

## CHAPTER VI

### Conflict and Change

The new year 1861 found the mill running with a low order book and Charles Huston very worried about the possibility of war. On the tenth of January he said, "If civil war should come and it very much looks like it will, there will not be much manufacturing done."<sup>1</sup> Huston's old friend William Watts agreed that business was not likely to improve, but he thought Lincoln would restore confidence in a short time, for Watts felt assured "that the law will find him to be its unyielding rigorous executor which in my opinion is all that is necessary." Watts declared that he was "opposed to all amendments to the constitution and compromise."<sup>2</sup> On February 25, Huston replied to Watts that while Lincoln would soon be in office, he feared that "the conflagration has got too much headway to be stopped by any civil power."<sup>3</sup>

Huston hated the thought of war, and as late as March 5 he thought that it might be avoided. He hoped that Lincoln's conciliatory inaugural address and the

passage of a new tariff law would lead to "brighter times."<sup>4</sup>  
 It was a forlorn hope. One month later Huston wrote Watts again. Because there was scarcely any work to do, Lukens could not buy any more blooms from Watts. The blame for the depressed market belonged to the South, and Huston approved the fact that "...Mr. Lincoln finds it necessary to set the foot down firm ... until we get the South satisfied that the majority shall rule in this country."<sup>5</sup>  
 This hardening position toward the South did not mean he feared war less than before. When the war came he wrote: "Civil war is indeed upon us with all its horrible anticipation - it shakes the writers faith in republican government."<sup>6</sup>

In May, Huston and Penrose exchanged letters with Issac Spear, their agent in Mobile. Spear, whom they had billed for the Lukens iron he held replied that:

...it is as much as a man's Liberty and Residence is worth to remit any money north at this time and I really cannot see how you can expect us too [sic]...<sup>7</sup>

Huston replied:

We are in receipt of yours of the 8th inst. We were not aware before this of the impossibility of remitting from your city, yours being the only account we have in the south. We are of course perfectly willing to await your convenience. We thank you for your frankness and think that if only the two sections of the country only understood each other we might still

harmonise - Mr. Lincoln with you I believe stands as the representative of the Abolitionists, a class despised here as well as with you and were it not that he was supported by large numbers of other classes to whom he pledged himself repeatedly not to interfere with your institutions he would not now be President. Upon these pledges however together with the bombardment of Fort Sumter he has united all parties and the North is now a Unit in declaring that the Union must be maintained unbroken. Business is very much destroyed but provisions are abundant and men and money are being offered to the government to an astonishing extent.

We hope you will pardon us for what we have written as our motive is to try to post you in the actual state of affairs here.<sup>8</sup>

The letter shows that, while Huston regretted the course that events had taken, he had come to feel that the North had no options left. He was a saddened but firm Unionist.

His partner, Charles Penrose, was much more ardent and enthusiastic in his support of the Union. On May 22, 1861 he wrote to the Corliss Steam Engine Company and asked:

Will you want the iron for the Gun Boats? We are keeping a place open for the order so that we can push it right through for you. We can give you one third in a week, balance in two weeks from receipt of your order, and of good Union iron that will stand Rebel thunder -9

With that letter, the Quaker pacifism practiced by Rebecca Lukens evaporated for the duration of the war as Huston and Penrose actively sought military orders.

There was one other anomaly that did not fit with Quakerism. Huston had told Spear that the Abolitionists were "despised here as well as with you." A letter to Huston and Penrose from Kemble and Warner in May also damns the Abolitionists. The agents asked:

Can the union men sufficiently hold back the Abolitionists when victorious to induce the South to again try their fortunes with us? That is what I fear most - Victory is certain but is it to be a barren one - Union is all we ask.<sup>10</sup>

Peter Kemble's father was a Quaker. Evidently the Union cause became a kind of secular religion which overcame Quaker tenets and proclivities for the duration.

Even though Lukens sought military orders from May forward, the mill was not driven hard until the very end of 1861. In August, John Mitchell, the Cincinnati agent, said that business was still "perfectly prostrate."<sup>11</sup> Another complication arose when Huston and Penrose found that replacement rolls were hard to obtain because machine shops were using their lathes to manufacture guns for the army.<sup>12</sup>

When the market did recover in the winter of 1861-1862, other problems confronted the partners. They found that money was hard to get. Their Philadelphia bank, Jay Cook and Company, told Huston and Penrose that it could not allow full rates on checks coming in from New York.

The bank said that "we are obliged to measure demand notes by the cubic foot almost. Currency is extremely scarce, buying at 5/8 selling 3/4 -." <sup>13</sup> That situation eased later in the year when the government paid cash for iron delivered for military use.

The high demand for iron brought other problems too. The agents constantly hectored the mill to increase its capacity and to push orders through as quickly as possible. In April, Kemble and Warner urged, "Hurry the iron [for gunboats] all in your power - Jeff Davis is waiting for them -." <sup>14</sup> The next month was marked by beseeching prayers for iron. Kemble and Warner assured Huston and Penrose that one customer was "nearly in fits for want of iron" and that others "probably have perished from want". <sup>15</sup>

The war seemed to be going well for the Union that May, but the agents cautioned the mill that:

You need not suppose that because McClellan has advanced beyond Yorktown that Mr. Parrott does not want that gun carriage iron - hurry it etc etc. <sup>16</sup>

By the summer of 1862 Huston and Penrose were positively innudated with orders and Kemble and Warner told them that if they operated half a dozen mills, they would still be running at top speed. <sup>17</sup>

The requirements of war that flooded the Pennsylvania iron manufacturers with orders almost wrecked their capacity to fill them because of the Union Army's need for men. The draft gave Huston and Penrose a serious fright. In August they wrote Watts that the draft was interfering with their efforts to make iron. Huston observed rhetorically:

Do you think the government can with justice to itself draft men out of the iron works running almost exclusively on order for war purposes? Let the Government once take our best workmen from our Furnaces - Forges and Rolling Mills and it will stop the production of one of the greatest sinews of war -.18

Watts in turn wrote on August 14 that the draft "has silenced two of my fires and I am not able just now to fill previous orders in any reasonable time."<sup>19</sup> This situation would get worse. Eleven days later he wrote Lukens that the draft had called up his men and Lukens must make other arrangements for its blooms.<sup>20</sup>

The same problem threatened the rolling mill also, but in early September, Huston and Penrose heard that exemptions were being made in certain cases, and they wrote Kemble and Warner asking if something could not be done for the Coatesville mills. Kemble and Warner replied that they had already asked the Secretary of the Navy to excuse men from the draft if they were working on government orders

for iron, and soon he had heartening results to report. The men would have to submit to the draft, but if upon induction the mill operators would submit an affidavit to the Navy claiming the indispensibility of the men involved, the Navy would then release the men from service. To insure this happy result, Kemble and Warner helped Lukens take advantage of this scheme by placing an order for government iron with the mill.<sup>21</sup>

In the next two months Huston and Penrose acted for others in securing the release of men from active duty. In both instances, the men worked for bloomaries that supplied Lukens. Lukens's correspondence shows the complex mechanism for release. On October 25, 1862 Huston and Penrose wrote to Gideon Welles, Secretary of the Navy:

Respy.

William Yost a skilled workman who is making blooms for us to be used in making boiler plate for the govt. batteries in construction by Mess'rs I. P. Morris Towne and Co. of Philadelphia has just been drafted in Lancaster County into the military service of the United States. We are already very seriously embarrassed in our manufacture by enlistments of rolling mill and forge hands and I do not know where this one could possibly be replaced - if you will be pleased to send us an order for his discharge it will very much assist us in fulfilling our contract.<sup>22</sup>

Two days later, Huston and Penrose were able to tell W. Boyd Jacobs, the owner of the bloomary where Yost

worked that they had a reply from Welles saying:

If you will forward to this department a certificate duly attested that Mr. Yost is loyal to the United States Government application will be made for his relief.<sup>23</sup>

Yost was released by November 5. Later that month, Huston and Penrose were asked to do a similar favor for another bloomary that lost two men.<sup>24</sup> The result in that case is not known.

One final method the mill might have used to protect the hands from induction was to provide bounty money. It is impossible to determine if Lukens used this method, although there is evidence that the owners stood ready to use the system if necessary. There is an entry in the journal dated February 18, 1865 that shows a bounty money account. Three of the hands had ten dollars apiece to their credit and the rolling mill had a two hundred dollar credit in the fund.<sup>25</sup>

The voluntary enlistment of one of the Lukens hands also caused the managers a problem in the early part of 1862. Oliver Griffith was married and had children but for some reason his wife was not getting her allotment. She turned to her husband's old employer for relief, writing on February 26:

sir Mr. penrose please to go to squire thomas and get that money for me and



send it down here for me for i stand  
 in need of it very much i have not  
 Received iny Money from oliver since  
 he had bin gone the last letter i got  
 from oliver he was With a fleet at  
 port Royal and he thought he would  
 have to leave there soon get that  
 money as soon as possible.

and you will oblige  
 Your friend  
 Mary Griffith<sup>26</sup>

That letter bears a note on the bottom saying "sent \$8.80."

Mary Griffith wrote Charles Penrose again the  
 next week.

Dear Sir

I received both of your letters and  
 the money. I have not received any money  
 from my Husband since he has listed and  
 I think it very strange I wish you would  
 find out if any of the others men has  
 sent their wifes any money. if you  
 would have the kindness to let me have  
 two months pay advanced and then as you  
 get it from esq. Thomas you can keep it  
 that money that you sent to me I had  
 to pay my rent with it and left me with-  
 out any money and myself and the children  
 are without shoses. Answer this as soon  
 as you get it yours

respectfully Mary Griffith<sup>27</sup>

This time Penrose sent an advance of ten dollars. The  
 post-war journals show that Oliver Griffith survived the  
 war and presumably thanked his employers for their  
 paternalistic generosity.

In the end the draft and enlistments only gave the  
 partners a fright. The mill managed to double its labor  
 force during the Civil War. By January, 1864 there were

thirty-seven hands employed. A glance at the surnames in the wage accounts show that many of the new hands were probably related to the old ones, and recruiting labor does not seem to have been much of a problem after all.

The fighting itself never touched the mill, although there were several bad scares. A Confederate raid in September, 1862 caused Charles Penrose to be called to active duty for a brief period. This incident moved Kemble and Warner to applaud Penrose's "defense of the land," although they were sure "the Rebels are in their last throes."<sup>28</sup> Nothing serious came of that raid, but the mill was slowed in filling its orders and some bloomaries did suspend operations while the raid was in progress.<sup>29</sup>

Lee's invasion of Pennsylvania in June, 1863 was a different matter altogether. One customer, Pusey and Jones of Wilmington, asked Lukens to hurry their order "before the Confederates hit your town."<sup>30</sup> By June 25, the Rebels were in Shippensburg, an important source of blooms. Charles Penrose was mustered again, this time with one quarter of Lukens's workmen.<sup>31</sup> It was feared the men would be lost to the mill for six months. Huston viewed the situation seriously enough to pack his wife's papers and ship them north. His catalogue of the contents

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of the boxes shows that between himself as trustee for his wife and those assets held in his wife's own name, she was worth \$76,299.77, excluding the stocks and bonds listed but whose value was not given. Most of these assets were mortgages and notes.<sup>32</sup> The New York agents, at a safe distance from the coming battle of Gettysburg, badgered Huston in spite of these troubles, and asked if the mill was running part time. They also put a brave face on things and assured Huston that they trusted "you will soon be out of your troubles and Lee and Co. safely locked up in Fort Lafayette."<sup>33</sup>

The mill escaped damage and the conscripted men returned quickly once the Gettysburg battle was over. It was a near thing though, for other iron masters in the area were not so fortunate. A forge owned by the notorious Abolitionist politician Thaddeus Stevens was burnt out *near Coatesville* by the rebels. He had supplied blooms to the Lukens mill, and this famous incident cost Huston and Penrose a source of raw materials.<sup>34</sup>

One final Confederate raid into the area in August, 1864, like those before it, left Coatesville unscathed but played "sad havoc" with production.<sup>35</sup>

Beyond the purely military alarms and diversions, the war had an enormous impact upon the Lukens establishment.

Production by 1863 had almost doubled over 1861 output. The firm achieved this dramatic rise in production simply by doubling manpower and running the mill harder. It made no additions to the plant and employed no new techniques. Though the plant was driven very hard during the war, the mill suffered remarkably few breakdowns that caused significant delay. The old lamentations about faulty machinery simply do not appear in the correspondence. It may be that with the press of orders holding high for years at a time, the operators rationalized their approach to preventive maintenance. The sustained high demand for iron may have compelled planning that was not necessary in earlier times when breakage-induced delays did not significantly alter production over the long run. The high demand during the Civil War did not allow "catching up" on orders.

Although the old techniques and equipment allowed considerable expansion of output, it was done in the teeth of serious difficulties. The main problems were scarce raw materials, soaring costs and quality control.

The crunch in bloom supplies was first noted in the summer of 1862 when Huston and Penrose found that the forgers producing high quality iron had their whole make committed to buyers with the price to be fixed at the

date of delivery.<sup>36</sup> Thus no stock of blooms could be built up at the mill, making it quite difficult to give a price on iron to be delivered in the future. This put the owners in a bind, and Charles Huston said that "this thing of filling orders months after they are taken is a poor business."<sup>37</sup> He proposed that Lukens should sell its plate as the bloomaries sold their blooms, that is, price to be determined at delivery. This proposal was not carried out, however.<sup>38</sup>

In 1862, in an effort to ease the supply of blooms, the partners secured pig iron from brokers in New York and New Jersey and supplied them to a forgemaster for conversion into blooms.<sup>39</sup> This unusual expedient was continued until the war ended. In addition, they looked much further afield for blooms, locating one source as far away as upstate New York.

This high demand for blooms put the forgemasters firmly in the saddle and changed the nature of the relationship between them and the mill. Huston and Penrose could no longer bargain effectively with them about prices or quality. Huston might complain to his agents that the forgemasters were getting "wild about prices," but he had to handle the forgemasters with kid gloves.<sup>40</sup> In the winter of 1863, Huston wrote to a forgemaster:

Bought outside  
State

Are you making any Blooms, if so are you offended at us and unwilling to sell to us or what is the reason we never hear from you anymore.<sup>41</sup>

The cost of supplies to the mill grew without a break after 1862, and in July, 1864 Huston and Penrose reported to Kemble and Warner that it took almost all the money they made in one month to purchase blooms for the next.<sup>42</sup> By September, Huston felt that the bloomaries had to be warned, and he wrote one forgemaster:

- our policy therefore now is to work our stock down and if necessary curtail our business and if the furnacemen don't take care they will find the very exorbitant prices they are demanding will check all enterprise and leave them without a market, in other words they are getting too much like the old woman who killed the goose that laid the golden eggs.<sup>43</sup>

Not surprisingly, the quality of Lukens iron suffered during this period. As noted above, the forgemasters could sell almost anything they made, forcing the mill operators to admit that the forgemasters would not bear much scolding about the quality of their product.<sup>44</sup> Even the forgemasters confessed to the inferiority of their goods at times. In a rare fit of candor, one wrote Lukens of a batch just sent them:

We fear the blooms made of the red-short iron will not prove very good - they worked very unsatisfactorily in the forge, the fault does not appear to be

merely red-shortness, but to a large extent the iron seemed 'coppery' and to be deficient in strength, hope they may do better in the Rolling Mill than anticipated.<sup>45</sup>

The fault for bad plate did not always lie with the blooms, and Huston and Penrose had their confessions to make also. In the spring of 1864 a letter from the mill to New York contained the admission that some of the iron delivered was defective because they were working the furnace in the mill beyond its capacity.<sup>46</sup> The war, however, made quality control less important; as long as the mill could keep production up, it could survive in the overheated market.

As in the previous decade, the partners entertained several new proposals about their business. Early in the Civil War, Huston and Penrose proposed to Kemble and Warner that the business be reduced to a cash basis only.<sup>47</sup> The great number of government orders they handled at that time were already being settled in cash, to the obvious advantage of both agent and manufacturer. Kemble and Warner agreed that it would be very nice to adopt Lukens's proposal, but it was in fact next to impossible to do so. The machinists who fabricated boilers often lacked capital to pay for their stock in advance. If Lukens settled for cash only, the machinists would be driven to those mills

that gave credit.<sup>48</sup> Huston and Penrose gave in to the judgment of their agents.

On October 2, 1863 Huston and Penrose offered Richard Gibbons \$14,000 for his rolling mill in Wilmington. Settlement and possession of the mill was to take place on October 15.<sup>49</sup> Gibbons reported on October 6 that his price was \$15,000 and that he could not turn over the mill before January 1, 1864.<sup>50</sup> Huston and Penrose ignored this counter-offer, and one week later Gibbons lowered the price to \$14,000 and possession by mid-December.<sup>51</sup> Huston and Penrose asked for a week's time to consider the offer, and during that week Gibbons offered possession by November 16.<sup>52</sup> At this point the correspondence stopped until January 28, 1864 when Huston and Penrose cancelled the negotiations:

Thine of the 27th inst. is received.  
In reply we have to say we do not wish  
to extend our business at this time  
and must therefore decline purchasing  
thy mill.<sup>53</sup>

The whole episode is a puzzle. Gibbons quickly met the Lukens offer, save that possession of the mill would be delayed one month from the date Huston and Penrose wanted. It appears that the partners simply changed their minds and decided to ride out the war with existing capacity, despite the pressure of demand. The reason that



the venture fell through was certainly not that the partners lacked funds for the purchase. Starting in January, 1865 the owners began investing in government securities, so that by the end of that year they had over \$67,000 invested in bonds and treasury certificates.<sup>54</sup>

At the war's end, the physical plant was unchanged, but the business had grown. There were about a dozen more hands on the job and the partners were far richer than at the start of the conflict. The correspondence shows no jubilation when the war ended. The owners were already looking beyond the war in the spring of 1865, so that when Lee and his army were "bagged," Huston and Penrose merely observed that they stood to lose money on the raw materials they had accumulated at wartime prices.<sup>55</sup>

One last shock born out of the war waited for the men of Lukens - the assassination of President Lincoln. On April 23, 1865 Huston wrote to Kemble and Warner saying that:

We have not been doing a great deal of business here in consequence of our heavy national affliction which indeed seems to every one as a personal bereavement - a cause for sorrow in every way.<sup>56</sup>

On that bleak note, a tradition ended at Lukens. The business correspondence which had been salted with comments on politics and national affairs stuck strictly to business

after that date.

Once the war ended, the mill easily reverted to something approaching its pre-war market situation. The market area recovered its former limits with the reestablishment of the New Orleans agency. The partners were looking cautiously ahead to a meanly competitive peacetime market, shorn of the easy glut of military orders. Nevertheless, on balance the situation looked tolerable enough. Production in 1866-1867, though down 25% from the wartime high, stabilized at about 30% higher than the best pre-war levels. However, this higher output required a 60% increase in hands over the pre-war labor force. The disproportionate amount of labor required for higher production was an ominous trend. This trend towards lower labor productivity was mitigated by high prices which, though drifting downward for two years after the war, finally stabilized at a level 35% higher than the pre-war averages, thus helping an antique mill remain in the market.

The first several months following Lee's surrender were hectic and uncertain. As noted earlier, the partners expected to lose money on the inventory accumulated at wartime prices. Nor were they surprised by low order backlogs. By early May, prices had slipped better than ten

per cent, down to eight and a half cents a pound for best iron, and some agents called for sales at seven and a half cents.<sup>57</sup> Huston and Penrose agreed to sell at eight and a half cents but balked at the lower price and threatened to stop the mill rather than make best iron at seven and a half.<sup>58</sup> By the end of May, things were so tight that the partners told one agent that they might let the mill stand idle right through to harvest time and let their men help the farmers.<sup>59</sup>

That threat was not carried out, and Lukens kept running in a difficult time, trying to stay in the market. By the middle of June, Kemble and Warner got instructions to seek out orders "at the best price you can, but take orders for us -."<sup>60</sup> Other agencies were approached at the same time for orders. Huston and Penrose asked John Holdane of New York, "Can't you send us some orders? Or do you intend to turn us off now that times are dull -."<sup>61</sup> Holdane, though, did not receive discretionary power over prices, as had Kemble and Warner.

Huston and Penrose were right to stay in the market, and their patience was rewarded quickly. In July they got a large order from New York destined for use in California.<sup>62</sup> By September, the price of best plate had risen to nine cents in New York and continued upward to

nine and a half by that November.

The decision to risk staying in the market was made easier by the fact that the partners enjoyed very considerable financial reserves accumulated during the war. The trial balance for the second quarter of 1865 shows that at the end of June, Huston and Penrose had \$48,000 in a treasury note account and \$15,000 in cash.<sup>63</sup> With resources like that available, keeping the plant in operation was a low-risk option.

The bonds noted above appear on the books quite suddenly in April, 1865, when the trial balance shows an entry of \$15,000 in a treasury note account for the first time. By July, 1866 the treasury note account grew to \$58,100, even though the partners had pulled \$17,596.75 out of the business through their personal drawing accounts over the same interval, and there was still \$11,173.27 in the cash account.<sup>64</sup> The owners, though, were in no hurry to invest these funds in 1865-1866. They would not use them until December, 1867 when the partners began to invest in a fuel and smelting company. This venture ultimately became a dead loss, as will be seen below. Until late 1867 the original business was not expanded or modernized and most of the surplus bonds were left to draw interest.

The decision to continue the business unchanged worked well enough until the spring of 1866. The market price of iron held firm at nine and a half cents a pound in New York. When Kemble and Warner lost an order because the mill could not make wide iron, they chided Lukens for operating an antiquated mill.<sup>65</sup> Huston and Penrose ignored that plea to modernize the plant. They also refused to have a new furnace built at the mill because of high labor and material costs.<sup>66</sup> In July, the owners also refused an offer to buy into a forge with others that would have required a total outlay of \$155,000.<sup>67</sup>

It was well that the partners put those proposals aside. By mid-February, 1866 they thought the market looked "blue."<sup>68</sup> Their agent, Kemble and Warner, were more optimistic. Though conditions were uncertain at the time, the New York firm expected trade to be good for the rest of 1866, "but after that we say look out -."<sup>69</sup> They were wrong about 1866 and the pessimistic assessment from Lukens was quickly confirmed. By April, best iron had slipped to seven and a half cents. At the same time, costs remained high for materials and wages. Bloom prices remained high until November when they finally dropped by twenty per cent to \$100 a ton. Wages remained fixed however, in spite of an effort to reduce them.<sup>70</sup>

Other events also conspired to make 1866 a difficult year. On the second day of the new year, Huston and Penrose found out that a load of their iron had sunk while en route to Providence, Rhode Island. The iron was insured, but that mishap seemed to forecast a bad time for the mill. Aside from the usual damaged furnaces and broken rolls, the mill had a major breakdown in March when the fly wheel stripped its supporting shaft.<sup>71</sup> With the malign perversity of machines, the fly wheel came unstuck in the month when the mill was running hardest.

Other problems vexed Huston and Penrose. The firm's agents were raising embarrassing questions about the quality of Lukens iron. Small amounts of Lukens iron had been rejected from time to time before, but those episodes were sporadic. In June, 1866, however, almost twenty five per cent of a large order was condemned.<sup>72</sup> There had never been an incident on that scale before. Again in December, an inspector of the Hudson Railroad Company condemned a lot of Lukens iron and refused to try any more since he did not "consider it safe to put into a boiler or any other place where good iron was required."<sup>73</sup> No one had ever said anything like that before.


The end of 1866 brought no relief to Huston and Penrose. In fact, the early part of the year before them

would mirror the one past, with prices slipping more than costs. Best iron fell from seven and a half cents to six and three quarters between January and December, 1867. In the same period blooms fell from \$100 to \$85 a ton. Wage rates remained stable, as did the price of coal. Quality control seems to have remained a difficult problem also. In January, the mill was running simply to stay in the market. A letter to Kemble and Warner shows how tight things were.

Will accept the order at five cents [second grade plate] at mill although we do not know whether we can make it without loss. By the time we fill these two orders we shall be able to say more definitely as to making five cents a regular rate at Mill.<sup>74</sup>

Business got better as the year progressed, but it was not buoyant. In July, the New York agency wrote that "business was remarkably dull and collections difficult to make, there appears to be no money among the people -."<sup>75</sup> In October, the mill was let stand idle a week for lack of orders.<sup>76</sup> The mill ran the rest of the year, but only because "...it makes a show at business and keeps the hands together."<sup>77</sup> In fact, the complaints made in the last three quarters of 1867 were out of place. Prices were falling, but costs were to fall even more. This, however failed to still the complaints from Coatesville.

In spite of the unsettled events of the two preceding years, in December, 1867 Huston and Penrose began to make a series of unprecedented changes in their business. All the notions and innovations which the partners had systematically rejected for seventeen years were adopted in four. Between 1868 and 1870 against all precedent, they invested large amounts of money in an outside venture; they finally marketed the premium iron they had talked about for so long, they had a railroad spur run up to the mill, and most important, after two years of discussion and consideration of alternatives, in 1870 they erected and put into operation a new steam powered rolling mill. This new mill allowed Lukens to exploit a new market for boat iron. This change called for the extensive use of puddled iron and that requirement caused the old mill to be converted to a puddling mill in 1871.



The implementation of these changes took place in the face of an indifferent market. Production crept ahead to 1,366 tons in 1868, a gain of 118 tons over 1867. In 1869 production ran 1,328 tons and in 1870 it came to 1,359 tons. Huston and Penrose were being clinically accurate when they described the market as flat. Several things made business difficult between 1868 and 1870. In 1868 Lukens might have done better but for the fact that they lost the Corliss Steam Engine Company as a customer.



No reasons were given why this old collaboration ended. In 1869 the summer was hot; the partners said they were "parched," but in spite of the low water, they kept deliveries up to demand.<sup>78</sup> The year 1870 shows the market shifting when they got their first order for boat iron in February, but the big event was the construction of the new mill, which did not prevent the old one from running at a pace that matched the preceding twenty one years. But while output remained virtually unchanged, Huston and Penrose executed plans during these three years that transformed the original aspects of their business.

Their first attempt to change the shape and scope of the firm was a total failure. The partners invested the firm's money in the Vinton Furnace and Fuel Company. The rationale behind the investment in Vinton remains a mystery. It was not a decision to rationalize the acquisition of blooms and coal for Lukens. The books do not show that Vinton ever supplied a single ton of iron or coal to Lukens. Vinton paid some small dividends to the partners but not nearly enough to offset their losses in the ultimate collapse of the enterprise. The decision to invest in Vinton was not discussed in the business correspondence of Lukens. A year after Huston and Penrose made the initial commitment of \$11,831.50 to Vinton, they wrote to another co-investor, W. Boyd Jacobs, that they were not inclined t

advance more funds without more security.<sup>79</sup> By that time, December, 1868, the partners had invested \$40,996.50 into Vinton. This momentary spasm of prudent reluctance passed, however, and over the next eighteen months they poured over \$50,000 more into Vinton without a murmur.<sup>80</sup>

The beginning of the end shows in the Lukens balance of July, 1870 when the value of the Lukens investment in Vinton stock slid from its high of \$94,851.03 during the previous quarter to \$55,686.03 in July. The difference is found under "Profit and Loss" on the debit side for the quarter beginning in July.<sup>81</sup> The partners registered the final act of this disaster in Lukens's ledger on December 30, 1871 when they wrote off the balance of the Vinton stock as a dead loss.<sup>82</sup>

The Vinton affair does not fit in with the historical pattern of the business at all. The partners had considered other outside investments before, but had ultimately rejected them all. The mill had thrived under this kind of cautious management. This decision to invest is not mentioned in the correspondence, nor is the decision to write it off as a loss. The only letter that does concern itself with Vinton shows that the partners were nervous about their investment, and yet they pressed ahead with it. The partners got no profit or goods from Vinton, and they

remained almost completely silent about it. Yet, up to that time, this venture represented the largest single financial investment undertaken by Lukens.

Nevertheless, the money poured into this fiasco did not inhibit the growth and reequipment of Lukens described below. Where then, did the money for the Vinton investment come from? It would not appear that the partners used funds from non-partnership sources. Isabella Huston had considerable property of her own, but there is no evidence that Dr. Huston ever used it in his own business ventures. Nor is there anything to suggest that Charles Penrose had access to any resources save for his share in the partnership's assets. Thus, they must have drawn from wartime profits for this misadventure and hence the wartime profits must have been large.

The second in the series of changes and innovations proved more successful than the Vinton affair. In the spring of 1868, the partners brought into production a premium grade boiler plate they named "Wawassett."<sup>83</sup>

They had proposed making a very high grade plate several times before, but their agents had rejected the idea until 1868 because they thought that such iron would be too expensive for the market. While the introduction of this new iron was a commercial innovation for Lukens, it required

little change in the operations at the mill. "Wawasset", except for the use of scrupulous care in selecting materials for equally careful manufacture, was made in the old way. It represented the old technology pushed to its limits.

More important by far than the introduction of a new grade of plate which left mill operations essentially unchanged in size and technique was the construction of a new steam-driven mill capable of rolling wide iron. The new mill allowed Lukens to increase its output to nearly 4000 tons a year by 1873. The construction of the new mill also allowed Lukens to convert the old mill for puddling, and thus allowed the business to exploit a new market for boat iron. Further, the conversion of the old mill permitted the business to begin to control part of its supply requirements.

As early as May, 1868, the partners began a series of inquiries about possible equipment for the new mill. They considered gas-fired furnaces, and in October, 1868 they asked Tuttle-Garfield and Company of Boston for the cost of the rights to use the Siemens gas process for their furnaces. They also wanted to know if their furnaces could be modified for this process, what the gas generator would cost, and if the firm guaranteed satisfactory results.<sup>84</sup>

Two months later, Huston and Penrose wrote the West Engine Company for the price of certain parts of the new roll train to be driven by a steam engine.<sup>85</sup> The West Engine Company jumped at the proposal and sent a man to the mill to check the details. They also offered to sell Lukens a 150 horse-power steam engine for the mill.<sup>86</sup> Nothing further came from this negotiation, but the partners continued to ask other firms about various technical processes throughout the next year.

Planning for the new mill continued in 1869. Some of the possibilities considered were not modest. In August, Huston and Penrose wrote to Johnson and Paine of Pittsburgh and asked for the names of mills with three-high roll trains and for the names of the builders of such machinery.<sup>87</sup> When they received the information they wrote to a machine shop, Totten and Company of Pittsburgh, asking to see Totten's three-high mill in operation and inquiring about the price of a mill with 96 inch long rolls.<sup>88</sup> They had taken their agents' criticisms about their inability to roll wide iron to heart and were looking at a wide range of possibilities for the future.

The partners began to tell agencies in early 1870 that the new mill would be in operation by the early summer. As it turned out, this estimate was too optimistic by five

months. Negotiations for the steam engine to power the mill continued from mid-February to early April before Pusey Jones and Company of Wilmington, Delaware finally got the contract.<sup>89</sup> From April to September the work on the new mill advanced steadily and without serious complication.

The partners were quick to tout the virtues of the new mill while it was abuilding. They declared that it would finally enable them to roll iron as cheap and as wide as anybody. Made of chilled steel, the new 84 inch rolls would also give the plate a superior surface finish.<sup>90</sup>

All this was exciting enough, but it did not represent a complete break with the past. The new mill would not take advantage of all existing technological capabilities. In March, Charles Huston wrote to a James Montgomery of New York telling him:

We have been looking into the principle of reverse mills for several years and for boiler plate find very serious objections to all - we have therefore ordered our machinery to be constructed very much after the old plan with some improvements of our own.<sup>91</sup>

When the mill started up in November, after some vexing delays in September and October, the owners professed themselves happy with it. They said that:

It is considered by all the workmen around here to be the best and most complete plate mill in existence and so think we - everything works to a charm except that we have had bad steel in the knives of our trimming shears - furnace, boilers, roll train, engine - are perfect and ample room for everything.<sup>92</sup>

Their conservative approach to the planning of the new plant seems to have paid off. The new mill shook down with few untoward incidents. The shears were quickly fixed and the steam engine proved to be a model of powerful reliability.<sup>93</sup>

While Huston and Penrose were justifiably proud of their new mill and assured others that they could roll more, better and wider iron than previously, they were disinclined to try to roll steel, even though the ingots could be easily obtained. Retreating to their old cautious ways, they chose to stay with a process they knew well.<sup>94</sup>

The construction and breaking in of the new mill and the developing of the market for boat iron overshadowed everything else in 1870. The initial order for boat iron came to Lukens in February.<sup>95</sup> Further, the ability to roll wide iron would please the ship builders in Wilmington. This market did not supplant boiler plate production in any significant measure in 1870, but it was one of considerable future potential.

All these changes made between 1868 and 1870 did not really begin to pay off until 1871. The market for Lukens iron was flat throughout 1870 and the partners had to hector the agents a bit for sales; it was all Lukens could do to hold even with the year before. The unhurried pace at the old mill let Charles Huston attend to his new one. It was a good thing that the new mill was well built and reliable, for 1870 was to be the last slow year for some time. Newly equipped for added output, Lukens rolled an average of 3,315 tons per year between 1871 and 1874, double the best annual rate of the Civil War.

Aside from the major changes of the last two or three years of the decade, two isolated episodes illustrate both continuity and change in Lukens's policies. First, on November 23, 1868 one of the men working at the mill was killed. No one saw the accident and "when on looking for him he was found at the bottom of the fly-wheel pit entirely dead."<sup>97</sup> The journal shows that the man was new on the job. His unfamiliar surroundings were probably a primary cause of the accident. This was the only lost time accident reported at the mill between 1850 and 1870, a remarkable record, given the many opportunities at the mill for burns, mashed fingers, mangled toes, bruises and broken bones. Perhaps any of the lesser accidents were not worth comment, but it is hard to believe they did not



occur. The partners assembled a purse for the widow after this accident, maintaining their posture of benevolent paternalism.

The second event concerned the construction of a railroad spur up to the mill in 1869. The method of payment for this improvement was unusual. The partners made payments to the Wilmington and Northern Railway while the track was being laid. Upon completion of the job, the ledger shows that a cost was transferred into an asset; Huston and Penrose got \$16,866.67 worth of Wilmington and Northern in return for paying for the spur.<sup>98</sup> In effect Lukens had built its own track and received the stock free.

The ten years following 1860 seem at first sight to have been remarkable different from those of the preceding decade. By the end of the Civil War, production was running twice the average annual rate in the 1850's. After the Civil War production fell off but still remained about one third higher than the average annual rate of the 1850's. The labor force that had doubled during the war remained high afterward, while the capital invested in the old mill increased by fifty per cent. The new capital went into improvements to the water wheel, the roll train and

the railroad spur.

The quantitative changes between the two decades are impressive, but they tend to mask a qualitative stability. Lukens accomplished all the changes in output by the use of techniques, raw materials and tools that were common to both decades. To get more output, the partners simply drove the old mill harder.

A formula that had worked in 1860 was, however, found increasingly inappropriate by 1870. The census of manufacturers shows that in 1860 Lukens's vital statistics were:

CAPITAL INVESTMENTS:	\$60,000
RAW MATERIAL COSTS:	\$61,675
ANNUAL WAGES FOR 18 HANDS:	\$7,200
ANNUAL PRODUCTION:	1000 tons valued at \$80,000

In 1870 before the new mill was opened, the census showed:

CAPITAL INVESTMENT:	\$100,000
RAW MATERIAL COSTS:	\$127,950
ANNUAL WAGES FOR 30 HANDS:	\$17,250
ANNUAL PRODUCTION:	1,500 tons valued at \$165,000

The new steam powered mill did represent a break with the past. Furthermore, it enabled Huston and Penrose to exploit a new market for boat iron by converting the old mill into a puddling mill to assure themselves of a good supply of cheap wrought iron. Still, the new mill did not represent as thoroughgoing a change as it might have. As

Charles Huston put it, it was "...to be constructed very much after the old plan."<sup>99</sup> Nor was the construction of a puddling mill an innovation in 1870. The refusal to roll steel plate in the new mill also shows a disinclination to innovate.

This kind of restrained growth was not the rule in Coatesville. While Lukens cautiously edged toward change in the late 1860's, the other two local mills, Pennock and Company and Steel and Worth transformed themselves. The census of manufactures shows that Pennock and Company and Steel and Worth were about the same size as Lukens in 1860.

	LUKENS	PENNOCK & CO.	STEEL & WORTH
CAPITAL INVESTED	\$65,000	\$60,000	\$60,000
POWER	90 H.P. Water	120 H.P. Water	180 H.P. Steam
WAGES	18 hands @ \$600 per mo.	19 hands @ \$600 per mo.	25 hands @ \$1000 per mo.
RAW MATERIAL COSTS	\$61,675	\$54,325	\$54,900
PRODUCTION	1000 tons valued at \$80,000	1000 tons valued at \$70,000	1000 tons valued at \$80,000

But by 1870 Pennock and Company and Steel and Worth had left Lukens behind.

	LUKENS	PENNOCK & CO.	STEEL & WORTH
CAPITAL INVESTED	\$100,000	\$350,00	\$330,000
POWER & EQUIPMENT	100 H.P. Water  1 set rolls	450 H.P. Water & Steam 3 train of rolls	523 H.P. Water & Steam 4 train of rolls
EMPLOYEES & WAGES	30 hands @ \$17,250 per year	150 hands @ \$75,000 per year	120 hands @ \$75,000 per year
RAW MATERIAL COSTS	\$127,950	\$289,166	\$397,500
PRODUCTION	1500 tons	not given	5000 tons
VALUE OF PRODUCTION	\$165,000	\$515,460	\$600,000

The new mill that sparked the pride of Charles Huston and Charles Penrose was, by Coatesville standards, a nice little mill. It is impossible to determine exactly how the new Lukens plant would have compared to the others since the census was taken before the new mill was put into operation. There was no change in the number of hands when

the new mill was opened, but the puddling mill would require some hiring when it began operating. The cost of building the new mill and modifying the old one are impossible to determine with any precision but together do not appear to have exceeded fifty thousand dollars. This suggests that Lukens did not attempt to approach operations on the scale of its neighbors.

There is little direct evidence which explains the slow and cautious growth of the firm in the 1860's. The partners had shown a reluctance to expand their business by purchasing Gibbons's mill during the war when demand was high. They usually were indifferent to proposals to engage in outside ventures. The exception to this was the disastrous Vinton affair. The loss of about \$80,000 did deny Huston and Penrose funds which could have made the new mill a much more ambitious effort. In the end, however, the Vinton losses may explain very little. There was no comment in the correspondence which suggests that the episode depleted the resources of the firm. Nor is there any suggestion that the partners wanted a bigger plant than the one they built.

The decision to limit the growth of Lukens was self-imposed. They knew their markets very well. The principal market places, New York, Philadelphia and Boston,

remained unchanged. In those markets the demand for Lukens boiler plate remained stable, and Huston and Penrose did not try to seek out new markets for their boiler plate.

Save for the mysterious Vinton flyer, the vigilant skepticism and cautious restraint shown by the Lukens managers in the 1850's remained characteristic of them during the next ten years. They changed things only in 1868-70 when the advantage became obvious or the need imperative. Even then, the changes were made with great deliberation and care. The partners remained proof against the appeal of innovation and quick expansion.

CHAPTER VI

<sup>1</sup>Ibid., 346. Jan. 18, 1861. Huston and Penrose to Schock and Sons.

<sup>2</sup>Ibid., 196. Feb. 21, 1861.

<sup>3</sup>Ibid., 346. Feb. 25, 1861. Huston and Penrose to W. M. Watts.

<sup>4</sup>Ibid., 346. March 5, 1861. Huston and Penrose to W. M. Watts.

<sup>5</sup>Ibid., 346. April 10, 1861. Huston and Penrose to W. M. Watts.

<sup>6</sup>Ibid., 346. April 17, 1861. Huston and Penrose to Richard Norris and Co.

<sup>7</sup>Ibid., 418. May 8, 1861. Issac Spear to Huston and Penrose.

<sup>8</sup>Ibid., 346. May 16, 1861. Huston and Penrose to Issac Spear.

<sup>9</sup>Ibid., 346. May 22, 1861. Huston and Penrose to Corliss Steam Engine Co.

<sup>10</sup>Ibid., 124. May 18, 1861. Kemble and Warner to Huston and Penrose.

<sup>11</sup>Ibid., 196. August 16, 1861. John Mitchell to Huston and Penrose.

<sup>12</sup>Ibid., 196. August 30, 1861. Kemble and Warner to Huston and Penrose.

<sup>13</sup>Ibid., 197. Feb. 21, 1862. Jay Cook and Co. to Huston and Penrose.

<sup>14</sup>Ibid., 197. April 28, 1862. Kemble and Warner to Huston and Penrose.

<sup>15</sup>Ibid., 197. May 12, 1862. Kemble and Warner to Huston and Penrose.

<sup>16</sup>Ibid., 197. May 13, 1862. Kemble and Warner to Huston and Penrose.

<sup>17</sup>Ibid., 198. August 9, 1862. Kemble and Warner to Huston and Penrose.

<sup>18</sup>Ibid., 348. August 12, 1862. Huston and Penrose to W. M. Watts.

<sup>19</sup>Ibid., 198. August 14, 1862. Huston and Penrose to W. M. Watts.

<sup>20</sup>Ibid., 198. August 25, 1862. W. M. Watts to Huston and Penrose.

<sup>21</sup>Ibid., 348. Sept. 5, 1862. Huston and Penrose to Kemble and Warner and 198. Sept. (day obscured), 1862. Kemble and Warner to Huston and Penrose.

<sup>22</sup>Ibid., 348. Oct. 25, 1862. Huston and Penrose to Gideon Welles, Secretary of the Navy.

<sup>23</sup>Ibid., 348. Oct. 27, 1862. Huston and Penrose to W. Boyd Jacobs.

<sup>24</sup>Ibid., 198. Nov. 13, 1862. Jacob Schock and Bros. to Huston and Penrose.

<sup>25</sup>Ibid., 24. Feb. 18, 1865.

<sup>26</sup>Ibid., 197. Feb. 26, 1862. Mary Griffith to Charles Penrose.

<sup>27</sup>Ibid., 197. March 8, 1862. Mary Griffith to Charles Penrose.

<sup>28</sup>Ibid., 198. Sept. 19, 1862. Kemble and Warner to Huston and Penrose.

<sup>29</sup>Ibid., 348. Sept. 26, 1862. Huston and Penrose to I. P. Morris Towne and Co.

<sup>30</sup>Ibid., 199. June 16, 1863. Pusey and Jones to Huston and Penrose.



<sup>31</sup>Ibid., 348. June 25, 1863. Huston and Penrose to Kemble and Warner.

<sup>32</sup>Ibid., 348. June 27, 1863. Huston and Penrose to Kemble and Warner.

<sup>33</sup>Ibid., 199. June 30, 1863. Kemble and Warner to Huston and Penrose.

<sup>34</sup>Ibid., 200. July 13, 1863. Thaddeus Stevens to Huston and Penrose.

<sup>35</sup>Ibid., 349. August 10, 1864. Huston and Penrose to Kemble and Warner.

<sup>36</sup>Ibid., 347. August 21, 1862. Huston and Penrose to Corliss Steam Engine Co.

<sup>37</sup>Ibid., 348. Nov. 8, 1862. Huston and Penrose to Kemble and Warner.

<sup>38</sup>Ibid.

<sup>39</sup>Ibid., 348. Oct. 7, 1862. Huston and Penrose to William Boyd Jacobs.

<sup>40</sup>Ibid., 348. Dec. 2, 1862. Huston and Penrose to Kemble and Warner.

<sup>41</sup>Ibid., 348. Dec. 7, 1863. Huston and Penrose to Schock and Bros.

<sup>42</sup>Ibid., 349. July 17, 1864. Huston and Penrose to Kemble and Warner.

<sup>43</sup>Ibid., 349. Sept. 23, 1864. Huston and Penrose to H. C. & J. Leight.

<sup>44</sup>Ibid., 349. Sept. 7, 1864. Huston and Penrose to John H. Flagler.

<sup>45</sup>Ibid., 419. Oct. 8, 1863. Jacobs & Bull to Huston and Penrose.

<sup>46</sup>Ibid., 349. April 15, 1864. Huston and Penrose to Kemble and Warner.

<sup>47</sup>Ibid., 348. Nov. 17, 1862. Huston and Penrose to Kemble and Warner.

<sup>48</sup>Ibid., 198. Nov. 18, 1862. Kemble and Warner to Huston and Penrose.

<sup>49</sup>Ibid., 348. Oct. 2, 1863. Huston and Penrose to Richard Gibbons.

<sup>50</sup>Ibid., 420. Oct. 6, 1863. Richard Gibbons to Huston and Penrose.

<sup>51</sup>Ibid., 420. Oct. 14, 1863. Richard Gibbons to Huston and Penrose.

<sup>52</sup>Ibid., 348. Oct. 16, 1863. Huston and Penrose to Richard Gibbons; and 420. Oct. 19, 1863. Richard Gibbons to Huston and Penrose.

<sup>53</sup>Ibid., 348. Jan. 28, 1864. Huston and Penrose to Richard Gibbons.

<sup>54</sup>Ibid., 72. Trial balance dated Oct., 1865; and 418. June 3, 1865. Samuel Huston to Huston and Penrose.

<sup>55</sup>Ibid., 350. April 10, 1865. Huston and Penrose to E. and G. Brooke.

<sup>56</sup>Ibid., 350. April 24, 1865. Huston and Penrose to Kemble and Warner.

<sup>57</sup>Ibid., 350. May 18, 1865. Huston and Penrose to John Holdane.

<sup>58</sup>Ibid.

<sup>59</sup>Ibid., 350. May 31, 1865. Huston and Penrose to Flagler and Co.

<sup>60</sup>Ibid., 350. June 13, 1865. Huston and Penrose to Kemble and Warner.

<sup>61</sup>Ibid., 350. June 13, 1865. Huston and Penrose to John Holdane.

<sup>62</sup>Ibid., 419. July 7, 1865. Flagler and Co. to Huston and Penrose.

<sup>63</sup>Ibid., 72. Trial balance, July 1, 1865.

<sup>64</sup>Ibid.. Trial balance, April, 1865 to July, 1866.

<sup>65</sup>Ibid., 419. Jan. 4, 1866. Kemble and Warner to Huston and Penrose.

<sup>66</sup>Ibid., 350. Feb. 10, 1866. Huston and Penrose to Kemble and Warner.

<sup>67</sup>Ibid., 419. July 14, 1866. A. B. Warner to Huston and Penrose.

<sup>68</sup>Ibid., 350. Feb. 15, 1866. Huston and Penrose to Kemble and Warner.

<sup>69</sup>Ibid., 419. Feb. 21, 1866. Kemble and Warner to Huston and Penrose.

<sup>70</sup>Ibid., 351. March 23, 1866. Huston and Penrose to Holdane and Co. The negotiations over wage rates are not described.

<sup>71</sup>Ibid., 350. March 2, 1866. Huston and Penrose to Kemble and Warner.

<sup>72</sup>Ibid., 415. June 19, 1866. Holdane and Co. to Huston and Penrose.

<sup>73</sup>Ibid., 419. Dec., 1866. Kemble and Warner to Huston and Penrose.

<sup>74</sup>Ibid., 351. Jan. 23, 1867. Huston and Penrose to Kemble and Warner.

<sup>75</sup>Ibid., 419. July 20, 1867. Kemble and Warner to Huston and Penrose.

<sup>76</sup>Ibid., 351. Oct. 8, 1867. Huston and Penrose to A. B. Warner & Son.

<sup>77</sup>Ibid., 352. Nov. 12, 1867. Huston and Penrose to A. B. Warner & Son.

<sup>78</sup>Ibid., 353. August 21, 1869. Huston and Penrose to A. B. Warner & Son.

<sup>79</sup>Ibid., 352. Dec. 4, 1868. Huston and Penrose to W. Boyd Jacobs.

<sup>80</sup>Ibid., 72. Trial balances for 1868 and Jan. to July, 1869. The author has been unable to find any reference to a place called Vinton. Nor do any of the available business directories refer to the Vinton Furnace and Fuel Company.

<sup>81</sup>Ibid. Trial balance of July, 1869.

<sup>82</sup>Ibid., 46. Ledger entry for Vinton Furnace and Coal Co.

<sup>83</sup>Ibid., 352. March 17 and 20, 1868. Huston and Penrose to A. B. Warner & Son.

<sup>84</sup>Ibid., 352. Oct. 21, 1868. Huston and Penrose to Tuttle-Garfield & Co.

<sup>85</sup>Ibid., 352. Dec. 14, 1868. Huston and Penrose to M. C. Boyer.

<sup>86</sup>Ibid., 210. Dec. 17, 1868. M. C. Boyer to Huston and Penrose.

<sup>87</sup>Ibid., 353. August 4, 1869. Huston and Penrose to Johnson and Paine.

<sup>88</sup>Ibid., 353. August 13, 1869. Huston and Penrose to Totten & Co.

<sup>89</sup>Ibid., 354. April 8, 1870. Huston and Penrose to Pusey Jones & Co.

<sup>90</sup>Ibid., 354. April 8, 1870. Huston and Penrose to A. B. Warner & Son. Also 354. March 5, 1870. Huston and Penrose to Paulding Kemble & Co.

<sup>91</sup>Ibid., 354. March 13, 1870. Huston and Penrose to James Montgomery.

<sup>92</sup>Ibid., 354. Nov. 14, 1870. Huston and Penrose to Thomas Wilbraham and Brothers.

<sup>93</sup>Ibid., 354. Dec. 6, 14, 1870. Huston and Penrose to Pusey Jones & Co.

<sup>94</sup>Ibid., 354. Nov. 21, 1870. Huston and Penrose to Carpenter and Wilson.

<sup>95</sup>Ibid., 354. Feb. 24, 1870. Huston and Penrose to A. B. Warner & Son.

<sup>96</sup>Ibid., 354. March 5, 1870. Huston and Penrose  
to Paulding Kemble & Co.

<sup>97</sup>Ibid., 352. Nov. 11, 1868. Huston and Penrose  
to A. B. Warner & Son.

<sup>98</sup>Ibid., 46. Ledger, p. 329. August 31, 1869.  
Wilmington and Reading Stock Account.

<sup>99</sup>Ibid., 354. March 13, 1870. Huston and Penrose  
to James Montgomery.

<sup>96</sup>Ibid., 354. March 5, 1870. Huston and Penrose  
to Paulding Kemble & Co.

<sup>97</sup>Ibid., 352. Nov. 11, 1868. Huston and Penrose  
to A. B. Warner & Son.

<sup>98</sup>Ibid., 46. Ledger, p. 329. August 31, 1869.  
Wilmington and Reading Stock Account.

<sup>99</sup>Ibid., 354. March 13, 1870. Huston and Penrose  
to James Montgomery.