism of the local youth gang from Oregon Hill.<sup>2</sup>

A company store was reorganized and opened for the workers in 1868. It was located adjacent to the canal which at that time ran behind the Tredegar plant. The store offered a wide variety of goods which catered to the employees' needs. Its organization resembled a general store as it sold clothing, hardware, drug products, and some food items such as cheese, flour, coffee, and sugar.<sup>3</sup> The store was run on a profit basis with 20 percent of the profits being assigned to the storekeeper in lieu of a salary. The storekeeper also maintained his living quarters in the store.<sup>4</sup>

The Tredegar work week was organized on a shift basis. Acutally a shift at that time was popularly

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<sup>2</sup>Tredegar Company Records, Tredegar Letter Book, August 27-November 12, 1869, Notice of J. R. Anderson, President, October 14, 1869. Tredegar Letter Book, August 23-October 30, 1871, F. T. Glasgow to Major John Poe, Jr., Chief of Police, [Richmond], September 4, 1871.

<sup>3</sup>Tredegar Company Records, Tredegar Company Store Books, 1868-1870, 6 vols.

<sup>4</sup>Tredegar Company Records, Minutes, pp. 32, 33.

called a turn, which lasted twelve hours. The firm operated on a round the clock system during the week. On Saturdays only the day shift worked, and on Sundays neither shift was in operation. The day turn usually had a full complement of men while the night crew sometimes operated with reduced manpower. As of 1871 the day and night shift rotation lasted for one week with the shifts then exchanging places. The day shift worked Monday through Saturday and assumed the night shift on the following Monday. The night shift functioned Monday through Friday nights and took over the day shift on the following Monday. The only exceptions to this schedule appeared to be the result of holidays or a low work demand which necessitated the cancellation of the night shift. The Tredegar worker thus had a good variety in his shift work.<sup>5</sup>

The number of workers actually employed by the Tredegar varied from about 700 to 1,000 men. In 1869 the firm had 700 hands as an average manpower total and stated that it could use 1,500 employees if the works were utilized to full capacity.<sup>6</sup> However, it appears

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<sup>5</sup>Tredegar Company Records, Units Produced, May 17, 1871-March 25, 1872. This whole volume was surveyed for the information in this paragraph.

<sup>6</sup>Tredegar Company Records, Tredegar Letter Book, January-May 1869, Memorandum, April 24, 1869.

that the 1,500 figure was not reached during the early 1870's. Employment had grown to about 1,000 men by 1872. By 1876 the Tredegar directly supported some 2,500 people, including workers and their dependents living mainly on nearby Oregon Hill.<sup>7</sup> The company was truly a vital cog in Richmond's economy.

A brief ethnic profile of the Tredegar worker reveals both black and white representation in the labor force. Black and white laborers worked in all branches of the plant, and many foreigners such as Welshmen and Irishmen were also represented in the Tredegar's personnel. Charles B. Dew has estimated that nearly 300 of the 650 workers at the Tredegar in 1870 were negroes.<sup>8</sup> Many of the foreign workers at the Tredegar were lured from the northeast United States by way of newspaper advertisements or by letters.

It appears that most of the white workers were not native Richmonders but were of European stock who had first settled in the North. European laborers had more experience than Richmond laborers in the iron industry and could adequately answer advertisements

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<sup>7</sup>Tredegar Company Records, Tredegar Letter Book, March 18-May 13, 1872. Minutes, p. 64.

<sup>8</sup>Tredegar Company Records, Tredegar Letter Book, July 5-September 10, 1867, J. F. Tanner to Samuel Hodgkins, Reading, Pennsylvania, September 3, 1867. Dew, Ironmaker, p. 314.

such as the ones Anderson placed in Philadelphia and Baltimore newspapers in 1867 for bar mill rollers and heaters which promised steady employment and good wages. The success of David Eynon, who had improved the Tredegar chair and spike machinery, proved beneficial in inducing more Welshmen to take up employment at the plant.<sup>9</sup>

In one rare case in 1867 the Tredegar attempted to override its northern labor source and deal directly with Europe via a Philadelphia agent in order to hire six puddlers and helpers. The company had offered to pay the steerage passage of the workers with the proviso that they would repay the Tredegar when they had earned enough money. However, that agreement was not consummated.<sup>10</sup> That episode represented the only time during this period that the Tredegar attempted to venture into the contract labor market.

In regard to work incentives and bonuses for the Tredegar worker no evidence appears that the common laborers were rewarded for good performance. However,

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<sup>9</sup>Tredegar Company Records, Tredegar Letter Book, July-September 7, 1866, J. R. Anderson and Company to The Philadelphia Ledger, September 17, 1866 and to The Baltimore Sun, September 17, 1866. Tredegar Letter Book, May-July 5, 1867, Joseph R. Anderson to Col. William M. Wadley, Savannah, May 31, 1867.

<sup>10</sup>Tredegar Company Records, Tredegar Letter Book, July 5-September 10, 1867, J. F. Tanner to Mr. Thomas Thomas, Philadelphia, September 5, 1867.

middle management positions such as David Eynon's were duly rewarded. In 1869 the Board acknowledged Eynon's contributions and bestowed upon him a \$500 bonus.

Several of the company officers including R. S. Archer, F. T. Glasgow, and Archer Anderson were awarded \$1000 each in 1871 "in recognition of faithful service."<sup>11</sup> However, no rank and file laborer was given a bonus.

A limited profit sharing plan was introduced in 1871 for the officers and five clerks or assistant officers in the company. It was limited because the common laborer was not entitled to its benefits. The plan consisted of a graduated scale based upon the percentage of net profits of the total capital stock. For example a 15 percent net profit would yield a 10 percent increase in salary, a 25 percent net profit would yield a 50 percent increase in salary, and a 35 percent net profit would yield a 100 percent increase in salary.<sup>12</sup> In retrospect this arrangement seemed unfair as the profit sharing did not extend across the board to all employees. A parallel to this slight of the rank and file laborer can also be seen in the company stock records where only the officers and such middle

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<sup>11</sup>Tredegear Company Records, Minutes, pp. 24, 42.

<sup>12</sup>Ibid, p. 48.

management personnel as David Eynon owned stock. In this way management exerted a strong control over labor since labor did not have a firm voice in the company's affairs.

Although labor did not have any participation in the control of company policy, the workers occasionally sought to improve their condition. On two occasions during this period labor directly challenged management, succeeding in one effort and failing in another. In June 1867 the puddlers struck for higher wages. They were being paid \$6.00 a ton for each ton of puddled iron that they produced, but they desired \$7.00 a ton, and Anderson presumed that they even wanted \$8.00 a ton. Anderson appealed to one of his iron suppliers in New York to stop shipment of iron since he could not give an estimate on the length of the strike.<sup>13</sup> Since the puddlers were the top ranking skilled laborers at the Tredegar and for that matter the most indispensable, a long strike would have had a serious effect on the plant's operation. Without puddled iron for the rolling mills or various foundries the plant would have been forced to a near standstill. In this case Anderson

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<sup>13</sup>Tredegar Company Records, Tredegar Letter Book, May-July 5, 1867, Joseph R. Anderson to Bussing Crocker and Co., New York, June 10, 1867.



acceded to the puddlers' demands and paid them at a rate of \$7.00 per ton. The strike lasted for approximately two weeks.<sup>14</sup>

The settlement of the strike marked a rare occasion when Anderson agreed to his employees' demands. It is noteworthy that Anderson did not attempt to hire strikebreakers to end the strike. However, he would have been forced to recruit in the north for new employees. That would have cost more delay so Anderson relented. Later that summer Anderson did inquire about obtaining several puddlers from Philadelphia, and he gave assurance that there was no strike at the Tredegar.<sup>15</sup> That implies that northern puddlers might have been reluctant to accept the strikebreaker role earlier in the summer if Anderson had approached them at that time.

In March of 1870 the second confrontation between labor and management occurred. The disagreement concerned the actions of the Moulders Society in relation to employment policies. The moulding craft dealt with

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<sup>14</sup>Tredegar Company Records, Tredegar Letter Book, May-July 5, 1867, R. S. Archer to David Eynon, [Richmond], June 20, 1867.

<sup>15</sup>Tredegar Company Records, Tredegar Letter Book, July 5-September 10, 1867, J. F. Tanner to Levy Rees, Philadelphia, August 26, 1867.

the preparation and maintenance of patterns or molds for iron castings. The society was a loosely structured union.

The main tenet of the society called for all the Tredegar moulders to belong to it. In March 1870 two moulders joined the Tredegar but did not enroll in the society. The society promptly commenced a walkout to protest that state of affairs. On March 14 the company responded with the argument that the company did not interfere with the society and that it did not expect the society to interfere in its affairs. It furthermore stated on March 15 that management policies would not be dictated by the society. It warned the society members that if they persisted in their course of action the company would not employ any of them. The company rules had preponderance in any situation in which the society rules conflicted with those of the company.<sup>16</sup> By March 23 both sides had relented with management stating that it would employ all the society workers with the admonition that they should not form any future combinations because they hurt both employees

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<sup>16</sup>Tredegar Company Records, Tredegar Letter Book, February-May 1870, F. T. Glasgow to Edward P. Vial, [Richmond], March 14, 1870. F. T. Glasgow to Edward P. Vial, [Richmond], March 15, 1870.

and employer.<sup>17</sup> The situation was resolved with management being the actual victor on that occasion as it thwarted what is today known as a closed shop.

The Tredegar thus maintained a firm attitude in regard to its workers. It only backed down on its attitude when its position became untenable as was the case in the puddlers' strike. Anderson exhibited a paternalistic feeling toward his workers, and they responded to his leadership. This included everyone from the common and skilled laborers who received \$1.00 and \$2.50 per day respectively to the previously mentioned puddlers.<sup>18</sup>

In regard to work safety during this period the Tredegar compiled a commendable record. Only one work related death detracted from the record, and management's rationalization of the cause of that death tended to reflect management's failure to recognize its responsibilities. On June 30, 1873 Samuel H. Saunders, fifty-three years old and the father of two children, was killed in a boiler explosion in the drying room adjoining the blacksmith shop at 6 a.m. Joseph R.

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<sup>17</sup>Tredegar Company Records, Tredegar Letter Book, February-May 1870, F. T. Glasgow to John Grotz, [Richmond], March 23, 1870.

<sup>18</sup>Richmond, Virginia, 1880 Industrial Census, Reel 214, p. 764. Virginia State Library.

Anderson ordered a full investigation into the matter and received a report from Charles Talbott and Charles Campbell, two individuals not employed by the Tredegar, on July 12, 1873.<sup>19</sup> The Talbott-Campbell Report claimed that the explosion was caused by a closed valve which should have been open. The report further stated that the boiler itself was in good condition, and the explosion occurred because of Saunder's neglect.<sup>20</sup>

The Tredegar was accused of neglect in the matter by a coroner's jury. Anderson in an open letter in the July 1, 1873 Richmond Whig responded that the jury verdict was not supported by the evidence, and that it went beyond the evidence. He further stated the point which was later formulated in the Talbott-Campbell Report that the "unfortunate victim" died through his own neglect. However, extenuating circumstances show that the Tredegar was not entirely blameless for the accident. First of all Saunders had been previously injured two months before his fatal accident in a fall in the car shop. He had only been working as a boiler

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<sup>19</sup>The Richmond Whig, July 1, 1873. Tredegar Company Records, Tredegar Letter Book, May 29-July 30, 1873, Joseph R. Anderson to E. R. Archer, Richmond, June 30, 1873.

<sup>20</sup>Tredegar Company Records, Tredegar Letter Book, May 29-July 30, 1873, Report of Charles Talbott and Charles Campbell, Richmond, July 12, 1873.

fireman for six weeks before his death. His new training as a fireman and the possible lingering effects of his previous injury impugn the validity of the Tredegar argument. The Tredegar should have accepted some or all of the blame for the accident since it appears that the company had not given proper training to the employee and did not verify if he had fully recovered from his previous injury.<sup>21</sup>

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<sup>21</sup>The Richmond Whig, July 1, 1873. Most of the information in this paragraph was obtained from The Whig account of the accident.

## CHAPTER V

### THE TREDEGAR MARKET

The Tredegar market may be examined in two areas: (1) the sources and procurement of raw materials, and (2) the marketing of the Tredegar's products. The primary raw materials upon which the Tredegar depended were pig iron, coal, and lumber. Although it was not classified as a raw material, scrap iron was another vital element essential to the Tredegar's final product. The Tredegar received most of its materials from within the state and from states in the eastern part of the country.

Pig iron sources in Virginia were found in the mountainous western area and included several of the previously mentioned blast furnaces owned by the Tredegar. The company also bought pig iron from such furnaces as Columbia and Elizabeth in Shenandoah County, and Amherst and Victoria in Amherst and Louisa Counties respectively.<sup>1</sup> All of those blast furnaces, as has been

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<sup>1</sup>Tredegar Company Records, Tredegar Letter Book, October 10, 1868-January 15, 1869, Joseph R. Anderson to Poole and Hunt, Baltimore, January 6, 1869. Tredegar Contract Book, April 1870-October 1880, R. S. Archer to John Wissler, Staunton, Virginia, February 23, 1872.

previously stated, produced charcoal smelted pig iron in the postwar period. Out of state sources for charcoal pig iron included Tennessee, North Carolina and Alabama.<sup>2</sup> Anthracite pig iron was obtained from areas north of Virginia such as Baltimore and Philadelphia.<sup>3</sup>

An abundant supply of bituminous coal was obtained from the Richmond area. As previously discussed the Dover Mines supplied the Tredegar with coal until they went out of business. The Tredegar also relied upon mines closer to Richmond for its coal needs. For example, the plant had been a steady customer of the Clover Hill Mines located approximately twelve miles from Richmond. With the opening of the Chesapeake and Ohio Railroad's line to West Virginia in the early 1870's, the Tredegar was afforded easy access to Kanawha Valley Coal.<sup>4</sup> Coal consumption at the plant reached nearly a hundred tons a day in 1872. In 1873 it was stated that the company used approximately

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<sup>2</sup>Richmond City Directory, 1873-74, p. xii.

<sup>3</sup>Tredegar Company Records, Tredegar Letter Book, March 4-May 18, 1867, Joseph R. Anderson to Hoffman, Thompson and Company, Baltimore, March 12, 1867. Joseph R. Anderson to Cabeen and Company, Philadelphia, March 25, 1867.

<sup>4</sup>Tredegar Company Records, Tredegar Letter Book, December 6, 1875-January 11, 1876, F. T. Glasgow to George J. Sampson, Agent Clover Hill Railroad Company, December 8, 1875. Richmond City Directory, 1873-74, p. xii.

30,000 tons of coal per year.<sup>5</sup> These figures represent a high point during the 1867-1873 expansion period.

Lumber for the company's car shops was almost exclusively obtained from North Carolina. In order to insure itself of a constant supply of lumber for its growing car shop division the company, in 1869, offered to build an engine and saw mill for \$3,000 for a North Carolina firm and would take payment for the mill in lumber. By 1870 the Tredegar had consummated three lumber-for-mills contracts in North Carolina and was actively soliciting more such arrangements.<sup>6</sup> The need for a steady supply of lumber arose because Anderson wanted to maintain a stable work force in the car shops rather than laying people off and recalling them according to the amount of lumber on hand at a particular time. As of 1872 the company had the capacity to utilize three to four million feet of lumber

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<sup>5</sup>Tredegar Company Records, Tredegar Letter Book, January 13-March 18, 1872, Joseph R. Anderson to Allan Campbell, New York, January 30, 1872. Tredegar Letter Book, December 2, 1872-February 17, 1873, Joseph R. Anderson to W. H. Edwards, Coalburg, West Virginia, February 3, 1873.

<sup>6</sup>Tredegar Company Records, Tredegar Letter Book, November 1869-February 1870, F. T. Glasgow to J. W. C. Ellington, Carey, North Carolina, December 16, 1869. Tredegar Letter Book, February-May 1870, F. T. Glasgow to W. A. Coleman, Kinston, North Carolina, March 9, 1870.



per year.<sup>7</sup> Anderson was simply seeking a uniform production rate for the car shops.

The firm used scrap iron to supplement its incoming pig iron supply. It was reheated and mixed with the puddled iron to form the finished product. The Tredegar sought scrap iron from practically all of its customers. A common practice employed by the company was to avoid cash purchases of scrap iron and to rely instead upon an exchange system. The Tredegar would offer a finished product such as bar iron, spikes, car wheels, etc., for a proportional value of scrap iron.<sup>8</sup> That tactic helped to keep the Tredegar name in constant circulation in the iron market, and it also reduced the cash outflow of the company. No specific geographic region of the United States predominated as the source for Tredegar scrap iron as was the case for its major raw materials. Scrap iron was obtained from up and down the east coast. In fact in 1868 the Tredegar received some of its scrap iron in

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<sup>7</sup>Tredegar Company Records, Tredegar Letter Book, August-November 9, 1870, F. T. Glasgow to J. C. Winder, Wilmington, North Carolina, September 22, 1870. Tredegar Letter Book, July 31-September 27, 1872, F. T. Glasgow to Col. R. R. Bridgers, Wilmington, North Carolina, September 16, 1872.

<sup>8</sup>Tredegar Company Records, Tredegar Letter Book, March 13-June 11, 1866, J. R. Anderson and Company to Capt. R. B. Pegram, [Petersburg], March 13, 1866.

the form of old rails from England. Arrangements for securing the old rails were made by J. K. Gilliat and Company of London, the firm which had previously served as Joseph R. Anderson's cotton broker.<sup>9</sup> It appears that the Tredegar would deal with any firm that had an appreciable amount of scrap iron.

In order to organize its selling market more efficiently the Tredegar made both managerial and physical improvements to promote its product. In the managerial sector the company implemented two important concepts. It opened a national office in New York City, and it made use of consignees or agents in other major cities. The firm established its New York office in January of 1868 for the expressed purpose of giving better service to its customers.<sup>10</sup> The advantages of the New York office were: it would give the Tredegar a closer communication with the pacesetting New York financial market, and it would also aid the company in keeping more fully aware of the national iron market. Another important aspect of the New York office was the fact that it enabled the Tredegar to have a more efficient

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<sup>9</sup>Tredegar Company Records, Tredegar Letter Book, April 4-November 2, 1868, J. R. Anderson and Company to J. K. Gilliat, Liverpool, August 27, 1868.

<sup>10</sup>Tredegar Company Records, Tredegar Letter Book, April 4-November 2, 1868, John F. Tanner to T. S. Williams, New Orleans, January 24, 1868.

means for importing scrap iron, usually old rails from Europe, than it would have had in Richmond since New York offered a closer communication with the world iron market.<sup>11</sup> Thus the firm did not have to deal with a middleman for its importation of scrap iron. John F. Tanner, the vice president, ran the office from 1868 until January of 1870 when he resigned from the company to go into partnership in a New York commission merchant firm, Tanner, Walker and McAnerny.<sup>12</sup> E. A. Wickes of New York City was then appointed head of the office. The New York office utilized the telegraph for communication with the Richmond home office and the Tredegar's customers.

In other cities the Tredegar relied upon consignees or agents to sell its product. The usual agency relationship with the Tredegar depended on several requirements to which the agency had to adhere. The agency had to agree to sell only Tredegar products in a particular line, for example just Tredegar spikes. The Tredegar did not want to foster any in-house competition within an agency as it felt the general

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<sup>11</sup>Tredegar Company Records, Tredegar Letter Book, May 2-July 19, 1871, Archer Anderson Granting Power of Attorney to E. A. Wickes, New York, May 8, 1871.

<sup>12</sup>Tredegar Company Records, Minutes, p. 38.

market provided enough competition. Monthly statements of sales were submitted to the Tredegar, and the agency was granted a 2½ percent commission on all sales whether the products were sold from the agent's store or sent directly from the Richmond plant. Prices were controlled by the Tredegar with the promise that it would meet the market competition. Agents were instructed not to tamper with regular Tredegar customers. For example, the Cincinnati agent, Post and Company, was told not to solicit spike orders from such established railroad customers as the Louisville and Nashville, the Nashville and Chattanooga, and the Chesapeake and Ohio. That tactic encouraged the agent to get out and sell the Tredegar product to new customers. Also agents were informed not to interfere with other agents' spheres of influence.<sup>13</sup> Thus the firm insured itself of a tightly controlled market. By 1876 the company had the following major agents: Crerar, Adams, and Company and Jones and [obliterated] Company in Chicago, Post and Company in Cincinnati, Breast, Gibson and Company in Nashville, and M. M. Buck

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<sup>13</sup>Tredegar Company Records, Tredegar Letter Book, May 29-July 30, 1873, Archer Anderson to Post and Company, Cincinnati, June 11, 1873. The major portion of this paragraph was obtained from this source.

and Company in St. Louis.<sup>14</sup> The lack of major agents in large Deep South cities is noteworthy. However, the Tredegar was so well established in the South that agents in that region would have been rather redundant.<sup>15</sup>

In the early 1870's the company undertook two physical improvements which gave it better access to the market. The first project was the construction of the Tredegar railroad bridge across the James River connecting the plant with Belle Isle. The second effort concerned the building of a branch rail line from the plant to the Richmond and Petersburg Railroad Depot on Eighth Street. Before those two lines were developed the Tredegar had no direct rail shipping links, so products had to be hauled to the rail depot or to the Richmond port, Rocketts.

The bridge concept represented a logical improvement of an existing situation. The Richmond and Danville Railroad at that time already had a railroad bridge from their yards on the south side of the James River to Belle Isle, the site of the Old Dominion Iron and

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<sup>14</sup>Tredegar Company Records, Tredegar Letter Book, January 18-February 26, 1876, Memorandum regarding Tredegar receivership, January 18, 1876.

<sup>15</sup>The Tredegar Sales Books from 1865-1876 (10 vols.) reflect a predominance of southern customers, many of whom had been Tredegar customers before the Civil War.

Nail Works Company. A railroad bridge from Belle Isle to the Tredegar on the north side of the James River would have enabled the Tredegar to have a direct rail shipping link to the south and southeast. The expansion of the Tredegar plant, especially its growing rolling stock division, necessitated the vital bridge link.

In 1870 the Tredegar offered to build the bridge for the Richmond and Danville Railroad with the understanding that the railroad would reimburse the Tredegar's efforts. After making the full payment to the Tredegar the railroad bridge would become the property of the railroad.<sup>16</sup> Several other stipulations were included in the proposal with all of them accruing to the Tredegar's benefit. The company desired the Richmond and Danville to ship coal from the Midlothian Mines at the rate of \$.50 per ton. It also sought a rate of \$.30 per ton on all iron and other materials coming into the Tredegar via Rocketts on the Manchester or south side of the James River. That rate also applied to products going from the Tredegar to Rocketts. Free use of the Richmond and Danville's wharf at Rocketts was an additional item. The final point in the

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<sup>16</sup>Tredegar Company Records, Joseph R. Anderson Private Letter Book, April 23, 1869-October 25, 1871, Joseph R. Anderson to Colonel A. S. Buford, President of the Richmond and Danville Railroad Company, Richmond, August 2, 1870.

Tredegar proposal concerned the means by which the railroad would reimburse the Tredegar. The shipping rate returns on coal, iron, and other incoming and outgoing rates for other materials hauled to and from the Tredegar by the Richmond and Danville Railroad would be remitted to the Tredegar until the bridge bonds including interest were paid off. In other words Tredegar freight charges would be applied as payment for the bridge.<sup>17</sup>

Archer Anderson estimated that the proposed bridge would save the company approximately \$10,000 per year, and that figure included maintenance and insurance for the structure.<sup>18</sup> However, another year passed before actual construction commenced. The Richmond and Danville endorsed the Tredegar plan, readily attesting to Joseph R. Anderson's statement to Colonel A. S. Buford in which he said: "Of one thing I am sure you are well aware--that every facility that encourages the enlargement of business in the city

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<sup>17</sup>Tredegar Company Records, Joseph R. Anderson Private Letter Book, April 23, 1869-October 25, 1871, Archer Anderson to J. F. Winslow, Poughkeepsie, New York, October 11, 1870. Joseph R. Anderson to Colonel A. S. Buford, President of the Richmond and Danville Railroad Company, Richmond, August 2, 1870.

<sup>18</sup>Tredegar Company Records, Joseph R. Anderson Private Letter Book, April 23, 1869-October 25, 1871, Archer Anderson to J. F. Winslow, Poughkeepsie, New York, October 11, 1870.

must enlarge your freights especially when the improvements connect the sites of business directly with your yard."<sup>19</sup> The main reason for the delay in building the bridge was in securing a right of way for the structure on the north bank of the James. The problem lay in the fact that the western portion of the Tredegar property consisted of low ground. The bridge length would have had to be increased, and some of the Tredegar buildings would have had to be removed. However, the owner of the adjoining land, Lewis B. Harvie, was reluctant to sell his land to Anderson.<sup>20</sup> In September of 1871 Lewis B. Harvey and his brother, John, finally relented and sold to the Tredegar Company their lot between the river and the canal which bordered the western boundary of the Tredegar. The main stipulation by the Harvies was that the Tredegar was to maintain a road through the property, and that the bridge would be high enough to let wagons pass under.<sup>21</sup>

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<sup>19</sup>Tredegar Company Records, Tredegar Letter Book, August-November 9, 1870, Joseph R. Anderson to Col. A. S. Buford, Richmond, September 23, 1870.

<sup>20</sup>Tredegar Company Records, Tredegar Letter Book, May 2-July 19, 1871, Joseph R. Anderson to L. E. Harvie, Richmond, May 23, 1871.

<sup>21</sup>Richmond City, Hustings Court, Deed Book 95B, Ms Volume, pp. 107-112. Deed of Lewis E. and John B. Harvie to the Tredegar Company, recorded September 15, 1871. Richmond City Courts Building.



The construction of the bridge commenced in the late summer of 1871. The bridge was planned by Colonel E. T. D. Myers, who also supervised its construction. He was a Richmond civil engineer, employed by the Richmond, Fredericksburg and Potomac Railroad. The bridge and its approaches was composed of 4,000 feet of railway track. That figure included 1,200 feet of trestle for the approaches while the actual bridge itself, patterned upon the Howe Truss design, was 1,375 feet long.<sup>22</sup> Granite blocks were used for the masonry foundation while wood and iron comprised the superstructure. The cost of the bridge and its approaches was approximately \$75,000.<sup>23</sup> The bridge officially opened on August 5, 1872 when the first train carrying a load of pig iron from Tennessee entered the Tredegar property.<sup>24</sup> The Tredegar thus had a direct rail link to the southern and southwestern markets.

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<sup>22</sup>Tredegar Company Records, Tredegar Contract Book, April 1870-October 1880, Edward T. D. Myers' Tredegar Bridge Estimate, September 27, 1870.

<sup>23</sup>Tredegar Company Records, Tredegar Letter Book, December 2, 1872-February 17, 1873, Joseph R. Anderson to Col. E. T. D. Myers, Richmond, January 25, 1873. Tredegar Letter Book, August-November 9, 1870, Joseph R. Anderson to John F. Winslow, Poughkeepsie, New York, September 29, 1870.

<sup>24</sup>Tredegar Company Records, Tredegar Letter Book, July 31-September 27, 1872, R. S. Archer to Henry Fink, Vice President, Louisville and Nashville Railroad, Louisville, August 6, 1872.

While plans for the Tredegar bridge were being implemented other plans for the Tredegar branch line were being carried out. The branch line would lead to the Richmond and Petersburg Railroad Depot on Eighth Street. Its main purpose was to give the Tredegar access to the northern market. The plant would also be afforded a direct rail connection with western markets via the Chesapeake and Ohio Railroad's intersection at Hanover Junction just north of Richmond. That would certainly be an aid to its car shop division. Before the bridge and branch line were completed the Tredegar rolling stock was hauled through the streets to the Richmond and Petersburg Depot.<sup>25</sup> That arduous task was made obsolete with the completion of the two Tredegar railroad connections.

As early as 1870 the Tredegar commenced making plans for a branch line connection to the Richmond and Petersburg Depot. Again one of the first problems was the securing of a right of way. The company desired to lay a track through the State Armory Property which bordered the Tredegar on its eastern boundary. On August 10, 1870 the State of Virginia agreed to lease

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<sup>25</sup>Tredegar Company Records, Tredegar Letter Book, November 1870-February 1871, Joseph R. Anderson to John W. Fleming and others, Richmond, February 1, 1871.

the Armory Property which at that time contained the ruined buildings of the armory. The main stipulation agreed to was that the tracks through the property would be removed on thirty days notice if it became necessary to do so.<sup>26</sup> The remaining portion of the route had to be acknowledged by the City Council. Permission was granted to allow the road to pass over Seventh Street via Overton Street to the Richmond and Petersburg Depot on Eighth Street.<sup>27</sup>

While securing a route through the city, the firm put forth its proposal for a branch line to the four railroads in the city which would be most affected by it: the Richmond, Fredericksburg, and Potomac, the Richmond and Danville, the Richmond and Petersburg, and the Petersburg Railroads. The Tredegar proposed that each of the roads contribute one fourth of the cost of furnishing and laying the track while the Tredegar secured the right of way. The Tredegar stated that it would advance the money, and that the roads could reimburse it by paying one half the freight

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<sup>26</sup>Tredegar Company Records, Tredegar Letter Book, March 18-May 13, 1872, Joseph R. Anderson to the Board of Public Works, (n.p.), April 25, 1872.

<sup>27</sup>Tredegar Company Records, Tredegar Letter Book, July 31-September 27, 1872, F. T. Glasgow to Thomas H. Wynne, President of the [Richmond City] Council, September 23, 1872.

earned on goods entering or leaving the plant. The company further stated that the roads would share in its lumber and coal hauling to the plant and its outgoing car and iron products shipping.<sup>28</sup> The share for each road amounted to \$1,500 while the total cost for the endeavor was approximately \$40,000.<sup>29</sup>

The proposals having been accepted construction commenced in the fall of 1872. The company again secured the services of Colonel E. T. D. Meyers to design and supervise the construction of the branch line. By late November of 1872 the line was completed, and the Tredegar had direct railroad access to the northern and northwestern markets.<sup>30</sup> The Tredegar had also provided half the cost for a siding at the Richmond and Petersburg Depot so its cars were hauled free of charge from the depot although at first the Richmond

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<sup>28</sup>Tredegar Company Records, Tredegar Letter Book, May 30-July 31, 1872, Memorandum regarding the branch line, (n.d.).

<sup>29</sup>Tredegar Company Records, Tredegar Contract Book, April 1870-October 1880, M. W. Yarrington, Treasurer, Richmond and Petersburg Railroad Company to Colonel Archer Anderson, Richmond, November 6, 1872. Tredegar Letter Book, December 2, 1872-February 17, 1873, F. T. Glasgow to Thomas H. Wynne, President, Richmond and Petersburg Railroad Company, [Richmond], January 14, 1873.

<sup>30</sup>Tredegar Company Records, Tredegar Letter Book, May 30-July 31, 1872, F. T. Glasgow to Col. E. T. D. Myers, Richmond, June 27, 1872. Tredegar Letter Book, September 27-December 2, 1872, F. T. Glasgow to James Barbour, President, Orange, Alexandria, and Manassas Railroad Company, Alexandria, November 30, 1872.

and Petersburg wanted to charge \$.25 per car for cars going to the north. However, the Tredegar persuaded them to withdraw that demand.<sup>31</sup> That minor controversy became a moot point when the Tredegar locomotive went into operation in early 1873.

With the completion of the two railroad lines in 1872 the Tredegar had a total of two miles of track in its yards.<sup>32</sup> This improvement coincided with its total plant expansion. In the midst of all this expansion a request to establish another plant in Rome, Georgia was turned down by the Tredegar.<sup>33</sup> The State Auditor was somewhat confused by the large scale expansion and wanted to also assess the Tredegar as a railroad company. However, the Tredegar quickly pointed out that the two railroad lines represented a capital investment in its manufacturing business.<sup>34</sup> Its railroad improvements greatly supplemented transportation in its markets.

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<sup>31</sup>Tredegar Company Records, Tredegar Letter Book, December 2, 1872-February 17, 1873, F. T. Glasgow to Thomas H. Wynne, President, Richmond and Petersburg Railroad Company, [Richmond], January 14, 1873.

<sup>32</sup>Richmond City Directory, 1873-74, pp. xiii, xiv. For an overall perspective of the Tredegar Railway System, please see the map at the end of this chapter.

<sup>33</sup>Tredegar Company Records, Tredegar Letter Book, July 31-September 27, 1872, F. T. Glasgow to C. G. Samuel, Rome, Georgia, August 27, 1872.

<sup>34</sup>Tredegar Company Records, Tredegar Letter Book, May 9-July 31, 1874, F. T. Glasgow to W. F. Taylor, Auditor, [Richmond], July 22, 1874.

A brief summary of the overall transportation outlets of the company can be described by regarding waterways and railroads. Immediately after the war the firm operated its canal boat fleet on the James River and Kanawha Canal. The boats primarily hauled pig iron from western Virginia to Richmond. On their outgoing trip they carried finished iron products. They also carried coal from some of the local mines such as Dover to the Tredegar. At that time the canal ran behind the plant, and the cargoes were transferred at the plant. A boat crew consisted of from four to five men. By 1867 the Tredegar fleet had become inoperative either through sales of the boats or their disrepair.<sup>35</sup> The company then relied on other canal shippers.

The Tredegar found itself in a fairly advantageous position for river and ocean transport. Situated at the head of tidewater on the James River, the company had access to ports on the East and Gulf Coasts. However, the plant was located by the James River Rapids which pass through Richmond. That obstacle prevented the Tredegar from having its own wharf as the James

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<sup>35</sup>Tredegar Company Records, Tredegar Petty Cash Book, June 1, 1866-January 31, 1868. This volume gives the operating disposition of the Tredegar boats during this period.

River was not navigable in that area. Before its railroad system was completed the company had its products hauled through the streets to Rocketts or to a specific railroad depot.

At Rocketts the company primarily employed two methods of hiring ships to carry its cargo. The first method consisted of negotiating with an independent captain for the use of his ship. This meant that a ship was contracted to the Tredegar for a specific time. For example, in 1867 the firm arranged a three-month contract with Captain Francis Jose for the use of his schooner on the Richmond to Savannah run.<sup>36</sup> The other method of shipping by water was to bestow an exclusive contract to a shipping line. In 1868 the company granted to the Old Dominion Steamship Company the exclusive right of carrying its goods to New York City.<sup>37</sup> It appears that the Tredegar made contracts for shipping to its established customers via regular shipping lines and used independent operators to ship to less frequent customers usually in remote areas.

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<sup>36</sup>Tredegar Company Records, Tredegar Contract Book, February 5, 1867-June 23, 1868, J. R. Anderson and Company and Capt. Francis Jose, May 14, 1867.

<sup>37</sup>Tredegar Company Records, Tredegar Contract Book, February 5, 1867-June 23, 1868, Tredegar Company and Old Dominion Steamship Company, April 6, 1868.

The Tredegar had an amiable relationship with its railroad shippers. Indeed the railroad industry was the firm's number one customer. Good rail links were available to such cities as Atlanta, Memphis, and New Orleans in the south, Chicago and St. Louis in the midwest, and Philadelphia and New York City in the northeast. The company's primary problem with the railroads concerned the freight rate issue. This was especially true of the recently rebuilt southern roads which tended to charge higher rates than the northern lines. The Tredegar sought to keep the rates low in order to lure distant customers to buy from it. It had to do that in order to meet the competition from northern iron companies which had the advantage of lower rail freight rates.<sup>38</sup> As early as 1866 Anderson was successful in obtaining a through rate from Richmond to Atlanta of 2½ cents per ton per mile.<sup>39</sup> This greatly aided the Tredegar's operations in the southern market as it established a working cooperation between the

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<sup>38</sup>Tredegar Company Records, Tredegar Letter Book, May-July 5, 1867, J. F. Tanner to E. M. Iver, Nashville, July 1, 1867. Tredegar Letter Book, March 3, 1869-January 15, 1870, J. F. Tanner to General William Mahone, Lynchburg, July 13, 1869.

<sup>39</sup>Tredegar Company Records, Tredegar Letter Book, September 22-November 19, 1866, J. R. Anderson and Company to Thomas Webb, Company Shops, North Carolina, October 13, 1866.



company and railroads which were both customers and shippers of the Tredegar. The Tredegar also cooperated with southern railroads by leasing rolling stock to them. For example, in 1874 a lease with the Carolina Central Railway ran for a year with the option of purchasing the cars at the end of the year.<sup>40</sup>

Thus transportation in the Tredegar market proved to be very conducive to trade. The company had good outlets to most of its customers. As of 1872 water and railway modes of transport in its market sustained the Tredegar's 150,000 tons of total annual shipments, a figure which included both incoming raw materials and outgoing finished products.<sup>41</sup> The destinations of its finished product provides a different perspective on the Tredegar's overall operations.

In 1872 the Tredegar market revealed the true dimensions of the company in its 1867-1873 boom period. At that time the Tredegar sold its products in every state in the Union.<sup>42</sup> That included all of the states

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<sup>40</sup>Tredegar Company Records, Tredegar Letter Book, May 9-July 31, 1874, Lease agreement between the Tredegar and the Carolina Central Railway, Wilmington, North Carolina, [1874].

<sup>41</sup>Tredegar Company Records, Tredegar Letter Book, May 30-July 31, 1872, Joseph R. Anderson to T. H. Wynne, Richmond, June 30, 1872.

<sup>42</sup>Tredegar Company Records, Tredegar Letter Book, March 18-May 13, 1872, Memorandum on Tredegar operations, May 11, 1872.

east of the Mississippi River, the Great Plains states, and the West Coast states. The Rocky Mountain and Southwest territories were the only exceptions to its American market area. Railroad products, particularly railroad fastenings which included spikes, bolts, fishbars, etc., were the primary representatives of the Tredegar name throughout the country. In fact the Tredegar claimed to be the largest manufacture of railroad fastenings in the country, and it supported that statement by reporting monthly sales of \$200,000 to \$400,000 in 1872.<sup>43</sup> The important point to note about its sales is that most of its orders were on a large scale. In 1871 the Central Pacific Railroad contracted for 2,000 33" car wheels while in 1872 the Atchison, Topeka, and Santa Fe Railroad ordered 70,000 fishplates, 140,000 bolts, and 200 tons of spikes.<sup>44</sup>

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<sup>43</sup>Tredegar Company Records, Tredegar Letter Book, May 1-June 3, 1875, Joseph R. Anderson to General Braxton Bragg, Galveston, May [5], 1875. Joseph R. Anderson Private Letter Book, November 9, 1871-July 1, 1873, Joseph R. Anderson to Johnson Brothers and Company, Baltimore, November 11, 1872.

<sup>44</sup>Tredegar Company Records, Tredegar Contract Book, April 1870-October 1880, C. P. Huntington, Vice President, Central Pacific Railroad and the Tredegar Company, October 20, 1871. J. T. Burr, Vice President, Atchison, Topeka, and Santa Fe Railroad Company and the Tredegar Company, March 26, 1872.

Tredegar railroad sales were not confined to the United States. It sold its products in Canada, South America, and Cuba.<sup>45</sup> In 1874 it even solicited a railroad order in Egypt in the hope that Charles P. Stone, formerly of the Dover Mines and then serving as an officer in the Egyptian Army, could exert some influence.<sup>46</sup> However, no Egyptian orders materialized.

The Cuban market, entered in 1868, was the most lucrative and consistent of the Tredegar's foreign markets. The firm first filled a contract for rolling stock for the Havanna Railroad Company.<sup>47</sup> Business expanded to other customers from railroad products to other products of the Tredegar line such as sugar mill equipment. A Tredegar agent, Charles Hughes, was sent to Havanna to supervise company affairs in the Cuban market. This is one of the few cases in which the

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<sup>45</sup>Tredegar Company Records, Tredegar Contract Book, April 1870-October 1880, Tredegar Company and M. Court-right for the Canada Southern Railway Company, January 19, 1872. George H. Evans and Charles S. Brown for the Western Railroad Company in Columbia, South America and the Tredegar Company, April 27, 1875.

<sup>46</sup>Tredegar Company Records, Tredegar Letter Book, November 1, 1873-February 6, 1874, Tredegar Company to Minister of Finance, Cairo, Egypt, January 8, 1874. Thomas M. Spaulding, "Charles P. Stone," Dictionary of American Biography, Vol. 18, p. 72.

<sup>47</sup>Tredegar Company Records, Tredegar Letter Book, May 2-June 26, 1868, Joseph R. Anderson to Don S. Echeverria, Havanna Railroad Company, May 12, 1868.

Tredegear relied on a single person to promote itself in a market area whereas it usually depended on an established business for its promotion. One of Hughes' memorable contributions was the securing of a vacuum pan order for a sugar mill in 1874. The pan was 8½ feet in diameter and eleven feet high with the capacity of yielding sixteen to eighteen hogsheads of sugar per cycle, and it cost \$29,000.<sup>48</sup> In this market the company's railroad reputation helped secure outlets for other items in its product line.

The distribution of other items in the Tredegear product line was not nearly as widespread as its railroad products. Such goods as bar iron, gas and water pipes, and specific iron castings such as angles, flats, etc., enjoyed a mostly southern market with the local Richmond market being a large recipient of Tredegear manufactures. The company helped Richmond recover from the war with such projects as providing the iron work for the new Richmond and Petersburg Railroad bridge across the James River in 1866.<sup>49</sup> Other Richmond customers included the City Gas Works,

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<sup>48</sup>Tredegear Company Records, Tredegear Contract Book, April 1870-October 1880, Charles Hughes, Tredegear Agent and Alexander Martinez, Havanna, March 12, 1874.

<sup>49</sup>Tredegear Company Records, Tredegear Sales Book, January 12, 1865-December 31, 1872.

purchasers of cast iron gas pipes and retorts, the City Water Works, purchasers of cast iron water pipes, and the Haxall, Crenshaw and the Gallego Flour Mills which ordered shafts for their mills.<sup>50</sup> The horseshoe market catered primarily to the southern region, but it did have outlets in the northeast and the midwest.<sup>51</sup>

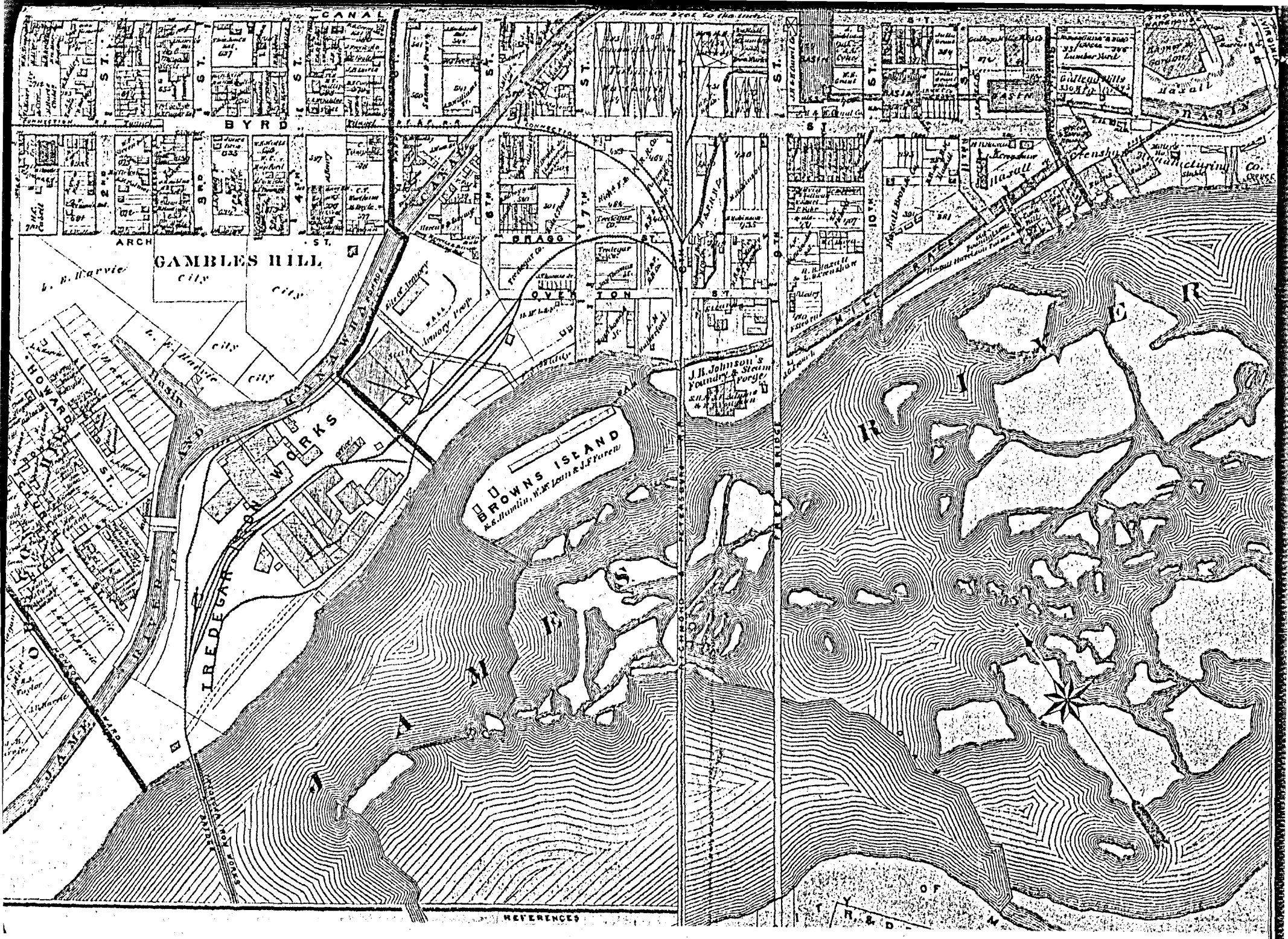
Thus the Tredegar enjoyed a healthy market in the boom years of 1867-1873. Its organization of the market contributed to its success. It was run efficiently and with consideration for each customer. The company let its product speak for itself and confidently felt that it did not have to use advertising.<sup>52</sup> The company suffered no major financial setbacks during this time, and the future appeared to be equally promising.

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<sup>50</sup>Ibid.

<sup>51</sup>Tredegar Company Records, Tredegar Sales Book, June 2, 1873-August 31, 1875.

<sup>52</sup>Tredegar Company Records, Tredegar Letter Book, May 2-July 19, 1871, Archer Anderson to A. Hogg, Auburn, Alabama, May 16, 1871. Even in the Richmond newspapers such as the Whig, Tredegar advertisements are not very plentiful.



GAMBLE'S HILL  
CITY

WORKS  
IREDEGAN

BROWNS ISLAND  
AS. Hamilton, W. F. Lewis & J. F. Patten

J. H. Johnson's  
Foundry & Forge  
S. H. & J. P. Johnson



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T. Y. & D. M.

## CHAPTER VI

### FINANCIAL PROBLEMS OF THE TREDEGAR

The Tredegar's financial status during its growth period from 1867 to 1873 revealed a picture of continuing improvement. Plant construction and market expansion were the outward signs of its emergence. However, profit reports show an even more precise evaluation of the company's rebirth. From 1867 to 1872 the company's net profits tripled. In 1867 the company cleared \$136,515 and paid out a 10 percent dividend to its stockholders. In 1870 the company made a net profit of \$221,006 and again paid a 10 percent dividend to its stockholders. The year 1872 stands out as the zenith during the company's boom period. In that year the Tredegar had profits of \$417,699 and distributed a 12 percent dividend to its stockholders.<sup>1</sup>

The Tredegar had the good fortune to share in the railroad boom of the postwar period. In fact, the

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<sup>1</sup>Tredegar Company Records, Minutes, pp. 25, 41, 52. No other profit figures were available for other years in the 1867-1873 period. However, a 10 percent dividend was issued in each year before 1872.

Tredegear boom period almost exactly coincided with the national railroad expansion era from 1865 to 1873 when trackage was doubled from 35,095 miles to 70,784 miles.<sup>2</sup> The company seemed oblivious to any future downturn in its growth as it was so caught up in the railroad mania. However, E. A. Wickes, the head of the New York office, did make a veiled warning on September 2, 1872, "I confess at times to a feeling that this cannot last long--this wonderful activity in railroad extension--but while it lasts we will continue to get the lion's share of the business."<sup>3</sup> Wickes appeared to be the only officer in the firm who expressed the possibility of an economic reversal. In just a little over a year later the country and the Tredegear found itself in a serious depression.

The Panic of 1873 was partially caused by over-expansion following the Civil War. Although expansion existed throughout the commercial market, railroad construction represented one of the most obvious abuses of market manipulation. The completion of the first transcontinental line in 1869, financed in part

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<sup>2</sup>Stover, Railroads, p. 122.

<sup>3</sup>Tredegear Company Records, Tredegear Letter Book (In Letters September 1872), E. A. Wickes, New York office to Col. Archer Anderson, Richmond, September 2, 1872.



by land grants, accelerated the expansion.<sup>4</sup> The iron industry was tied directly to the fortunes of the railroad companies. In fact the national railroad industry from 1865 to 1873 is a prime example of the multiplier concept in economics. It was the linchpin of the postwar economic system. Railroads shipped manufactured products to the West and brought back vital grain supplies to the East. However, in many cases railroad expansion into certain areas did not render a sufficient return in traffic to recoup the initial investment.<sup>5</sup> Financial failures resulted, and investments were lost.

In September of 1873 business witnessed the beginning of a severe national depression. The failure of Jay Cooke's New York City financial house on September 18, 1873 signalled the end to overspeculation.<sup>6</sup> Cooke's firm liquidated because it could not sell enough bonds to finance the construction of the Northern Pacific Railroad. A serious contraction in the American

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<sup>4</sup>Joseph A. Schumpeter, Business Cycles, 2 vols. (New York: McGraw-Hill Book Company, Inc., 1934), I, p. 335.

<sup>5</sup>Victor S. Clark, History of Manufacturers in the United States, 3 vols. (New York: McGraw-Hill Book Company, Inc., 1929), 2, pp. 155-156.

<sup>6</sup>Robert Sobel, Panic on Wall Street, A History of America's Financial Disasters (New York: Macmillan Company, 1968), p. 179.

economic system followed as other railroads also went bankrupt. "Speculation in land and stocks collapsed, prices fell, exports increased, imports decreased, firms of all types failed in large numbers, the stock exchange had to be closed, banks suspended payment, unemployment became serious almost immediately."<sup>7</sup>

The depression continued for six years with recovery coming in 1879.

The national iron industry suffered severely during the depression. Its dependence on the railroad industry forced it to bear the full brunt of the depression along with the railroads. Railroad construction reached its low point in 1875. In the South only 1,356 miles of new track were laid during the depression years from 1873 to 1879, and that accounted for only 8 percent of all new construction in the nation.<sup>8</sup>

The Tredegar was seriously hurt by the business downfall.

Tredegar fortunes had actually been slipping before the commencement of the Panic of 1873. Several of its large railroad customers defaulted on payments to the Tredegar. The most serious default concerned the bankruptcy of the New York and Oswego Midland Railroad. In August of 1872, the Tredegar had agreed to furnish

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<sup>7</sup>Schumpeter, Business Cycles, I, p. 337.

<sup>8</sup>Ibid., p. 337. Stover, Railroads, p. 125.

1,670 cars for the Midland Railroad. That represented the largest rolling stock order which the Tredegar had contracted to make in the 1867-1873 period.<sup>9</sup> However, it did not prove beneficial to the company.

As early as September 1872 E. A. Wickes warned the home office that the Midland was not as well organized and financially secure as it was thought. The directors of the road had no previous background in railroading, and the president had no experience in managing a railroad.<sup>10</sup> If that information had been available earlier, the Tredegar could have reduced its losses. It appears that the road's promoters were strictly interested in making money from constructing the road and not from operating it. Of course that attitude was prevalent with the speculative fever of the pre-Panic era. Because of the lack of emphasis on management, the road went bankrupt in September of 1873.<sup>11</sup> The Midland bonds which the Tredegar had accepted as payment for the cars were worthless. One

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<sup>9</sup>Tredegar Company Records, Minutes, p. 50.

<sup>10</sup>Tredegar Company Records, Tredegar Letter Book (In Letters December 1872), E. A. Wickes, New York office to Col. Archer Anderson, Richmond, December 2, 1872.

<sup>11</sup>Harry H. Pierce, Railroads of New York: A Study of Government Aid, 1826-1875 (Cambridge: Harvard University Press, 1953), pp. 57, 85.

consolation for the Tredegar was the fact that it had delivered only 400 cars by September of 1873, or its losses would have been greater.<sup>12</sup>

Besides the failure of other railroads such as the Chesapeake and Ohio in 1875, the Tredegar faced losses from other types of customers in the depression period. For example, the Cornwall Iron Works of Rome, Georgia, which had supplied iron products for the Confederacy, also figured as one of the causes in the Tredegar's declining fortunes.<sup>13</sup> A supplier of pig iron for the Tredegar since 1870, the Cornwall Works asked the Tredegar for financial aid in 1871. The Tredegar obliged and loaned the Cornwall Iron Works \$25,000 so that it could remain solvent. As security for the loan, the Cornwall Iron Works deeded its property to the Tredegar. However, even with the Tredegar's help the Cornwall Works went bankrupt following the Panic of 1873.<sup>14</sup> The Tredegar recouped

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<sup>12</sup>Tredegar Company Records, Archer Anderson Private Letter Book #2, April 10, [1871] to April 24, [1875], Memorandum of cars delivered to the New York and Oswego Midland Railroad Company, September 9, 1873.

<sup>13</sup>Ethel M. Armes, The Story of Coal and Iron in Alabama (Birmingham: Chamber of Commerce, 1919), p. 185.

<sup>14</sup>Tredegar Company Records, Tredegar Contract Book, April 1870-October 1880, Cornwall Iron Works and the Tredegar Iron Works, May 17, 1870. Cornwall Iron Works and the Tredegar Iron Works, January 11, 1871. Anderson Family Papers, Box 1, Thomas McCulloch, Cornwall Iron Company to General Joseph R. Anderson, June 19, 1873. Virginia State Library.

some of its losses by selling the remaining pig iron at Cornwall in the Cincinnati market.<sup>15</sup>

The Tredegar was immediately affected by the Panic of 1873. It was forced to lay off workers and to cancel orders for such raw material as coal due to the lack of business. In fact operations at the plant were more or less suspended from late September until mid-October 1873.<sup>16</sup> Prices of Tredegar products fell drastically. In spite of this the company continued to produce most of the items in its regular line. However, the return became less with the lower prices and lower volume. For example, Tredegar spikes sold for 5¼¢ per pound in May of 1872, but by 1875 the price had fallen to 2 3/4¢ per pound.<sup>17</sup> The hardest hit of the Tredegar divisions was its car shop department as most railroads could not begin to buy rolling stock in the depression period. Car shop production plummeted to a total

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<sup>15</sup>Tredegar Company Records, Tredegar Letter Book, November 6-December 28, 1876, Frank T. Glasgow to Smith and Branham, Rome, Georgia, December 16, 1876.

<sup>16</sup>Tredegar Company Records, Tredegar Letter Book, July-October 1873, Frank T. Glasgow to J. M. Higby, Glen Allen, Virginia, September 25, 1873. Frank T. Glasgow to S. S. Solomons, Charleston, S. C., October 20, 1873.

<sup>17</sup>Tredegar Company Records, Tredegar Letter Book, March 18-May 13, 1872, Tredegar Company to William A. Jones, Griffin, Georgia, May 7, 1872. Tredegar Sales Book, September 1875-January 1876, Recapitulation for 1875, p. 83.

of 135 cars in both 1874 and 1875.<sup>18</sup> The company found itself fighting for survival.

The Tredegar's financial condition continued to grow worse. There was a sense of having no control over the situation. Although Joseph R. Anderson correctly assessed the problem's cause as being an overextension of credit to railroads, he could not arrive at an immediate solution.<sup>19</sup> A solution had to be achieved or the company would disintegrate. For the year 1874 the company netted a profit of only \$39,273. This occurred in a rapidly descending market and a decreasing of half of the Tredegar's business volume. Thus in two years the company's profits had fallen nearly 91 percent.<sup>20</sup>

Because of the default of railroads on their bond payments to the Tredegar, the company found itself in debt as soon as the Panic of 1873 commenced. It had difficulty paying its bills and frequently asked to

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<sup>18</sup>Tredegar Company Records, Tredegar Sales Book, January 1873-January 13, 1876, pp. 228, 308.

<sup>19</sup>Tredegar Company Records, Tredegar Letter Book, November 1, 1873-February 6, 1874, Joseph R. Anderson to The St. Louis Bolt and Iron Company, St. Louis, December 20, 1873.

<sup>20</sup>Tredegar Company Records, Archer Anderson Private Letter Book #2, April 10 [1871] -April 24, [1875], Memorandum of operations in 1874, January 9, 1875.

postpone its payments.<sup>21</sup> As early as October of 1873 a stopgap solution was proposed to keep the company financially solvent. The company introduced a \$1,200,000 bond issue through the auspices of Isaac Davenport, Jr., a Richmond financier. The Tredegar pledged its property including the Grace and Rebecca furnace properties as security for the bond issue which was to be payable at 8 percent per year by 1893. However, the board in September of 1874 reduced the mortgage bond issue to \$1,000,000.<sup>22</sup> The company thus had a little breathing room, and in November of 1874 it even expressed confidence in the near future.<sup>23</sup>

The Tredegar reprieve lasted for approximately one more year. The company maintained its operations and continued to sell its products. However, in 1875 two events foreshadowed an even bleaker future. Since the Richmond and Danville Railroad had defaulted on its

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<sup>21</sup>Tredegar Company Records, Tredegar Letter Book, November 1, 1873-February 6, 1874, Frank T. Glasgow to Graham and Robinson, Maximum Meadows, Virginia, November 15, 1873.

<sup>22</sup>Chancery Court of Richmond, Deed Book 101-A, Manuscript Volume, pp. 403-407. Deed of Trust of Tredegar Company to Isaac Davenport, Jr., recorded October 24, 1873, Richmond City Courts Building. Tredegar Company Records, Minutes, p. 56.

<sup>23</sup>Tredegar Company Records, Private Letter Book #2, April 10, [1871]-April 24, [1875], Archer Anderson to James H. Young, New York, November 28, 1874.

payment to the Tredegar for the James River bridge, the Tredegar was burdened with a balance of \$55,186.<sup>24</sup> In February of 1875 the firm enacted a deed of trust to M. K. Jessup, Paton and Company and Perkins, Livingston, and Post and Company, both of New York City. The Tredegar pledged the bridge as security to the two companies in order to sustain its credit with them.<sup>25</sup> Thus by 1875 all of the Tredegar's manufacturing assets had been pledged as security in deeds of trusts. However, the farm land in Goochland County still remained in the hands of the company.

Since the company was forced to contract its business because of its low selling volume it decided to close its New York office in 1875. The duties of the New York office were assumed by M. K. Jessup, Paton and Company and Perkins, Livingston and Post. They would act as agents for the Tredegar.<sup>26</sup> The closing of the New York office marked a significant end to

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<sup>24</sup>Tredegar Company Records, Archer Anderson Private Letter Book #2, April 10, [1871]-April 24, [1875], Memorandum of Joseph R. Anderson appointing M. K. Jessup and Charles L. Perkins as trustees of the Tredegar Bridge, February 18, 1875.

<sup>25</sup>Chancery Court of Richmond, Deed Book 105-B, Manuscript Volume, pp. 56, 57. Deed of trust of Tredegar Company to M. K. Jessup, Paton and Company and Perkins, Livingston, and Post, recorded February 26, 1875. Richmond City Courts Building.

<sup>26</sup>Tredegar Company Records, Minutes, p. 60.



Tredegear expansion. The financial status of the company grew worse towards the end of 1875. The Tredegear's 1873 bond issue had not been successful, so the Tredegear debts could not be adequately absorbed. The firm's creditors grew more and more impatient. The company accepted its status with "philosophic resignation," and by January 6, 1876 it was practically begging its customers to pay their accounts so it could meet its financial obligations of the next week.<sup>27</sup>

By January 18, 1876 the Tredegear financial reprieve came to an abrupt halt. The company's bond issue had failed to be sufficient to absorb the firm's growing debts. On January 18 the company faced a debt of \$1,300,000 with its total assets valued at only \$300,000.<sup>28</sup> In a meeting of the Board of Directors held on January 18, Joseph R. Anderson explained the options available to the firm. He felt that the creditors desired a receiver to be appointed to continue the company's operations. The Board concurred with Anderson's suggestion and also agreed on several other

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<sup>27</sup>Tredegear Company Records, Tredegear Letter Book, November 4-December 6, 1875, Archer Anderson to A. A. Low and Brothers, New York, November 30, 1875. Tredegear Letter Book, December 6, 1875-January 11, 1876, Archer Anderson to J. H. Wilson, Charleston, S. C., January 6, 1876.

<sup>28</sup>The Richmond Whig, January 19, 1876.

important points.<sup>29</sup> Anderson urged that the works should not be sold because of the depression, especially in the iron trade. If it was sold a heavy loss would be borne by the creditors so Anderson proposed that the works should continue manufacturing until a better market developed. Anderson also pointed out that with the stock of raw material on hand and with several large orders in process, it would be to the creditor's benefit to keep the company in operation.<sup>30</sup>

On that same day the "financial embarrassment of the Tredegar Company," as Frank T. Glasgow described it, was presented in the Chancery Court of Richmond.<sup>31</sup> In the case of A. Y. Stokes and Company and others as plaintiffs versus the Tredegar Company and Isaac Davenport, Jr., as defendants, the company's insolvency was directed to be rectified to the best advantage of its creditors. Joseph R. Anderson was appointed receiver of the company and was instructed thusly,

He is authorized to employ such officers, workmen and laborers as may be necessary to carry on the manufacturers at the works of the company

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<sup>29</sup>Tredegar Company Records, Minutes, p. 63.

<sup>30</sup>Ibid., pp. 63-65.

<sup>31</sup>Tredegar Company Records, Tredegar Letter Book, January 18-February 26, 1876, Frank T. Glasgow to Col. Thomas Dodamead, Columbia, S. C., January 18, 1876.

in the City of Richmond, and shall exercise his best discretion in restricting the operations to such extent as that they will conduce to the best interest of the creditors.<sup>32</sup>

More detailed instructions included such items as filing an inventory with the court, listing all the company's debts, collecting all balances for the company, keeping the property in good repair, paying taxes and wages, and maintaining an account of all receipts and disbursements.<sup>33</sup>

The company shut down completely for about a week following the Chancery Court decision. It resumed its operations on January 24, 1876 in a somewhat restrained posture.<sup>34</sup> In ten years the company had experienced the full turn of the business cycle. By April 1876 the last of the company's property, the farmland in Goochland County, was put in trust as further security for Isaac Davenport, Jr.<sup>35</sup> At the direction of the Chancery Court, the firm conducted its business on a cash base only as

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<sup>32</sup>Chancery Orders #10, Chancery Court of Richmond, November 16, 1875-June 1, 1876, Manuscript Volume, pp. 156-158. A. Y. Stokes and Company and Others versus the Tredegar Company and Isaac Davenport, Jr., recorded January 18, 1876. Richmond City Courts Building.

<sup>33</sup>Ibid.

<sup>34</sup>The Richmond Whig, January 26, 1876.

<sup>35</sup>Chancery Court of Richmond, Deed Book 107-B, Manuscript Volume, pp. 478-481. Deed of Trust of Joseph R. Anderson to Isaac Davenport, Jr., recorded April 22, 1876. Richmond City Courts Building.

opposed to its earlier policy of extending credit to its customers. In that way the company could meet its debts more efficiently.<sup>36</sup>

Anderson retained the position of receiver until September 1, 1879. It is noteworthy that in January 1879 the depression neared its end as United States banks resumed specie payments and thus returned to the gold standard. On July 3, 1879 the Chancery Court had ordered Anderson to turn over all assets under his receivership to the Tredegar Company as the creditors were satisfied with the solvency of the firm.<sup>37</sup> The Tredegar still had a debt of \$1,000,000. However, it successfully issued a 4 percent twenty-year mortgage bond proposal in 1879.<sup>38</sup> In 1880 Anderson looked forward as he always had in regard to his company. "Still we have a large property and works with large capacity. Besides this is a great country--rapidly increasing in population--whose wants in our line are always growing. Let us hope that we may supply our share of them."<sup>39</sup>

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<sup>36</sup>Tredegar Company Records, Tredegar Letter Book, May 15-June 22, 1876, Joseph R. Anderson to W. J. Anderson, Raleigh, June 17, 1876.

<sup>37</sup>Chancery Orders #15, Chancery Court of Richmond, June 5, 1879-April 3, 1880, Manuscript Volume, p. 96. A. Y. Stokes versus the Tredegar, recorded July 3, 1879. Richmond City Courts Building.

<sup>38</sup>Tredegar Company Records, Minutes, p. 74.

<sup>39</sup>Ibid.

## CHAPTER VII

### EPILOGUE

Although President Joseph R. Anderson expressed optimism for his company's future the fact remains that the Tredegar did not return to the national prominence and high earnings of the 1867-1873 period.<sup>1</sup> In that era the Tredegar made the most of its opportunities. It expanded its plant and adopted more efficient means of iron production, for example its spike machine improvements. The company cultivated its market by continually searching for new customers and by satisfying its regular clientele. With its strong pursuit of the market the Tredegar was able to turn back profits into the company for plant expansion and also to distribute sizeable dividends to its stockholders. However, two flaws were inherent in the postwar Tredegar success story.

The first discrepancy concerned the railroad market. The Tredegar appeared to be overdependent on its rail

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<sup>1</sup>The Tredegar did fulfill government munitions contracts in World War I, World War II, and the Korean War, but it still remained a small scale concern, and its earnings reflected that.

products division. Of course, it endeavored to take advantage of the postwar railroad boom, but it did not sufficiently pursue other facets of its overall production line such as sugar mills, cast iron pipe, etc. True, it did introduce a horseshoe line shortly before the Panic of 1873, but that did not begin to replace its iron rail division which was discontinued in 1870 as a result of steel rail competition.

However, the Tredegar continued primarily to serve the railroad industry with such products as spikes, fishbars, rolling stock, etc. The Panic of 1873 emphasized the Tredegar's lack of diversification in production in other areas besides the railroad industry. Thus in spite of a good market development the Tredegar operated on a carpe diem philosophy--from the Latin meaning literally enjoy the present day or seize the present opportunity--which could not accommodate any setbacks such as the railroad construction collapse of 1873.

The carpe diem motif can be more readily seen in the Tredegar's attitude toward steel. After the Civil War steel began its ascendancy in the United States. Steel rails were the prime example of steel's early use in the country. The Tredegar realized its iron rails could not compete with the longer wearing steel rails. However, the Tredegar solution was to abandon rail

production completely. Let it be recalled that this occurred in the midst of the Tredegar boom period when profits could have been turned back into the company for the purpose of converting part of the plant into steel rail production and other steel products. The company seemed content with iron production even in light of the available reports on the strength and endurance of steel.

In the Tredegar's defense a few comments must be made in regard to its attitude toward steel production in the 1867-1873 period. The iron ores of Virginia were not conducive to the steel making process. The Tredegar would have been forced to obtain its ore from such areas as the Mesabi Range in Minnesota or the Birmingham region in Alabama. Freight charges alone would have hindered any Tredegar efforts in entering the steel market. An area such as Birmingham with its close proximity to raw materials for making steel could easily have undercut the price that the Tredegar would have been forced to sell steel at in order to make a profit. With that in mind a conversion of part of the plant to steel production would have been a rather risky venture.

The company's hesitancy to investigate steel production on a trial basis during its boom period made the effects of the Panic of 1873 harsher and

subsequent recovery more difficult. The Tredegar could not convert to steel production immediately after the depression because it was burdened with the \$1,000,000 debt. There was no capital available for conversion, and the iron market was losing more and more of its sales to steel's rising prominence. The Tredegar was forced to maintain a tight budget. In fact its debt was not completely paid off until 1928.<sup>2</sup> In the meantime the Birmingham, Alabama region achieved dominance as the steel production center of the South. The Tredegar's reluctance in investigating steel production during its boom period hurt its chances of making a quick recovery after the Panic of 1873, as it was locked into iron production, and no capital was available for conversion to steel manufacture. The company never regained the heady success of 1867-1873 era.

The Tredegar relationship to Richmond still continues. However, when one speaks of the Tredegar today he must consider two frames of reference. After a fire in 1955 at its James River site in Richmond the company moved its operations to Castlewood Road in Chesterfield County just south of the Richmond city

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<sup>2</sup>Tredegar Company Records, Minutes, pp. 414, 421.



limits. It maintains a small rolling mill at that site and employs approximately eighty people. The company's main products are railroad joint bars--similar to the fishbars mentioned in this study--and track spikes. It sells its products primarily in this country but also fills some foreign orders. The firm is headed by Frank Williams who is the great-grandson of Joseph R. Anderson. Thus the Tredegar has been controlled by the Anderson family and its descendants since 1848.<sup>3</sup>

The original site of the Tredegar Company is presently undergoing restoration under the auspices of the Ethyl Corporation, the present owners of the property. The restoration project commenced in 1973 and was undertaken by the Richmond contracting firm of Taylor and Parrish, Incorporated.<sup>4</sup> At the present time the New Gun Foundry which dates to 1861 has been almost completely restored. Only the air furnace remains to be restored on that building. The Tredegar main office building is now used as the center for restoration operations. A wing which was added to the office in

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<sup>3</sup>Interview with Frank Williams, President of the Tredegar Company, August 11, 1976.

The material for the greater portion of this paragraph was furnished by the interview with Mr. Williams.

<sup>4</sup>The Richmond Times Dispatch, March 22, 1973. James S. Wamsley, "Tredegar, Where Pioneer Industrialists Worked Iron, Restoring Begins," The Commonwealth (May 1973), 40, p. 58.

the Twentieth Century will be removed as the restoration project proceeds. Plans also call for the Pattern Shop and the Company Store--the only other buildings remaining somewhat intact on the site--to be maintained. Also some remnant walls and the mill races will be preserved. This effort is being solely financed by the Ethyl Corporation, a Richmond based firm dealing in chemicals, plastics, paper, and aluminum products. When the project is completed the property will be transferred to a historical society for administration and will be open to the public.<sup>5</sup> The public will thus be enabled to enjoy the proximity of the Tredegar Company and reflect on its past glories.

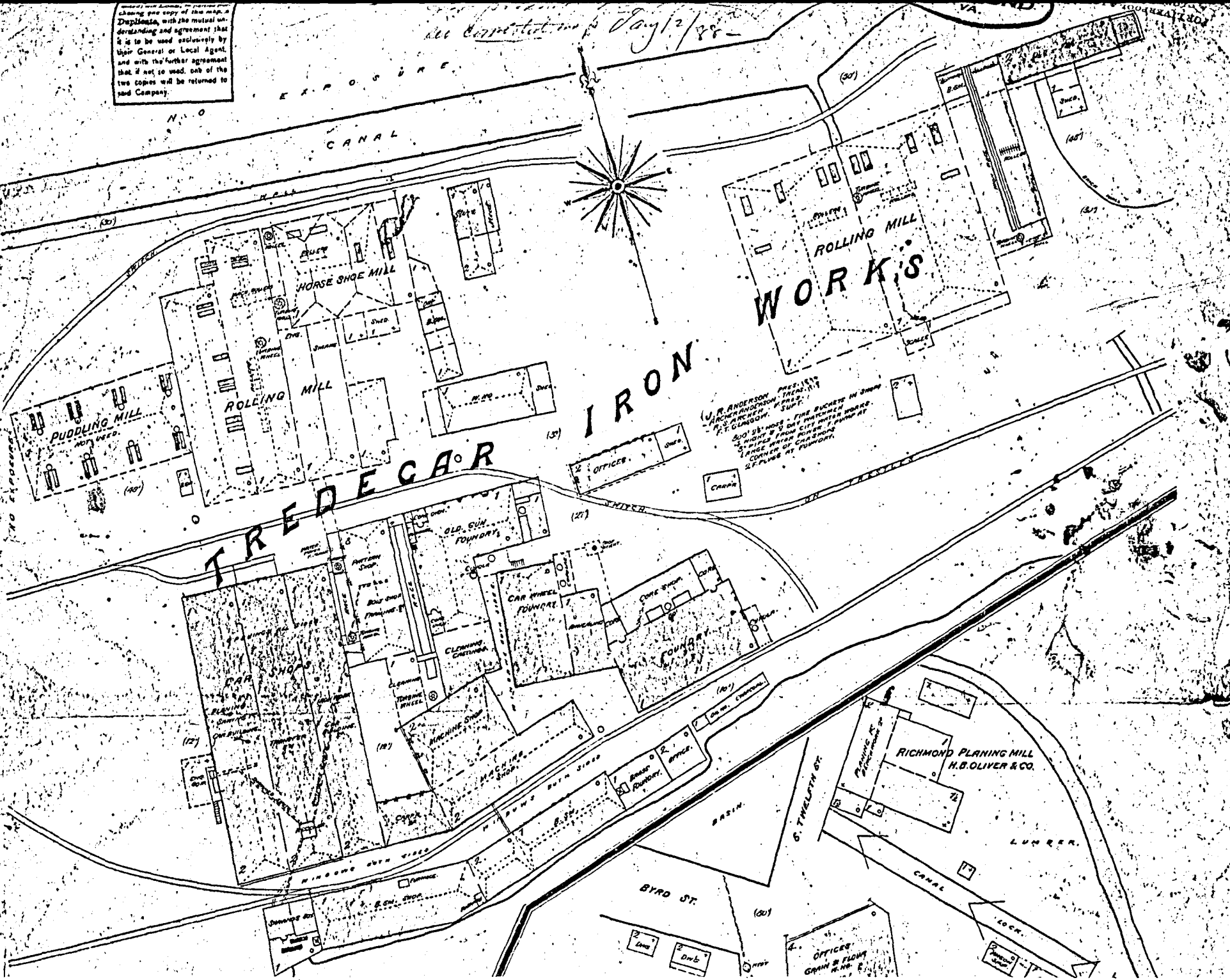
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<sup>5</sup>Interview with Roy Johnson, Properties Manager, Ethyl Richmond Division, July 29, 1976.

The Material for the greater portion of this paragraph was furnished by the interview with Mr. Johnson.

Send one copy of this map, a Duplicate, with the mutual understanding and agreement that it is to be used exclusively by their General or Local Agent, and with the further agreement that if not so used, one of the two copies will be returned to said Company.

*See Correspondence of Day 12/88*



(V.R. ANDERSON PRESIDENT  
 W.A. ANDERSON TREASURER  
 J.S. ANDERSON SUPERVISOR  
 F.T. GUNSON SUPERVISOR  
 500 SQUARE FEET SACKET IN SHED  
 3 INCHES FROM CENTER OF ROLLING MILL  
 LARGE WHEEL CENTER PLUMP AT  
 2 FEET FROM FURNACE

RICHMOND PLANING MILL  
 H.B. OLIVER & CO.

OFFICES  
 GRAY & FLOW  
 N. H. & S.

TREDEGAR

IRON WORKS

ROLLING MILL

HORSE SHOE MILL

PUDDLING MILL

OLD SUN FOUNDRY

CAR WHEEL FOUNDRY

FOUNDRY

CLEANING CASTINGS

MACHINE SHOP

BRASS FOUNDRY

OFFICE

BYRD ST.

S. TYNALITH ST.

CANAL

LOCK

LUNGER

BASIN

(12)

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(27)

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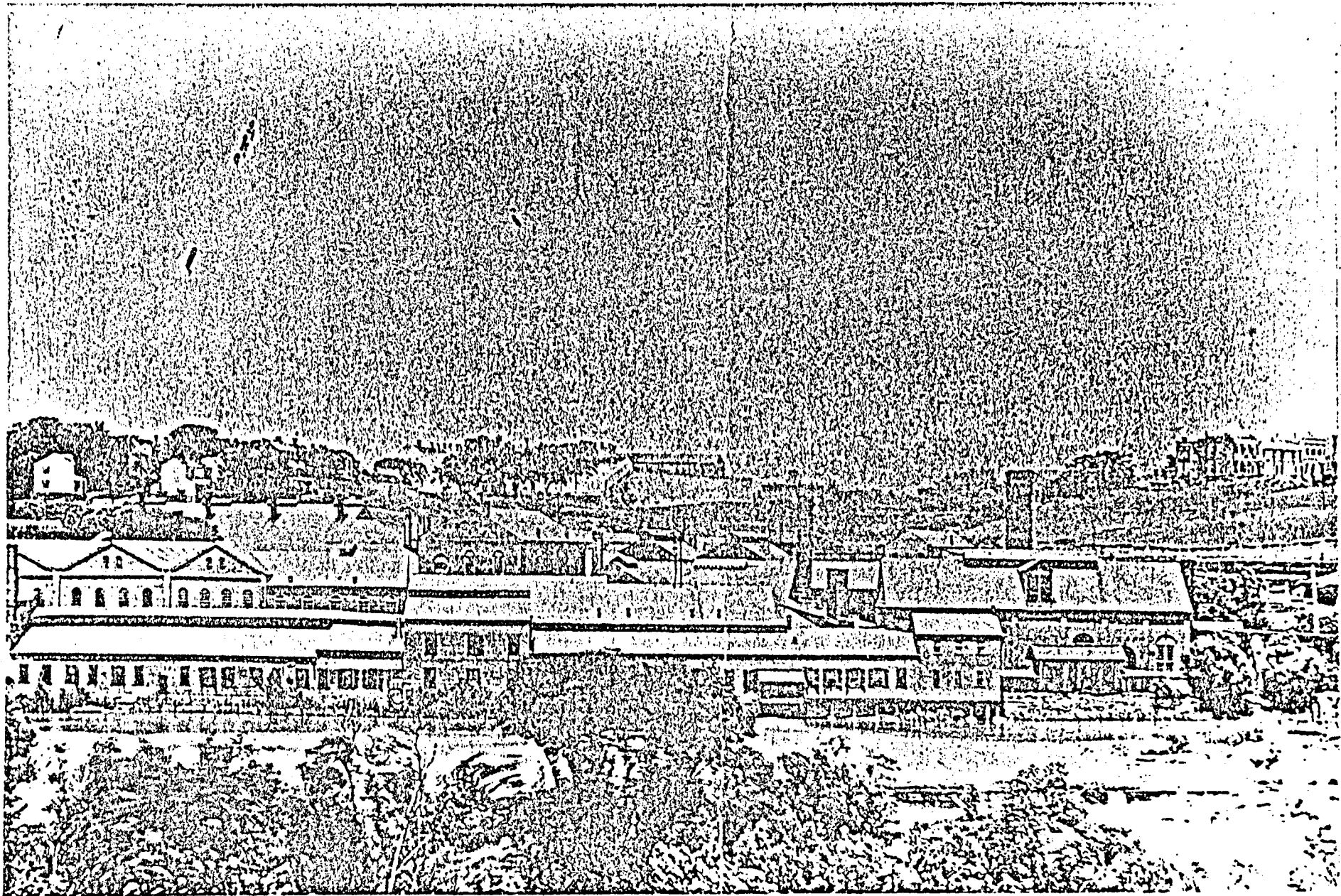
N. O.

CANAL

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VA. MD.

DOCK



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## VITA

The author is presently employed in the Archives Division of the Virginia State Library under whose auspices a grant and leave of absence were graciously bestowed in order to pursue this degree. Born in County Tipperary, Ireland on November 11, 1948, he was adopted by his American parents in 1952. He received his primary school education in Chicago, Illinois, Milwaukee, Wisconsin, and Richmond, Virginia. In 1966 he was graduated from Benedictine High School in Richmond, Virginia. He obtained the Bachelor of Arts in History from Villanova University in 1970. From 1971 to 1973 he served two years of active duty in the United States Naval Reserve, being attached to Carrier Group Three Staff. In December 1973 the author commenced employment at the Virginia State Library.