

# An evaluation of the number and distribution of Burton unions

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## Introduction

Over a period just short of 40 years I escorted many thousands of visitors around Marston's Burton unions. In the course of this I tried to impart my own enthusiasm for the union system and its products and I hope that some of the visitors still remember the experience. In order to emphasise what, for much of this time, has been their unique status, I invariably, if somewhat unspecifically, recounted how widely they had been used in the past. Whilst I am confident that my gentle 'spin' was justified, mature reflection forces me to confess that I am not aware of any specific quantified data on the full extent of their use. This paper attempts to remedy that shortfall and, to some extent, understand both the number and the extent of Burton unions.

Despite the extensive loss of company records relating to most Victorian breweries, there is still a great deal of information available covering the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. These records that survive generally cover the commercial and corporate aspects of the brewing industry fairly well but seldom run to details of production plant, particu-

larly plant which has been superseded. There are only a few general, and largely theoretical descriptions, of Burton unions in the technical literature over that period.<sup>1</sup> Even in these little detail is given as to how they were used or operated, and there is virtually no hard information on their numbers.

Overwhelmingly, the largest source of information on numbers of union sets (and on Victorian breweries in general) is that provided by Alfred Barnard's four volume *Noted Breweries of Great Britain and Ireland*, published between 1889 and 1891. Without Barnard's unique survey attempting to evaluate the quantity of unions would be close to impossible and the data quoted in this paper is substantially, although not exclusively, based on his records. A clear understanding of this source is important and I refer to it throughout the paper. The primary contention of this article is that the number of Burton unions peaked at or around 1890. This coincided with high-points in both the volume of beer production and the number of common brewers, particularly in Burton on Trent. In evaluating the number of unions it is impossible to avoid the inextricable link between the

rapid expansion of the brewing industry in Burton in the mid 19<sup>th</sup> century and the rise in popularity of the Burton union system. I am conscious that to a significant extent this article reiterates the history of the rise of Burton on Trent and of the Burton trade in London and elsewhere. Inevitably it also touches on the survival of Burton on Trent as a brewing centre and its more recent changes. Much of this information is already well established in brewing history circles and will be well known to the many experts and amateurs interested in the subject: for that I can only apologise in advance. However, I hope to repay their attention by drawing together information of which they may not be aware and by presenting it from a slightly different viewpoint.

### **The rise of the Burton union**

... they are divided into twenty separate 'sets' the casks of each set communicating by pipes running alongside ... from each cask rises a bent copper tube or swan's neck through which the yeast produced by fermentation rises up into the trough above leaving the beer cleansed.

*A. Barnard: The Noted Breweries of Great Britain and Ireland, Vol. I. 1889*

As a starting point, what do we know of the history of Burton unions? Many believe that the system originated with Peter Walker's patent of 1838.<sup>2</sup> However, there is a strong case to be made that his

patent was not for what we would today recognise as a Burton union. Yet since we can identify neither a specific person responsible nor a specific place or date when all the recognised features of a union set first came together, Walker is, by default, the only nominee for the position of 'inventor.'

There is, of course, evidence both well before and over 100 years after 1838 of the use of casks in the commercial fermentation of beer with no pretence of them being a union system. There is also proof of the existence, long before 1838, of systems involving wooden two or multi-part fermenting vessels which, although they can scarcely be described as union systems, are precursors of unions or to some extent related to them. It has largely passed without comment that Walker's patented 'swans neck' yeast overflow covered not only a cask based yeast cleansing system, but was extended to apply to a split, (two level) wooden gyle tun. This was a neat simplification of the complex 'all singing all dancing' gyre tun with its own separate overhead yeast safe described by Shannon in 1805.<sup>3</sup> Shannon's illustrations showed a much simpler swan's neck shaped overflow delivered into the yeast safe which was much closer in concept to that used in the mature union system than Walkers later patent.

Shannon did not use casks, but thirteen years prior to 1838 R.W. Dickenson of the Albany Brewery was recorded by Morris, in the 1825 edition of his text A

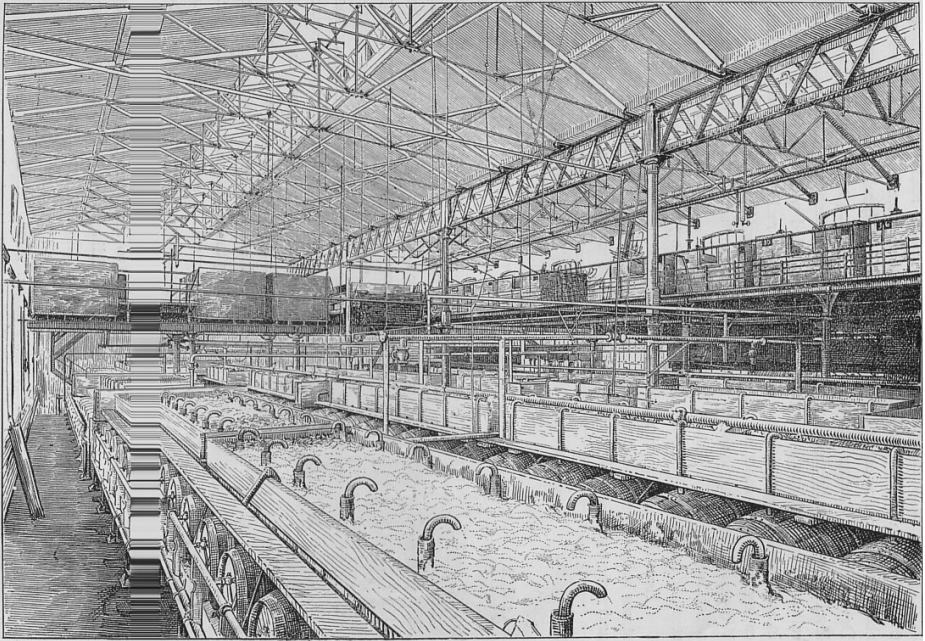


Figure 1. Engraving of Truman Hanbury and Buxton's Union Room in their Black Eagle Brewery, Burton upon Trent.

*Practical Treatise on Brewing*, as developing an arrangement similar to, but smaller than, Shannon's. This was based not on purpose built gyle tuns, but on upended casks. These overflowed up a straight yeast overflow pipe linking the cask head through the bottom of the yeast safe mounted on top of the cask, rather than through an up and over swans neck design. Significantly Dickenson's arrangement allowed drainage of the separated beer back to the cask through a second completely separate pipe matching more closely the concept used in the mature union system.

Clearly the design in Walker's patent did not arise solely from his personal 'blue sky' thinking, it built upon existing ideas. The new and key feature of Walker's patent was the cleverly combined swans neck yeast overflow and beer drain. However, no example of his swans neck design is recorded in use in any source. A development of it is illustrated in the 1854 patent of Burton brewer John Youil of Cross Street, who sold up in Burton in 1855.<sup>4</sup> His patent focuses on the exclusion of contact between product (or yeast) and air (a concept ahead of its time), including an air trap on a covered

top trough as well as two variants on Walkers combined overflow/drain arrangement. Youil's arrangements seem inherently uncleanable and there is no evidence of his ideas ever being put to use.

It is not widely understood that Walker's combined overflow/drain must have been abandoned quite early in the development of the union set and did not form part of the mature union system: only the simplest but most distinctive part of Walker's design which had already been used by others, the bent 'swan's neck' overflow pipe, was retained. In all the recorded 'mature' unions of the late Victorian period the functions of the swans neck overflow and the beer drainage were again completely separated, as they had been in the very early two vessel systems.

Certainly neither Walker's nor Youil's overflows feature in any of the breweries which Barnard visited in either text or illustration. This was certainly the case by the time of Barnard's visit to the Peter Walker Brewery in Burton (at that time operated by his executors) where Walker's original swan neck is not in use. Originality seems to remain linked with the Peter Walker name, however, since during the visit Hodson, then the Head Brewer, describes his own patent<sup>5</sup> for what proved to be a complicated and ingenious, but unsuccessful union set modification. This includes what sounds like a ball valve in the feeder trough controlling the flow of returning beer which flow was fed into the bottom of the casks via the bottom taps, rather than into the

cask heads via the side valves. This return via the bottom tap had the intention of keeping as much yeast in suspension as possible and working it out onto the top trough. A worthy idea which also added significantly to the union sets already considerable hygiene problems. There is no record of it being used successfully or otherwise anywhere else.

Amongst other features of Walker's original patent, it is clear that his casks were not linked together in any direct way and were a much looser assembly of casks than the mature Burton 'union' system eventually became. His cask arrangement was illustrated and referred to, almost in passing, as sharing an overhead or 'top trough.' This common overhead yeast trough Walker supported from the roof above the casks, presumably to allow the easy removal of casks for washing individually elsewhere. These casks might have been a mixture of sizes, possibly including trade casks. At some point this developed into the mature system of a frame, with a top trough mounted as part of the frame, which held the dedicated union casks semipermanently, supported in such a way that they could be rotated in the frame for washing. Walker's patent, although a blind alley in one respect, appears to have been significant in respect of a casual inclusion within it, that is the invention of the top trough, a key feature of the Burton union.

The James Williams patent of 1861<sup>6</sup> and the Edmund Alfred Pontifex patent of

1865<sup>7</sup> were the first illustrations of a mature union system of which I am aware. Yet both were concerned with offering solutions to the problem of revolving the cask for washing and both were complicated and short lived.

We also know that after 1982 there was only one brewery, Marston Thompson & Evershed p.l.c., still operating a significant Burton union system<sup>8</sup> comprising of eight union sets (232 casks). A further four sets (120 new casks) were installed in 1991.<sup>9</sup> In 2008, their current owners Wolverhampton & Dudley Breweries p.l.c., recently renamed as Marstons p.l.c., still employ working Burton unions. Prior to that Ind Coope and Allsopp's Burton brewery decommissioned their last unions in 1959,<sup>10</sup> Truman Hanbury and Buxton closed their Burton brewery and with it their unions in 1971 and Bass closed their last union room in 1982. By the time of these closures both Ind Coope and Bass, with the modernisation of their Burton operations, had significantly curtailed their dependency on unions from the large numbers described by Barnard.<sup>11</sup> So between 1838 and 1982 the union system rose to prominence and fell back to relative obscurity.

In examining the increase in numbers of Burton unions after Peter Walker's patent we first need to consider the nature and growth of the brewing industry in general in the mid and late 19<sup>th</sup> century. Over the period prior to Barnard's publication the amount of commercially brewed beer in the U.K. (including Eire) had risen

steadily between 1850 to 1880. At around that time the volume reached 31 million barrels a year.<sup>12</sup> During and post World War I volumes fell significantly and only steadily recovered to a similar level after World War II.<sup>13</sup> The amount today is again in decline. Mathias<sup>14</sup> indicates that in the late 18<sup>th</sup> century and early 19<sup>th</sup> century brewing was largely a small scale craft industry produced in a domestic environment. The only major breweries were the eight or so large London companies producing porter (and one in Dublin). However, in the mid 19<sup>th</sup> century other brewers developed, beginning to build plant on a similar scale across the country. Gourvish and Wilson<sup>15</sup> quantify the changes in the numbers of common brewers (commercial brewers, wholesaling to retailers) and their brewery sizes in some detail. Summarising this, in the early 19<sup>th</sup> century a large number of very small brewers, licensed not as common brewers but as licensed victuallers and beer house keepers (microbrewers in today's terminology), were in existence. Their numbers and output steadily fell after 1840 and declined even more rapidly after 1870. Correspondingly the overall number of common brewers had risen in the 50 years before 1880, but after that date their numbers decreased. In particular the number of smaller ones, brewing between 1,000 and 20,000 barrels a year, reduced dramatically whilst the larger common brewers, producing between 20,000 to 2,000,000 barrels a year, increased in number. By the time Barnard started writing in 1889 common brewers produced 90% of the

nation's beer and the first stage of brewing consolidation was almost complete and a second stage of that inexorable story was about to begin.

As a result of the national growth in volume and the increase between 1850 and 1880 in the size of common brewers at the expense of 'micro-brewers,' considerable new industrial scale brewing capacity was needed and a period of great expansion in brewery building followed. Pearson<sup>16</sup> identifies the boom as starting in 1860 and continuing until 1906. She lists 634 major projects, either new breweries, extensive rebuilds of breweries or major brewery expansions during this period. The peak years were in 1885, when 34 breweries were built or rebuilt, and 1889 with 31. Barnard's *magnum opus* reflects the results of much of this building work and its associated plant.

The brewing industry's fermenting capacity must have increased in line with the growth in volume and alongside its restructuring. In a growth situation, with a pressing need to match existing products, retain markets or to produce new products, with a low level of scientific understanding of fermentation, no risks would have been taken. The nature of new plant installed would have followed the perceived requirements of the products to be brewed in other words the *status quo* for existing products or the current fashion deemed necessary for new ones. The desire or necessity to experiment with and to 'modernise' fer-

mentation systems would not be great, although many fascinating and now obscure variants were devised by some of the mavericks in the industry. Barnard's accounts indicate that some of the investment, particularly in Burton, had involved new Burton unions as well as incorporating existing ones. For example, Bass continued to invest in its middle brewery (1853), in the new brewery (1864) and finally rebuilt the old brewery (1876), all with large numbers of unions which were still operating in 1889. Elsewhere continuous investment in fermentation perpetuated other existing local practices, such as Yorkshire (stone) squares. However, much of the fermentation plant recorded by Barnard took the form of variations on what was to be the mainstream practice for fermentation for the next 80 years, a combination of dropping and skimming vessels.

After the 1880s, when levels of production were at or close to their highest point, it would seem logical to conclude that the industry's fermenting capacity, and by inference that the number of Burton unions had reached its peak. There would, of course, be a lag in brewery owners comprehending and reacting to market trends, in completing immediate and long term investment plans and in some cases fulfilling their corporate ambitions.<sup>17</sup> Allowing for this, significant major investment in incremental fermenting capacity, including union sets, would certainly have been difficult to justify post 1890.

Further investment in fermentation plant in the early 20<sup>th</sup> century would depend on replacing old and worn out capacity, or be justified by generating significant improvements in efficiency or cost saving, such as might be driven by brewery closures and consolidation. It is worth noting that most of the fermentation plant and vessels described by Barnard between 1889 and 1891, particularly in smaller breweries, consisted of small fermentation units which were frequently below 80 barrels in capacity. Any relocation of 19<sup>th</sup> century fermentation plant, which was almost always incorporated into the building structure, was not to be undertaken lightly.<sup>18</sup> Brewery consolidation presented an opportunity, or even a necessity, to install new fermentation plant. This would be in larger and presumably more economically efficient units, both in capital and operating terms, and was promoted by progressive developments in the materials of vessel construction. Burton unions would not feature heavily in investment projects driven by efficiency gains or cost reduction but could be favoured where there was an overriding imperative to maintain specific beer characteristics, where, for example, a specific flavour was paramount.

The number of Burton unions was influenced by more than the volume of beer produced, or by the industry's capacity, or the increasing size of production units as they changed in the mid to late 19<sup>th</sup> century. At several points in his visits, when prompted by his hosts and

sponsors, Barnard reports an ongoing change in product style. In the 1850s porter dominated the beer market in London, by far the largest centre of population, although by 1890 that had changed significantly.<sup>19</sup> Public taste was still moving away from porters and stouts and towards ales. On his visit to Mann Crossman and Paulin's Albion Brewery on the Mile End Road, Barnard blithely writes off German lager as a three week a year drink but in poetic vein writes:

Our old friend Porter with its sombre hue and foaming head is no longer the pet of fashion but a bright sparkling bitter, the colour of sherry and the condition of champagne carries off the palm.

Barnard on the same visit reports that plant for the production of porter and stout had already been removed or had fallen into disuse. On another visit the old established London brewers Meux revealed to Barnard, with a measure of pride tinged with regret, that they had been one of the last brewers in London to abandon the practice of brewing only porter and stout and to have actually started brewing ale. They had held out until 1872. This was a public admission by the most die-hard of porter brewers of a forced change of policy. The disarming honesty perhaps also includes an element of Victorian spin designed to put what was a serious commercial problem in a more favourable light by using the installation of new ale plant to announce the Company's presence in the more fashionable ale.

This was a quantum shift in the alcoholic drinks market<sup>20,21</sup> parallel in many ways to the more recent moves away from mild to bitter and from both towards lager, wine and latterly to alco-pops or spirit mixers. By the time Barnard wrote about it in 1889 this change in taste from porter to ale was, in reality, already brewing history.

The old established large London breweries had, between the 1830s and 1880s, enjoyed considerable growth. This was to be expected since the population of London doubled over roughly this period and consumers purchasing power increased - but the growth of individual

brewers was variable and in some cases less than in other parts of the U.K.. Over this period the pecking order amongst the big London players changed. The more successful of the London breweries at the time Barnard was writing were generally those who at the start of the period of growth had been the smaller, more flexible ones and were the first to switch to producing ales.<sup>22</sup> These in the main produced mild ale, but when pale ales (which were sometimes not all that pale) first appeared in the market they were almost exclusively the province of Burton brewers. It was generally acknowledged, even by the London companies, that the Burton water com-

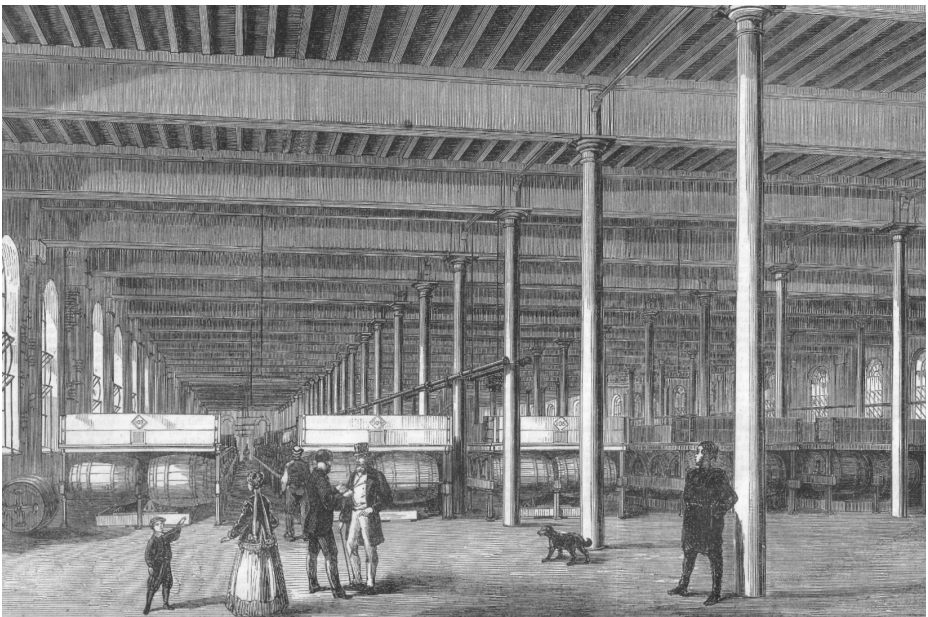


Figure 2. Engraving of Allsopp's union room in their New Brewery from London Illustrated News 1866.



bined with the union system, developed during the 1840s,<sup>23</sup> produced pale ales of an overwhelming superior reputation (and even more important a useful price premium).<sup>24</sup> This was a new and profitable market which brewers could only ignore at their peril: London and regional brewers had to 'get a slice of the action' and to offer pale ale to their customers, preferably by brewing their own.

This new wave of would-be pale ale brewers, both inside and outside London, all attempted with mixed success to emulate Burton. As a quick fix it was relatively easy and cheap to crudely match Burton water by adding gypsum, but creating a consistent and detailed match is a more complex task. When it came to the union system the high cost of investment in plant and buildings and its high running costs<sup>25</sup> made any decision as to its installation an expensive and difficult one, even for major brewers. From personal experience of creating a new union room in the 1990s I am all too well aware of the high cost of union plant compared to the modern alternatives.<sup>26</sup> In the late 19<sup>th</sup> and early 20<sup>th</sup> centuries this contrast was probably less marked, but none the less significant. In the 1880s, with appropriate quality oak and with coopering skills widely available, the cost penalty was probably not as prohibitive as regards the plant itself, but would still have applied to its operation and the associated expenses. Unions sets require large, well ventilated buildings with a large floor area and effective drainage (preferably at or close to ground

level, thereby minimising risks, during operation and cleaning, of leakage through floors). That building cost would be high per unit of capacity compared to housing equivalent capacity in rounds or squares. In addition, installing unions as a stand-alone project amongst existing plant and buildings was and is particularly expensive and difficult.

The union set price factor was possibly less important in the mid Victorian period prior to the incorporation of many breweries into Public Companies and the inevitable involvement of shareholders. Before then the brewing entrepreneur's decision as to plant style and design, however idiosyncratic, was unquestioned and final.<sup>27</sup> Probably towards the tail end of the volume driven building boom, it may have been desirable and possible to bury the bad news associated with the high capital investment in Burton union technology by incorporating it within the many extensive brewery rebuilding programmes.

Yet, for many breweries, the overriding cost considerations would be the space needed for union sets and in town centre sites (particularly in London) this was just not available. However, space was not an important issue to the Burton breweries who were expanding in what was then a relatively small town and one in which brewing requirements took precedence. In 1890 the large London brewery of Barclay Perkins was based on a land-locked twelve acre site whilst Bass in Burton had over 140 acres. The 1928

edition of *Kelly's Directory* for Burton<sup>28</sup> suggests that Worthington, recently taken over by Bass, owned 30 acres whilst Bass itself was then in possession of a massive 750 acres in and around the town. Included in this was an area occupied by a maltings and a large area of farmland on the edge of Burton at Shobnall, on the western edge of the Trent Valley. The latter, and this surrounded and protected what were then seen as a key asset, the shallow wells delivering the precious Burton water.<sup>29</sup> This area has now been built over and is a large modern Industrial estate, Centrum 100, a change which reflects shifts in the importance in ale production.<sup>30</sup>

The commercial, and flattering, response to this technical problem on the part of some London brewers (possibly also helped by lower land and property values) was to establish satellite breweries in Burton. Romford brewer Ind Coope did this in 1856, followed by Charringtons in 1872 and Truman's in 1873; the latter two both bought existing breweries and entirely rebuilt them almost immediately. Mann Crossman and Paulin<sup>31</sup> built a totally new brewery on a greenfield site in 1875. Even successful provincial brewers, such as Boddingtons, Peter Walker and A.B. Walker and Everards, built new or bought existing breweries to establish their presence and credentials at the heart of the fast growing 'gypsum valley.' Later yet others bought or opened Burton plant or less usually even shipped Burton water by rail to brew authentic

Burton beers in their existing breweries. Even more flattering the English owners of an Australian brewery, R. and E. Tooth of Sydney, built a new brewery in Burton. They sold out to the newly formed London and Colonial Brewery Company Limited a few years later, which in turn failed, and the brewery was eventually purchased by a local brewer, T. Cooper & Co. Such external stimuli, coupled with local enterprise, resulted in 1888 in the number of common breweries in Burton peaking at 31 and producing over three million barrels.<sup>32</sup> This compares with London's 113 common brewers producing around five million barrels.<sup>33</sup> Although in Burton well over half of this volume was due to the two major brewers Bass and Allsopp,<sup>34</sup> many of the other breweries slipstreaming them were still substantial in output by the standards of the day (and even today). The success of Burton ales, which created a premium market, was the prime driver of the Burton's expansion and it attained its peak around 1890, coinciding with Barnard's publication. As pale ale sales and the number of Burton breweries reached their maximum, one would expect the numbers of Burton unions to have increased in parallel.

The Victorian railway boom and the building of the Birmingham to Derby railway along the Trent valley in 1838 century stimulated and then sustained the brewing industry in Burton. It enabled Burton breweries to transport beer around the U.K. and abroad more quickly and at far lower prices than were

previously possible, thereby competing more effectively with the London brewers on their home ground. Prices fell from about twelve shillings a barrel (36 gall) when transported by canal to around three shillings by rail, a very significant reduction.<sup>35</sup> Bass's average selling price per barrel (36 gallons), even as late as 1890 was £2.18s., and rail transport would have accounted for only around three shillings and six pence of this. To support their new trade Burton brewers established large depots in London. Several were at St. Pancras railway station and the one used by Salts is described in volume 2 of Barnard. Thus, railways provided cheaper transport, but even significantly lower distribution costs in a fast maturing and increasingly competitive market began to have a strong bearing on wholesale beer prices and in turn on where beer was brewed. It was an 'on cost' which could be avoided by brewing your own pale ales as near as possible to your market, and of course the biggest market by far was London.

### **The decline of the Burton union**

An alternative strategy to brewing in Burton or wholesaling Burton brands was adopted by Courage of Horsleydown and, like the access of Burton beer to the London market, it was driven by low-price transport. Courage first contracted for the supply of pale ales with Flowers of Stratford upon Avon (1871) on the basis of cheap railway transport. They subsequently moved the contract to Fremilns

of Maidstone (late 1880s) due to inexpensive water transport down the Thames. Finally they bought G. & E. Hall's brewery at Alton (1903) for the production of pale ales which again depended on rail transport, but was much closer to London and under their own control.<sup>36</sup> How successful any of Courage's partners and their 'Burton substitute' breweries were or whether they used unions we do not know. They were not 'noted' by Barnard, but the survival and growth of Courage suggest they were not a total failure.

Many London and regional brewers worked for some time on producing and improving their own pale ales. Janes<sup>37</sup> suggests that Coombe Delafield & Co. at the Woodyard Brewery adjusted methods to meet the demand for beers similar to those of Burton. Watneys' Stag brewery at Pimlico had a tradition of brewing Pimlico or pale ales which had grimly survived the long ascendancy of porter, pale and light beers represented the bulk of its barrelage. Reid, like Meux, did not react to drinking fashion at all and brewed almost entirely stout until the early 1870s when capital was raised to build an ale brewery. This was completed in 1877, but significantly was erected on the Griffin brewery site at Clerkenwell Road rather than in Burton on Trent. Both their ale and porter breweries are described in volume 2 of Barnard.

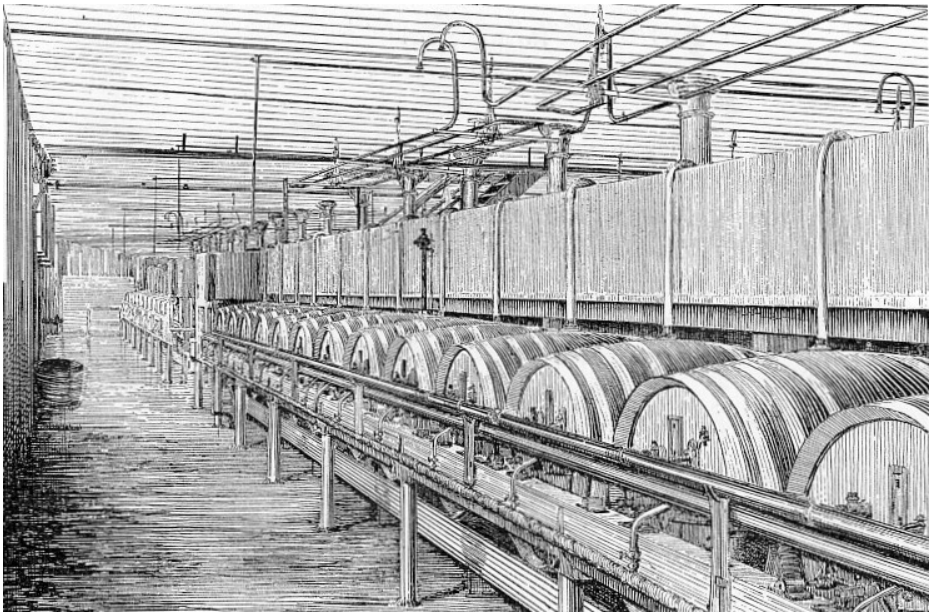
No technological (or marketing) advantage lasts for ever. In order to compete with Burton, other companies steadily developed their pale ale brewing expert-

ise. Barnard notes, for example, when he visited the Bristol breweries of Jacob Street (which had a London depot) and Lawrence Hill, that they had growing reputations for Burton style pale ales. On his call to Brains of Cardiff he observed that their beers were then offering competition to the Burton brewed article and a similar story is told at Tyne Brewery Newcastle and Hansons in Kimberley, Nottingham. Significantly though Burton pale ales still remained the yardstick by which these and all others were judged. For many years and for many consumers these substitutes would encroach on the Burton name which was of course not *appellation contrôlée*, but they still did not have the Burton caché.

During 1888 Frank Faulkner, in an article published in the *Brewers Journal*, despite viewing unions as good for producing Burton beers, criticises other brewers for blindly imitating Burton without warrant. Most tellingly he goes on to suggest that

the disposal by sale of a union set by a Burton brewer would be impossible now (1888) although there had been a mania for their erection a few years ago.<sup>38</sup>

This is obliquely supported by Barnard who makes only one reference to unions actually in course of installation in any of his visits, that being the one in Alton's Wardwick Brewery, Derby. However, in volume 1, amongst advertisements for



Figures 3. Youngers brewery union room Edinburgh from Barnard 1890.

whisky (from his Scottish connections - Barnard, A. (1887) *The Whiskey Distilleries of the United Kingdom*) and brewing equipment suppliers, Barnard accepted one for Hodson's Improved Burton unions (described in Barnard's volume 2) and one from Steward & Hodgson, coppersmiths and brass founders of Edinburgh, which included the offer of union room fittings. Hodson's variant was aimed at converting, modifying or improving existing unions so adding a variety of additional problems at a significant cost; needless to say it failed. Perhaps Edinburgh, although familiar with unions, was not aware of changing fashions in fermentation plant or that the market for Burton unions had reached, or indeed passed, saturation point.

Faulkner<sup>39</sup> interestingly also predicted the decline of Burton on Trent, not only because of what he describes as increasing competition from 'improving' provincial beer, but also because of his other vision, that of 'the advance of continental brewery influence.' In the long term his predictions proved true in respect of both ales and lagers, but he seriously underestimated the versatility of Burton and it's eventual response to, and progressively enthusiastic embrace of, lager brewing. I am not sure if Coors would chose to agree that the current predominance of lager in Burton is due to continental influence, after all the immediate origin of Carling is Canadian.

By 1890 the beer market was fast reaching maturity; growth in volume slowed,

stopped and at times even contracted a little. As a result competition between brewers, particularly for the premium London trade, became fierce. The need to control and protect trade by purchasing and then progressively increasing the numbers of tied houses they owned became a dominant factor for most breweries, even smaller 'Country Brewers.' Since the number of licenses had effectively been fixed, and in reality would shrink, the tied house phenomenon grew and the need to purchase property turned into a scramble. The freedom of the Burton breweries to sell their beer became increasingly limited as the doors of many houses were partially or completely closed to them. In this new climate, in which investment in tied houses had become a priority, any investment in expensive new fermenting capacity was likely to be examined closely and expenditure on maintaining expensive union sets would need strong justification.

As trade stagnated competition became fiercer and breweries not already established in the premium pale ale trade were likely to have great difficulty breaking into the market. This is confirmed by the negative view given in correspondence concerning the possible introduction of a new Scotch pale ale into London in the *Brewers Journal*.<sup>40</sup> The success of most companies without an established export trade, recognition as a national brewer, or brand name depended on the race for licensed outlets, preferably within easy travelling distance of the brewery. Those

with no or little insurance from an established tied estate began to falter, although even with this advantage success or survival was not guaranteed. Perversely over time the security of tied trade itself became an attractive target and the amalgamation and consolidation of estates increased and has remained a driving force ever since.

Even in 1890 the writing was slowly but clearly appearing on the red brick walls of Burton - it was to be a slow decline.<sup>41</sup> A Burton beer, usually bottled, was a 'must stock' in most public houses into the 1950s and 60s. The retail profit margin of these was supported by the Burton brewers allowing the regional and local brewers to bottle the Burton brands.

Within the Burton breweries, Allsopp's sales volumes began to decline sharply after 1880. This was attributed, by their Chairman Lord Hindlip, to competitors buying and tying public houses. Allsopp's own entry into the property market was late and when it came prices had risen. Their foray into this market severely damaged the company's profitability which fell far short of the expectation given to its shareholders when floated as a public company. This was to become a notorious issue leading to spectacularly lively AGMs and ultimately contributed to the company's bankruptcy.<sup>42</sup> Bass were also rather late into the property market, but their purchases were more circumspect and their volumes held up rather better because of a healthy export trade.<sup>43</sup> The growth areas for industrial scale brewing

had moved away from London to the growing cities of the Midlands and the North. In these areas Burton beers had less market influence than they had in the capital supplied, as they were, by financially sound local brewers. Companies such as Parker's of Burslem and Wolverhampton and Dudley Breweries Ltd.<sup>44,45,46,47</sup> had determinedly but judiciously bought houses to consolidate their local trade.

Of the London brewers with Burton satellites, some quickly recognised this trend. In 1898 Mann Crossman & Paulin pulled out of Burton to save transport costs and retrenched in London, followed some years later by another London brewer, Charrington (1926). Truman Hanbury and Buxton, who supplied their interests in South Wales and the North from Burton, did not finally rationalise their production back into London until 1971. Meanwhile Salts, a substantial brewery in Burton, became bankrupt in 1906. They were followed by Ind Coope in 1909 and the once mighty Allsopps in 1911, although all recovered to trade on before achieving stability in further consolidation. By 1911 there were only 17 breweries left in Burton. What had been Mann Crossman and Paulin's ale brewery at Shobnall in Burton by this time housed a company made up by the amalgamation of three locally owned breweries, Marston, Thompson and Evershed, each of whom had developed over many years by absorbing other brewers. Their original Burton breweries were of course closed, never to be used



*Figure 4. Yeast gathering in Marstons Union Room No 1 (The Bottom room) 1955.*

for brewing again and the trend followed by many others meant that by the mid 1950s there were only five breweries operating in Burton. The closure of Trumans and then that of Everards and their move back to their sales base in Leicester in the 80s reduced the number to three.

It is unlikely that in general, as Burton breweries consolidated as a response to falling volumes, many existing union sets were relocated to new premises. Fermentation was much more likely to have been squeezed into existing capacity or, if new equipment was essential, transferred to the easiest and cheapest plant to install in the limited

space available on an existing site, such as skimming squares.

There is indirect evidence that in one case some union sets may have been relocated as a result of brewery consolidation. This was when Marston and Thompson amalgamated in 1898 taking a lease on the vacant Mann Crossman and Paulin's Albion brewery, which at the time of Barnards visit in 1889 had 176 union casks. It is unlikely that any of these were relocated to London, but at some point before WWII the brewery had installed two additional sets - 48 unions - making a total of 224. It is possible that they were transferred from the original site of Marstons' Horninglow brewery at the time

of the amalgamation and may have included some of the 80 unions counted by Barnard. Alternatively, it is possible that any Thompson brewery unions might have been moved and used in whole or in part in the joint Albion brewery venture. We do not know if Evershed's brewery, who amalgamated with Marston Thompson a few years later in 1905, used Burton unions. However, by starting in Burton in 1854, they must have been under pressure to comply with the local fermentation practice and, if they had succumbed, could then have contributed some or all of any they had. Another possibility is Charringtons brewery in Burton, which closed in 1925, and from which, as well as pubs, Marstons acquire ten 'modern' 80 barrel copper fermenting vessels in iron frames. These were located in the cask racking room (subsequently referred to for the next 80 years as 'Charrington's room') and the acquisition of the two union sets from the same source could well have occurred. Whatever the reasons brewery consolidation meant that the number of unions was in decline and the days of installing union sets was over for nearly a century until 1991.

Of the remaining three concerns the Ind Coope Burton brewery, which had overtaken its Romford parent in size in the 1870s, had been amalgamated with Allsopps brewery and was subsumed into the Allied Breweries empire. This subsequently became Allied Lyons, eventually part of Carlsberg Tetley and was later sold as a production unit without any

brands to the Bass group, thus forming one enlarged brewery in the centre of Burton. Soon afterwards Bass's Burton site was sold on again with its brands to Interbrew and then finally, without the Bass brand, to Coors. It is currently operating as the now giant Coors Burton Brewery focussing almost totally on lager, whilst Worthington White Shield is still being produced and bottled in a stretched microbrewery, The Museum Brewery attached to Coors Visitors Centre.

The Mann Crossman and Paulin's old Albion Brewery, a much smaller concern on the Western edge of the valley, is the other survivor. It traded for a century under the ownership of Marston Thompson & Evershed p.l.c. until in 1999 when, with many of the Marstons brand names retained, it become part of Wolverhampton & Dudley Breweries (since January 2006, renamed Marstons p.l.c.). This brewery is the last to use Burton unions on any significant scale, giving a whole new meaning to the term 'perfidious Albion'. Micro brewers apart, Burton, in 2008, has only two significant breweries, although that is two more than many large cities. These now produce a similar volume of beer to that which 31 breweries produced in the heyday of the town, but today it is overwhelmingly lager in style. Compared to this the much vaunted Burton Pale Ales, now limited to Marstons and Bass, are all produced at the Albion brewery. The combined ale volume is reduced to a role subordinate in all respects, except to the pride of



Burton and the delectation of the cognoscente.

It appears that Barnard was writing, in 1889, at or very close to the zenith of the Burton union. Although the Burton brewers continued production in the difficult times that followed, their numbers, influence and reputation was at its height. It is unlikely that many unions were installed after that date.

Since it seems probable that almost the total scope of Burton union capacity existed in 1890 and was available for inclusion in Barnard's four volumes, we need to evaluate how likely it is that he actually visited and recorded all the breweries using them. If not, what proportion are likely to be missing from his various visits and reports, and why? In considering the likelihood of his overlooking any large, and indeed any medium sized breweries having union systems we need to consider Barnard's book in the context of the brewing industry of the late 1880s.

Pearson identifies 91 common brewers producing over 50,000 brls per annum in 1890 and 567 producing over 10,000 brls a year.<sup>48,49</sup> Barnard includes some 113 'noted' breweries in his work made up from 97 brewing companies, some of which had more than one brewery. Logically one would suppose that he visited a majority, if not all, of those brewing 50,000 brls a year. However, many significant breweries are conspicuous by their absence. Birmingham appears to have been a dessert since none were

visited in the city and similarly the Norwich breweries escape mention. Also missing are those in Alton and Stratford and, except for John Smith's, those in the other brewing centre of Tadcaster. Many significant brewers producing over 100,000 barrels a year are not mentioned, such as Lacons, Vaux and Georges of Bristol. There is, as far as I know, no reason to suggest that any of these specifically used union sets but I am unable to exclude the possibility or that other breweries which were omitted might well have done so. On the other hand many of those described in the later volumes of Barnard were relatively small and would have been struggling to come near to 50,000 barrels per annum. The smaller end of the spectrum of breweries actually visited by Barnard is reflected by Marstons' Horninglow Brewery in Burton with some 80 union casks and an annual output well below 50,000 brls a year (Owen suggests 20,000). Strangely the Horninglow brewery, which at the time of Barnard's visit had recently been sold to Henry Sugden, formerly a partner in Nunneley's brewery, was included in volume 2: whilst those included in volume 4 were more typical of this size. Perhaps Sugden was using inclusion as a means of recording and informing the world of what had otherwise been a quiet change of ownership and flagging that another Burton brewery was available for business .

In reality the hundreds of medium sized breweries not detailed in Barnard would have needed considerable confidence

and ambition to embark on a Burton union development and it is unlikely that many would have been interested in installing such tricky and expensive technology. Scamell and Colyer,<sup>50</sup> writing in 1880, suggest a level of controversy existed over the advantages of Burton unions and they thought it doubtful if it were advisable for a small brewery to adopt them. However, they published several plans for larger breweries which did incorporate them, so suggesting that there had up to then been at least some interest in unions. They clearly identified that plant cleaning issues were critical and a high level of training and supervision were essential for success. Problems in union cleaning and possible solutions are still being put forward in correspondence in the *Brewer's Journal* 1895.<sup>51</sup> The 'almost insuperable difficulty of keeping clean the multiplicity of small vessels of the Burton Union system' is even noted by Barnard during his visit to Stansfeld and Co. in Fulham. Here he blatantly flatters his sponsors by extolling the comparative simplicity of the skimming system used by his hosts of the day.

The answer to this problem, to Scammel and Colyer's concerns, and even Barnard's doubts, might be where unions were strongly recommended by an expensively imported brewer; especially a brewer who had Burton training and experience of the union system. Burton, it should be remembered, had become a kind of Mecca<sup>52</sup> in brewing circles, in particular a training and recruiting ground for ambitious young gentleman brewers.

These, or rather their families, paid the head brewer for the privilege of the pupil brewer receiving expert training, in effect paying for an apprenticeship or, in more modern terms, up front tuition fees for a vocational course at the 'University of Burton on Trent'.<sup>53</sup> In 1888 the widowed mother of the 14 year old Sydney Nevile paid £100 a year for two years as a premium for his training as a pupil at Robins of Brighton,<sup>54</sup> their local brewery. Burton, as the Oxbridge of its day, presumably commanded higher fees.

Some breweries may have avoided appearing in Barnard if there was a negative aspect in their production which would be exposed by his description. This applied particularly if you were one of the many breweries still 'cleansing' in puncheons or even trade casks using not union sets, but old fashioned manual top up systems. Such brewers perhaps did not want to raise their heads above the parapet and be seen as technically backward or just plain old fashioned compared to the trendy brewers of Burton or London. That this type of operation was still quite widespread and, on a small scale, even an acceptable process is clear, not only from description in Barnard's visits, but in the selection of plans for breweries of various capacities illustrated in Scamell and Colyer. The plan for a new small brewery even in 1880 depicts cleansing in single casks on stillions, very much the old fashioned way, rather than Burton unions which are also depicted in plans for larger breweries.<sup>55</sup>

It is likely that at least some medium sized breweries, which Barnard did not visit, actually had union systems. The most likely suspects arise in Burton, since Barnard reports only on 13 of the town's 31 breweries. Taking Owens production data at this time, the 13 that he did visit actually encompassed 83% of the brewing capacity in Burton, but the remaining 18 breweries are probably the most likely omissions as potential union set users; for example the Burton Brewery Co. which is not the subject of a visit was a much bigger brewer than J. Marston & Co. Similarly T. Robinson & Co., also much larger, either had no unions or just chose not to bother with Barnard. The production of these remaining 18 breweries amounted to just over 500,000 brls a year, but there is very little evidence as to whether they used union sets and such as exists is more tantalising than enlightening. An example is the small, obscure brewery of Carter & Son (previously Perks & Son) on what is now Horninglow Road. In their brewery sale in 1868<sup>56</sup> was included '80 union, stillage and puncheon taps.' No mention of union sets as such appears in the sale notice, but this implies that Carter's had unions and were fermenting in various styles of wooden cask. The Carter brewery was eventually purchased in 1869 by J. Thompson & Son of Horninglow Street and any unions Carters owned may have been sold to John Thomson who bought the brewery to augment his existing Burton brewery a quarter of a mile away towards the town centre down Horninglow road. This was another brew-

ery about which we have no details and may well have been using unions.<sup>57</sup>

It is possible, by speculating in this way, to suggest that at least some of the Burton brewery's fermenting capacity not audited by Barnard was in the form of unions. It is probably unlikely that it was more than half of that capacity in which case the number of union casks needed would have been around 1,150. I have not included this in the union cask count, but refer to it again in the commentary as potentially the largest source of error.

Rather less likely are other medium sized breweries near Burton. Barnard identifies three in the Derby and Lichfield area as having unions. Perhaps others which were not visited, but were in close local competition with the Burton breweries, might have found it necessary to use unions, either to produce a Burton flavour or just to appear credible in the local market place. Burton and the surrounding area, with its heavy input of knowledge (and tap room rumour) from generations of brewery or brewery dependent workers (which at times included nearly all of Burton's working population), has, until comparatively recently, been a unique micro-market with a tradition of premium pale ale drinking driven by local consumer's addiction to the premium pale ale brands they brewed. This local ale market has for 40 years and is still (as far as ales go) represented almost entirely by two premium brands, Bass (the brand now owned by Inbev and contract brewed by Marstons in Burton) and

Pedigree (the brand owned by Marstons, lately Wolverhampton & Dudley Breweries p.l.c., and still brewed at its home at Marstons in Burton). However, in 1890, for the medium size regional brewer further away from Burton without this strong local market for premium beers, competition from authentic Burton style beers or a fashion conscious and prosperous customer base such as existed in London, Burton unions were of no interest.

As I have indicated, some large breweries outside Burton were also omitted by Barnard as were many of the medium

sized ones. On the basis both of a low probability of non-Burton breweries having unions and of their likely modest size, the total numbers of casks missed will be small and those will probably not significantly distort the total summarised. Nonetheless small numbers of unions in other locations would none the less be interesting in gauging the spread of the union system. Other suspects in the search for any of Britain's 'lost unions' might be found in the other major breweries built between 1860-1906.

There is no direct evidence as to what proportion, if any, of the smaller common



*Figure 5. Marstons union room. The Albion Brewery Burton on Trent 2002.*

brewers or the licensed victualler brewers that Barnard did not cover might have had Burton unions or related plant. However, as suggested above, it is likely that many were fermenting in wooden vessels or vats and some were still cleansing in casks without the benefit of the automatic top-up provided by the union system. This is described by Barnard at several breweries, but most clearly at quite a substantial brewery, Buckley's in Llanelli. None of these has been included as a full blown union system in the count of unions.

There are at least two other areas, outside the U.K., in which Burton unions operated and where there is evidence which confirms their existence as late as the early 1890s, unfortunately both without any clear evidence of the number of casks.

There is proof that Burton unions were used in several breweries in India, most significantly by the Murree Brewery operating at that time out of the Ghora Gali brewery site, (established in 1860). It is suggested that they were replaced there by more conventional fermentation around 1880.<sup>58,59,60,61,62,63</sup> This unhappy fate, so close to the heart of the India Pale Ale legend, is consistent with Faulkner's comments.

For a large part of its history the Indian beer market was linked to Burton, perhaps as consequence of the I.P.A. export trade and then in parallel with it, a fledgling Indian brewing industry developed. It

can be no co-incidence that several Indian breweries were owned by Henry Meakin, a member of a well known Burton family, who, from the 1860s had interests in several breweries in Burton. They later came to be better known in the U.K. as Maltsters, building a large maltings in Burton in 1875 (the Crown Maltings described in volume 1 of Barnard) shortly after selling the site of their London and Burton Brewery Co. to Charrington & Co.. Henry Meakin seems to have moved to India in the mid 1860s where another ex. pat., Edward Dyer, was already established and had set up five breweries, including the Murree brewery. After a period in the tea trade Meakin bought two of Dyers older breweries, Solan and Simla, and went on to build five more, Ranikhet, Dalhousie, Chakrata, Darjeeling and Kirkee.

We can estimate the potential number of union casks from data about the size of the Indian market at and immediately after this period. By the early 1890s (fifteen years after the reference to Muree's unions) the total U.K. exports to the British East Indies averaged 80,000 brls per annum against an average local production from 23 breweries of 152,611 brls. Assisting in the decline of these imports were Meakin and Company (formerly of Burton, now Kussowlie), who in 1884 secured a five year contract with the Bombay Government to supply 13,000 barrels of beer per year to the British troops in the area.<sup>64</sup> At that time of the contract Meakin owned about half of the 15 breweries in India. In the early

1890s the Commissariat purchased some 80,000 brls per annum.

We know that the imports into Calcutta in 1894 amounted to 20,000 brls, of which most was described as Pilsner, and there was a noted shift to the 'light description of beer,' a taste which Bass was struggling to meet in the Indian market.<sup>65</sup> The market was no longer primarily for I.P.A. so Meakin's substantial contract and other similar local contracts for supplying other Indian provinces, which may have existed with the Dyer breweries, was likely to be for lighter beers. Perhaps this goes some way to explain the decline of the export trade to India and the change in interest to fermenting plant suitable for sedimentary yeast as opposed to Burton unions. The largest brewery in the 1890s was Muree producing only 23,000 brls, which was small by U.K. standards.

In the extremely unlikely event of all the Commissariat purchased beer being produced by union sets it would have required only 400 union casks and all the beer sold on the sub-continent would have only requires 1,200 unions, just a few more than Worthington probably had. In reality it is likely that there were probably no union sets left operating in India by 1890. Because of that and the scarcity of hard information as to numbers I have not referred to them in the data table.

Henry Meakin died aged 35 in 1895<sup>66</sup> and his company, post independence

and under Indian control, operated as Mohan Meakin Ltd.

In Australia the Tooth brewery of Sydney had Burton unions. An occasional correspondent in the *Brewer's Journal*<sup>67</sup> suggested that the Tooth brewery had 'a union room not excelled by even anything in Burton' and a photograph dated at around 1890 from the Powerhouse Museum archive in Sydney clearly shows union sets in what can only be described as a pristine union room. It is difficult to assess how large the Union Room is, but 48 unions are clearly visible and there are probably at least a further 48 behind these. Other photographs indicate an extensive cleansing operation in puncheons. Yeast crops from these, which presumably oozed or cascaded down the outside of the casks, can only be described as microbiologically extremely vulnerable but the more hygienic unions alone probably yielded sufficient premium yeast to pitch all the Tooth ales.

Tooths was a substantial brewery, probably the biggest in Australia at that time, making good profits and paying good dividends. The correspondent, possibly a Sydney local, may have been prone to unjustified antipodian machismo, but the photograph does suggest that Tooth's union room, although small in comparison to the large rooms in Burton, was in some ways in a better decorative state than their British counterparts. The likely number of unions was not significant in terms of the U.K. count. It is included in this survey for completeness, but is

excluded from the U.K. brewing market calculations. Although possibly still operational in 1893/4 these were likely by then to be declining in importance to Tooth & Co. as the advent of refrigeration enabled the Australian market to move towards cold beer (lager).<sup>68</sup>

Total Australian production is suggested as being close to one million barrels at this time,<sup>69</sup> about the same as Bass. The volume Toths brewed in Sydney is not clear, but is hardly likely to have brewed more than 25% of the Australian one million barrels. At this level they were about a little larger than the size of Worthington. This is broadly consistent with Bass who were incorporated at about the same time. Toths were capitalised at £900,000 compared to Bass at £4 million.

The data that Barnard generated is used to quantify the Burton Unions in each location and is summarised on the next page.

### **Commentary on union data**

The numbers are presented as a count of individual union casks. The capacities of individual union casks vary between breweries and sometimes even between different sets in the same brewery. Some are quoted as a mere two barrels (72 galls) whilst the largest mentioned are seven barrels (252 galls), but the extremes are rare; the overwhelming majority are from a nominal four to four and a half barrels (approx. 140-160 galls).

The number of casks which constitute a union set and are mounted within a single frame can also vary. The number probably depended (within limits) on the space available in the room, followed by convenience of management in operation and cleaning rather than any technical constraint. Some illustrations in Barnard seem to indicate ten casks. Marstons latest sets are 30 casks and older ones contain 24 (which conveniently makes a 100 barrel unit) whilst the oldest had 40 (of 3.65 barrels) in a combined frame with two feeder troughs, one at each end making a double set. Bass operated some unions with 52 casks all served with a single central feeder trough on the lines of the refurbished one displayed outside Coors Visitor's centre.

In 1889-91 there were 2,390 common brewers in the U.K.,<sup>70</sup> most quite small, and out of the 113 breweries which he visited, Barnard identified just 30 breweries using Burton unions. 13 of these were in Burton (counting Bass' - three sites as one brewery and Allsopp's two sites as one brewery).

Looking at Barnard in detail emphasises the value of his reports which provide information which is not available from other sources. Despite his commercial slant, his journalistic style and what, to modern ears, is a sycophantic tone, the wealth of detail in his accounts amply repays careful examination. Barnard's data is normally detailed and accurate (although at times he is side-tracked into becoming a travel agent or a local and

Brewery name	Location	Owner	Total number of union casks	Casks counted by Barnard	Additional casks estd. (author)	Notes and basis for estimate if not a specific count
Bass	Burton	Bass & Co. Ltd	6,698	6,698		
Samuel Allsopp & Sons	Burton	Samuel Allsopp & Sons	3,192	3,192		
Ind Coope & Co. Ltd.	Burton	Ind Coope & Co. Ltd.	1,424	1,424		
Salt & Co.	Burton	Salt & Co.	864	864		
Abbey Brewery Holyrood	Edinburgh	Wm. Younger	508	508		
Black Eagle Brewery	Burton	Truman Hanbury Buxton	320	320		
The Brewery	Reading	H & G Simmonds	312	312		
Cross St Brewery	Burton	James Eadie	286	286		
Abbey Brewery	Burton	Charrington & Co.	400	240	160	'old union rooms containing innumerable union cask'
North Ann St. Brewery	Dublin	Jameson & Pim & Co	200	200		'2 union casks'
Clarence St. Brewery	Burton	P. Walker (executors)	195	195		
Wardwick Brewery	Derby	Alton & Co. Ltd.	315	189	126	In course of construction
Albion Brewery	Burton	Mann Crossman & Paulin	176	176		
Ardee St. Brewery	Dublin	Joseph Watkins	164	164		'2 union casks'
A.B. Walker	Burton	Andrew Walker	162	162		'2 union casks'



The Breweries	Newark	Richard Warwick & Son Ltd	147	147	
The Brewery	Stone, Staffs	John Joule	124	124	
IP Walker Clarence St. Brewery	Warrington	P. Walker	192	96	'a large union room'
J Marston	Burton	J Marston (Horninglow)	80	80	
Worthington	Burton	Worthington & Co..	1,008	1,008	6 rooms
Ind Coope	Romford	Ind Coope & Co. Ltd.	200	200	'2/3 of a floor'
Castle Brewery	Newark	James Holr & Co.	176	176	'11 union sets'
City Brewery	Lichfield	The City Brewery Co. (Lichfield) Ltd.	120	120	'Row upon row'
Trent Valley Brewery	Lichfield	Trent Valley Brewery Co. Ltd.	120	120	'A reduction on on what illustration suggests of 8 sets of 28 casks = 224: high for a small brewery'
Kimberley Brewery	Nottingham	Thomas Hardy	120	120	'6 ranges'
Brindley & Co.	Burton	Brindley & Co.	80	80	'2 avenues the same a Burton breweries'
Springfield Brewery	Wolverhampton	W. Butler & Co. Ltd.	80	80	'Sufficient to hold 350 barrels'
The Anchor Brewery <sup>71</sup>	Brighton	E. Robins & Son	60	60	'A number of Burton unions'
The Brewery	Tiverton	T. Ford & Son	60	60	'3 union sets'

Eshald Well Brewery	Woodlesford (Leeds)	Henry Bentley & Co. Ltd.	48		48	'A number of Burton unions'
Kent Brewery Not included in the total of calculations	Sydney, Australia	Tooth & Co.	96	48	48	A union room not excelled by anything in Burton.
Number of union casks			17,831	15,377	2,454	
Weekly capacity in barrels based on 153 gall/cask and 7 day turnaround			75,782			
Annual capacity in barrels at 90%* utilisation			3,546,586			
Average U.K. (inc. Ireland) production of all beers in brls.			30,000,000			
% of total U.K. 'beer' (inc. porter & stout) produced in unions			11.82			
Estimated U.K. 'ale' production in brls in 1889 (based on ale as 60% of total)**			18,000,000			
% of estimated U.K. national 'ale' produced in unions. (excluding porter and stout)			19.70			

\*This may seem a high utilisation factor but apart from periodic maintenance union sets need to be kept full of beer to avoid timber drying out and shrinking and warping of staves with consequential beer loss from leakage and expensive repairs. Unions would normally be filled as a priority when not actually undergoing maintenance and seasonal variations in trade would normally be reflected in the utilisation of square or round skimming vessels which were almost always present even in breweries strongly favouring unions for the production of commodity beers and milds and stouts etc.

\*\*The percentage of ale out of the total volume brewed was still changing during this period and not specifically recorded. I believe the figure of 60% represents a conservative estimate. A higher ale volume would give a lower % of ale produced in unions.

Figure 6. Burton union count 1889-91 - Primarily from Barnard's Noted Breweries (with additional information from other sources).

family historian, perhaps padding his article because on some visits the brewing facts and figures he was offered were scant). Where he had the opportunity he seems to have been very attached to his tape measure and enthusiastic about counting windows, although much of his information was no doubt supplied by his hosts. Many of his illustrations can be verified from photographic records and in some cases buildings still stand. Where union data can be substantiated, such as at Marstons and Bass, it is accurate, but unfortunately on his visits to some breweries the details relevant to unions are vague.

Where such union data is unspecific, incomplete or missing I have made a best estimate of numbers based on such information as is given using Barnard's illustrations, combined with other facts such as quoted brewery capacity, other plant size and indications of product mix. These estimates and specific points of interest have been indicated as such in a separate column. For example, at Ind Coope, Romford, Barnard uses the vague phrase 'one floor being used as a union room with two thirds of the floor being covered with union casks,' but he later refers to six cleansing rooms crowded with casks which cover half an acre.<sup>72</sup> The specific output of the brewery is recorded as around 200,000 brls per annum, the pitching yeast for which would be provided by about 200 union casks. This is the figure I have included which is also consistent with the contents of  $\frac{2}{3}$  of a large room. Again at Bindley &

Co. in Burton he describes in great detail the patent union cask attemperators designed by the owner Major Bindley (previously head brewer at Worthington and later to become a partner in Briggs the brewery engineering company). However, he only mentions in passing 'two avenues of union casks the same as those in other Burton breweries.' These I have estimated as most probably containing 80 casks.

At Worthington's Brewery, potentially one of the bigger users, Barnard saw a room and mentions it as one of six (he rather sounds as if he did not see the other five). However, he makes no mention of numbers of casks and he is apparently deliberately vague, not only about unions, but about many aspects of Worthington's production capacity.<sup>73</sup> Based on the strong possibility that Worthington's, a stalwart of Burton pale ales, the vast majority the beer was cleansed in unions and on the output quoted by Owen (which is also consistent with the breweries water usage recorded by Barnard) I calculate the brewery had 1,008 casks, consistent with six union rooms.

I suggest that the possible count of unions in the 18 Burton breweries not visited by Barnard was circa 1,150. These are additional to the sum of Barnard's data in the table and represent a possible error in the union count (arising from Burton alone) of just under 7%. I have included a rather strange hybrid of a union/Yorkshire square system described

by Barnard at Springfield Brewery, Wolverhampton because of the swan's neck configuration used but in any event the number is minimal.

Firm evidence exists in the form of a photograph in the *Classic Brewing* text book by H. Lloyd Hind<sup>74</sup> of two union sets each of 18 casks making a total of 36 at the Mortlake brewery of Watney Coombe Reid & Co Ltd in the 1940s. Since I have no specific indication as to when they were installed or removed I have not included these, but I suspect they were introduced well after the peak of their popularity in Barnard's time.<sup>75</sup>

Gourvish and Wilson quote the Tadcaster Tower Brewery's Partners diaries of December 1882 as recording the purchase from Lord Wenlock of 51 casks and two union sets from Escrick Hall (near York). They do not record their size or whether the sets were installed at the Tower Brewery. The brewery may just have been buying his Lordship's goodwill and future trade as a significant private customer in an age in which domestic brewhouses were rapidly being abandoned or, since the Tadcaster partners were reputedly all well connected, a friend or relative was giving or receiving a favour. Although of interest as possibly another northern outpost of the union set these have not been included in the count.

## Conclusion

The data summarised in the table indicates that at that time around 11% of the total beer brewed in the UK was fermented in Burton unions. Assuming that perhaps at that time 60% of the national output was ale, as opposed to porter and stout, just short of 20% of this ale was fermented in Burton unions, a remarkably high figure. Of these unions 85% were located in Burton and, of the remaining 15%, a further 2%, although located outside Burton, were used by companies with strong Burton connections, such as Ind Coope at Romford.

The most significant application without a Burton link was Wm. Youngers in Edinburgh who had a strong reputation and an extensive free trade, much of it in the London area, and a healthy export trade, for which a Burton style brew was a necessity. The low key presence in Dublin is also interesting as are the usage as far away as India and Australia. The descriptor 'Burton' attached to 'Union Set' is clearly fully justified and the spread across the country, although wide was rather thinner than may have been first thought.

I believe it is likely that there were other breweries which used Burton unions that I have not been able to identify but may be known to local historians. I would be delighted to receive any details of those not identified in this paper or any further information relating to them.

## Acknowledgements

My thanks are due to Coors Visitor Centre and Museum of Brewing for access to their archives; Eric Fower for his advice and access to his extensive memory, researches and archive on Burton History; and the Powerhouse Museum Archive, Sydney for their help.

## Notes and references

1. There are two exceptions giving some detail on Burton union set operation, which I would recommend to the interested reader. The first is Southby, E.R.(1877) *Brewing Practically and Scientifically Considered*. Unwin: London. The second is George Peard's rather short Section II of the joint lecture given to the London Section of the Institute of Brewing by Lasman, Peard, and Peet. It was printed in the *Institute of Brewing Journal* No. 61, 1955 pp.192 and was given at a time when there were still four breweries operating unions sets in the U.K. Even so it proved to be almost a retrospective. Whilst the figures George Peard gave for comparative costs inevitably changed over time for the worse and whilst I would disagree in a minor way with one or two of his ideas, he very eloquently emphasises the undoubted consistency and stability which the mature union system has to offer.
2. Peter Walker. Patent No. 7656. (1838).
3. Shannon, R. (1805) *Practical Treatise on Brewing Distilling and Rectification*. Robert Scholey: London.
4. Youil Patent No. 1957 (1854).
5. Hodson Patent No. 14425 (1885).

6. Williams Patent No. 638 (1861).
7. Pontifex Patent No. 2222 (1864).
8. Modern, but small scale versions of union systems, have been established by the Firestone Walker Brewery in the U.S. ([www.firestonewalker.com](http://www.firestonewalker.com)) and at a micro brewery at the Loaded Dog in Melbourne, Australia. (*The Brewer and Distiller*, April 2005).
9. Buckland, K. (1999) *A Brewer of Pedigree*. Private publication. M.W.F. Hurdle: London.
10. Ind Coope and Allsopp, as a combined company, had union sets at locations in the old Allsopp brewery until their removal in 1959. Those which had existed at the old Ind Coope brewery had been removed at some earlier point. Source: D.A. Finch, B.H.S. Oral History Archive.
11. Barnard, A. (1889-91) *The Noted Breweries of Great Britain and Ireland*. Joseph Causton & Sons: London.
12. Gourvish, T.R. & Wilson, R.G. (1994) *The British Brewing Industry 1830-1980*. C.U.P.: Cambridge.
13. The C19 volumes are quoted at the standard gravity first 1057 and then 1055 on which duty was levied. The post WW II volumes are quoted as sales volumes (although the duty calculation and payment process still required the collected volume to be converted on a theoretical basis for duty calculation purposes, to the standard gravity of 1055); current duty payments are of course based on alcohol by volume, ABV, 'at the brewery gate.' The sales gravity post WW II was at an average gravity generally around 1037-1039, and has since risen slightly; that is around 70% of the strength in the C19. This drop in strength would have impacted on mash tun capacity

rather than have any effect on fermenting capacity, particularly so since the use of sugar as a proportion of fermentable extract grew over that period. However, in the period post 1970, the growth, particularly amongst lager brewers, of high gravity fermentation and dilution for sale means that the sales volume could be produced with less fermenting capacity. This style of fermentation usually used the 'new' style of deep stainless steel cylindro-conical vessels rather than any in use in 1890.

14. Mathias, P. (1959) *The Brewing Industry in England 1700-1830*. C.U.P.: Cambridge.

15. Gourvish, T.R. & Wilson, R.G. (1994) op. cit.

16. Pearson, L. (1999) *British Breweries and Architectural History*. Hambledon Press: London.

17. Alton's Wardwick Brewery in Derby was visited by Barnard during a building phase in around 1890 when, uniquely, it was part way through a union set installation programme. The brewery was reported as 'new' some years later in the *Brewer's Journal* 1900 pp.169, complete with artists detailed aerial impression and apparently complete with what looks like a large union room. The ten year gap presumably arose as progressive works were funded out of cash flow.

18. Supporting this argument is the construction of most Victorian fermentation plant. This was made from very heavy timber, frequently the more exotic species of pine but sometimes of oak, and in northern areas of large slabs of stone, usually slate. All would have had a very long working life. They were capable of some adaptation as standards of hygiene and methods of cleaning improved, and as temperature control and techniques of

yeast cropping continued to advance; for example, by lining a wooden surface with copper (or more recently stainless steel) and fitting vessels with internal metal coils through which cold water could flow and with arrangements for yeast collection. 'Generations of brewers would use the same plant' (Button, A.H. (1971) 'Changes in Fermentation Techniques.' *Brewer's Guardian*) and some are still in use very successfully. The most transient fermenting equipment (trade casks apart) is indeed the union set, the cask staves of which, whilst of 1½ inch thick oak (nominal), are only half the thickness of a typical round or square wooden fermenter. In a union cask this timber is further weakened by being hollowed and bent to form the curved belly of the cask, by the large number of joints between staves, by the joint between the end of the staves and the two cask heads at the chimes, by the use of large screws to attach cast iron crosses to the heads and by the boring of various apertures into the cask for removable attemperation panels and for beer and yeast flow. To add insult to injury, whilst a trade cask might expect to be washed only every three to eight weeks or even longer in quiet trading times, a union cask is subject to the general attrition to timber and hoops caused by weekly washing and by the almost perpetually wet and humid conditions of a working union room. These factors all contribute both to a much heavier maintenance requirement and to a shorter life for the union cask than other fermentation plant. A life of between 20 and 40 years would be expected from a union cask depending on the quality of the timber from which it was made and the standard of care and maintenance it experienced. Weakened

staves were replaced as required during regular overhauls which would take place every one or two years. Bung staves, although wider than the others, would have large holes bored through them and would do well see more than two overhauls. At overhaul all staves would be shaved or scraped to remove scale and to present a fresh smooth and hard oak surface to the beer and any new replacement staves would be shaved down to match the profile of the older worn staves which they abutted. Thus, in the course of maintenance, the whole case would become progressively thinner and weaker (and sometimes misshapen) until further repair would become uneconomic and a completely new cask was necessary. A round vat or wooden square, lined or unlined, could achieve double or treble this life with minimal attention. I have used 130 year old square vessels (by then lined with copper and apparently without damage or major repairs) and these can by no means claim to hold a longevity record. The fact that a decision on revenue expenditure arose every two years with regards to a union set's continued maintenance or a capital investment decision every 20 or so as regards cask renewal was undoubtedly a factor accelerating the decline of the union system. No other system placed it's head on the accountants chopping block so regularly, thereby inviting the inevitable result.

19. Hawkins, K.H. (1978) *A History of Bass Charrington*. O.U.P.: Oxford.

20. Pearson, L. (1999) op. cit.

21. Gourvish, T.R. & Wilson, R.G. (1994) op. cit.

22. *ibid.*

23. Owen, C.C. (1992) *The Greatest Brewer*

*in the World - A History of Bass Ratcliffe and Gretton*. Derbyshire Record Society: Chesterfield.

24. Hawkins, K.H. (1978) op. cit.

25. Gourvish, T.R. & Wilson, R.G. (1994) op. cit.

26. The installation of four sets (520 brls of capacity) in a new room at Marstons in 1990 cost a little over £1,000,000 (plant and building). As an indication of the relatively high capital cost, the same investment in industry standard cylindro-conical fermenters could have generated between 15 and 20 times that capacity. This seemed a large sum at the time, but just a few months later Whitbread & Co. installed an automated yeast culture and handling system at their Cheltenham brewery with the intention of using it as a central source supplying all the ale yeast requirements for the group's smaller (ale) breweries. The Cheltenham brewery was itself closed shortly afterwards. The cost of this was around £1 million and this presumably produced and handled several strains of ale yeast using minimal labour and with a low running cost and maintenance requirement. Unlike unions, it produced a minimal amount of beer and this, as the product of abnormal culture conditions, would be atypical in flavour and would need to be well blended or diluted before sale and consumption. The new unions at Marstons not only generated a significant volume of excellent Burton style pale ale with a normal commercial yeast count, but also a substantial crop of around five times more union yeast than they initially required for pitching. This effortless generation and totally reliable cropping by the union sets of the union strain of yeast, which is otherwise very difficult to crop, allowed a much

larger volume of Marston's various beer brands to be produced, albeit in more conventional shallow 'skimming' vessels.

27. It may be significant that when Bass went public in 1888 the public were only invited to subscribe for preference shares and debenture stock. The partners retained control (at least for some years) and Bass continued to use unions for almost a further 100 years. As a comparison, in the same year and although smaller and in slightly different corporate circumstances, the public tender for Georges of Bristol made all classes of share available to the public.

28. *Kelly's Directory* (1928) Burton on Trent.

29. This early drift of brewing capacity away from the centres of cities, London in particular, was to be echoed with a vengeance 100 years later with the building of 'mega' breweries on greenfield sites (in Luton, Runcorn, Reading, Salmesbury, and Magor). This was supported by factors such as product change (towards lager), distribution requirements (the motorway network and at Runcorn by an initial, aspiration to use rail), and city land values. Furthermore, it was thwarted by industrial relations problems, real or perceived, self inflicted or resulting from external influences.

30. Nowadays the overwhelming volume produced in Burton is lager which requires much softer water than that for which Burton is famed, but technology can be used to render any available water supply suitable for the brewing of any product - at a cost.

31. Alexander Crossman was the fifth son of Robert Crossman and was sent to Burton on Trent around 1862 to study brewing. The change in public taste and the possibility of brewing light and bitter beers was at least partially behind this. He was in Burton for

some years and the result was that Mann Crossman & Paulin decided to open a brewery in Burton to brew pale ales. Alexander oversaw the building of Mann Crossman and Paulin's Albino Brewery in Burton which opened in 1875. The Crossman name is commemorated in Crossman Street, still running into Marstons Shobnall brewery, and in the Mann Crossman and Pauline name, which has been preserved in the stone coping on the brewhouse walls long after their other brewery premises have disappeared.

32. Owen, C.C. (1978) *Burton on Trent: the Development of Industry*. Phillimore & Co. Ltd: Chichester.

33. Gourvish, T.R. & Wilson, R.G. (1994) op. cit.

34. Hawkins, K.H. (1978) op. cit.

35. Owen, C.C. (1992) op. cit.

36. Pudney, J. (1971) *A Draught of Contentment: The Story of the Courage Group*. New English Library: London.

37. Janes, H. (1958) *The Albion Brewery 1808-1958 The Story of Mann Crossman & Paulin Ltd*. Harley: London.

38. Faulkner, F. (1888). *The Brewer's Journal*. p.45 & 101.

39. Faulkner, F. (1888). *ibid*.

40. *The Brewer's Journal*. (1895) p.185.

41. Gourvish, T.R. & Wilson, R.G. (1994) op. cit.

42. Anderson, R.G. (1971) 'The fall of the House of Allsopp.' Inst. of Brewing lecture 1971 available on

<http://members.aol.com/hconor/Brewery.htm>

43. Hawkins, K.H. (1978) op. cit.

44. Parker's shareholders were informed at their ordinary general meeting in 1891 that a large number of public and beer houses had been bought. All those coming onto the mar-



ket were examined and any at reasonable value were bought, although those at exaggerated prices were not purchased. The policy to purchase was to continue as was that to bring these purchases up to the good condition of existing houses.

45. Vaisey, H. (1960) *The Brewing Industry 1886-1951: an Economic Study*. Pitman: London.

46. *The Brewer's Journal*. (1894).

47. *The Brewer's Journal*. (1895) p.18.

48. Pearson, L. (1999) op. cit.

49. Faulkner, F. (1899) *The Brewer's Journal*. pp.45 & 101.

50. Scamell, G. & Colyer, F. (1880) *Breweries and Maltings: their arrangement construction machinery and plant*. E. & F.N. Spon: London.

51. *The Brewer's Journal*. (1895) p.618.

52. Owen, C.C. (1978) op. cit.

53. Lott. (1895) *Journal of the Federated Institute of Brewing*. p.117.

54. Nevile, S. (1958) *70 Rolling Years*. Faber & Faber: London.

55. Batman's of Wainfleet were recorded in their company history dated circa 1994 as still cleansing or fermenting in what they called the carriage cask system, that is, in trade casks as late as the early 1950s.

56. *Burton Weekly News* 4th December 1868.

57. After Thompsons had amalgamated with John Marston and moved to the Albion Brewery in 1898 one of their Horninglow street breweries (the one originally owned by Carter's) was sold to Hodges, a local builder, on whose site the base of the brewery chimney and various buildings can still be seen.

58. Holland, J.L. (1894) Letter dated 5th August to *The Brewer's Journal*. p.524.

59. 'Obituary Henry Meakin.' (1895) *The Brewer's Journal* p.316.

60. *Burton Weekly News* (1884) 14th August.

61. Will of H. Meakin (1895) *The Brewer's Journal*. p.215.

62. <http://chowk.com>

63. <http://www.mureebrewery.com/history.aspx>

64. *Burton Weekly News*. (1884) 14th August.

65. *The Brewers Journal* (1895) p.509.

66. *The Brewers Journal* (1894) p.316.

67. *Brewers Journal* (1893) p.38.

68. *Brewers Journal* (1896) pp.377 & 454.

69. *Brewers Journal* (1893) p.348.

70. Gourvish, T.R. & Wilson, R.G. (1994) op. cit.

71. Sydney Nevile, managing director of Whitbreads and chairman of the Brewers Society underwent a two year brewing pupillage at Robins starting in January 1888. He gives a potted description of the brewing process at an early point in his autobiography (*70 Rolling Years*), but does not mention union sets. His description of fermentation is of a generalised skimming system, probably Whitbread's. Since he was between 14 and 16 years of age during his time in Brighton, and much of his subsequent 60 years association with Whitbreads and the industry was mostly in an administrative and trade role, which may well have obscured any details in his memory and does not necessarily contradict Barnard's statistic.

72. These casks are not union casks and are described as 'on slate stillions' and again are in a room 'on a level with the ales stores.' This was an indeterminate area, but one which, because the omission of any of Barnard's references to size, one suspects is

probably a smaller area where casks are stored just prior to delivery to the trade. Rather than any kind of union system this later area probably reflects an extensive ale storage operation based on either a primitive late cask cleansing system or, more likely, a controlled venting operation for lively beer early in its storage or, since fermentation is a progressive process, maybe a combination of the two, after which casks were moved to the smaller store ready for imminent despatch of 'matured' beer.

73. A plan dated 1952 in the Coors Museum archive of what is termed union room No. 3 had six sets with 28 casks each, a total of 168 unions, and there was a similar sized union room No. 2 although whether it still housed unions at that time is not clear. Six rooms with six such sets gives exactly 1008 unions. This is, to some extent, contradicted by another (verbal) report that at the final closure some years later Worthington had one room with only eight large sets in operation. Some Worthington brands were by that time been brewed at Bass and presumably dependency on unions had been reduced over time. Worthington seems to have been a smaller brewery than its nationwide reputation (achieved particularly for bottled beer) suggests. Perhaps maintaining this perception of size, both before and after the Bass amalgamation, was seen as important to its marketing strategy and high profile.

Barnard visited Burton on several occasions, but missed 18 of the breweries altogether. He included the medium sized Worthington in volume 1 and the rather small Marstons in volume 2. Whether this is because of personal preference, brewery reputation or level of sponsorship and support for

the writer or was just dependent on the train timetables is debatable.

Worthington amalgamated with Bass in 1926 and, although just next door, was run as a totally separate operation with little attempt to extract what is now termed the 'synergy' of the merger. Worthington was always shrouded in an air of secrecy even into the 1950s and 60s when it was finally closed (the blinds in the laboratory were reported as being kept closed even in the 1960s). So perhaps this aura of commercial secrecy, that became cultural under the controlling Manners family, had started even in 1889 and they simply did not intend to reveal any aspect of their capacity. The Worthington directors at the time of the Bass merger soon held the major sway in the enlarged company, influence which was retained until the takeover of Bass by Mitchells and Butlers in the 1960s.

74. Lloyd Hind, H. (1948) *Brewing Science & Practice*. Vol 2. 3rd Edition. Chapman and Hall Ltd.: London.

75. In this photograph of Mortlake there are also stanchion bases for a further set possibly removed prior to this time. The building in which they are located is certainly not Victorian and looks relatively modern in style. It is also air-conditioned which was Lloyd Hind's point of interest rather than the Unions themselves. Their pipework arrangements are not classic Burton and if anything a little primitive. It is possible they were either purchased second-hand as breweries closed in the early C20 or were from one of the many breweries taken over by Watney Coombe Reid or Mann Crossman and Paulin or the companies which composed them.

It is stated by H Janes in the *Red Barrel: A History of Watney Mann* (1963) that the

Mortlake brewery was used to brew all the company's bitter beers after the closure of Coombe and Reid's Breweries and also that between the wars, the dropping system, the Burton union system and Yorkshire squares were all in use at the brewery.

Kloss (1949) *The Art and Science of Brewing* prints the same photograph, but although he was chief chemist at Mortlake, at one point his comments on set management seem either a little out of touch with working operations or to indicate operating procedure which were much removed from classical practice. He offers no information as to the origins or *raison d'être* of the sets. Serocold, in his book *The Story of Watneys* (1949), states that they were introduced on the initiative of Sir Richard Garton 'some years earlier'

which suggests that they were still operating in 1949. Sir Richard entered a partnership at Cobbold & Co in Alton in 1901 and went on to join the Watney's board in 1902 having 'an immediate effect on laboratory centralisation.' He supported the laboratories and the development of science (always an Achilles heel of union sets) until his death in 1934. The best estimate I can make, therefore, is that the unions arrived at Mortlake at an indeterminate date, after 1902 and before 1934, and were removed after 1949.

Grand Metropolitan ceased brewing at the Stag Brewery, Mortlake (by then without the unions) in the late 1980s, but brewing on the site has continued in the hands of Anheuser-Busch.