DESCRIPTION OF BROWN BEER BREWERY IN THE KINGDOM OF BAVARIA

From the estate of Benno Scharl,

Count's home administrator in Grünbach.

Printed by the Agricultural Association

in Bavaria.

With 4 lithographed plates.

Munich 1814. Bev Joseph Lindauer.

Translator's Notes

Translation of this work was performed in two steps. The first step consisted of transposing the original 1814 text from the antique German Fraktur font utilized by the original publishers as this font is quite difficult for modern readers to understand. This work was performed with the assistance of my mother in law Christa Miller who learned to read this font as a small child growing up in pre and post WW2 Germany. This step sometimes included the modernizing of some archaic words which have long since gone out of use though this was kept to a minimum.

The second step was to then perform the actual translation. There are a few items to note regarding this. In certain cases I have utilized square brackets ("[" and "]" to denote certain instances where a literal translation may have sufficed but would not have conveyed the gist of the passage suitably. I have typically only done this at the first occurrence of such substitutions and bi-lingual readers can access the original or transposed versions of the work should they wish to. Where paretheses appear they are utilized as was present in the original work. It is also worth noting that for this reason I have tried to maintain as best as possible the pagination of the original work in my translated version.

Additionally I have utilized curly braces ("{" and "}") to denote instances where I may have added words not in the original German version of the sentence. This was often it is necessary to either add explanations and context with respect to what the original author is discussing or to enhance readability in English.

In a similar vein although, or perhaps because, modern language usage has changed in the last two hundred years I also sought,

to the greatest extent possible, to perform the translation in a manner that would retain the original phrasing as closely as possible while still conveying the original author's ideas. In translating such an old work there is always a temptation to "modernize" the language but to do so would rob the translated work of the ability to convey the differences between how brewers of their day worked to the modern reader.

I should also make a quick note on measurements for length and volume. The term “Schuh” literally means shoe but equates to 11.5-12 inches so I have used “foot” to replace it. The term Eimer literally translates to “bucket” and Maß (“measure”). I have used the values of 68.416L per Eimer and 1.069L per Maß as per Andreas Krennmair in “Bavarian Brewing in the 19th Century” and other sources. Regarding temperature 1 degree Celsius = 1.25 Reaumur = 2.25 Fahrenheit.

Jay Hersh a.k.a. Dr. Beer ®

Original Publisher’s Statement

The undersigned publishing company believes that the numerous admirers of the blessed administrator Scharl in Grünbach and all those at home and abroad who either practice Bavarian brown beer brewing themselves, or wish to know more about it, are done a service by its providing them with the present print of the manuscript left by him. Scharl had previously given it to his special patron, the King. Financial trainee [clerk] Mr. Von Steiner sent it after the author's death to the General Committee of the agricultural association in Bavaria, so it might be forwarded for printing.

The General Committee {of the agricultural association} entrusted the review of it to an expert and honored the publishing company with the trust to publish this long-desired work about an excellent branch of Bavarian industry. Short life stories about the author by his spiritual adviser and Professor Sailer in Landshut, of the weekly journal of the agricultural association, are undoubtedly an addition that is as appropriate as it is welcome.

Lindau Publishing House

Biography of

Estate Administrator

Benno Scharl

Benno Scharl was born on June 6, 1741 in Seefeld, a Countship of Töring-Seefeldischen Hofmark in Bavaria. His father was an innkeeper there, a good man who deserves to have his name preserved in history. His father was an innkeeper there, a good man who deserves to have his name preserved in history. It was only in his 70th year that he fathered his Benjamin, our Benno, to whom he was particularly fond. In his 78th year, cataracts robbed him of his sight,

and in his 80th he regained it, to his greatest joy, through a successful operation, which he underwent with noble determination.

Benno lost his mother when he was barely 6 years old. Too young to feel this loss his father later said that as a man and as an old man he often recounted he could still remember how everything was about him: “I cried around his good mother, but he, the son, couldn't help but laugh joyfully at the mourning bells, which were something new to him and which he didn't understand.”

Both parents had earned love and respect in the local area through piety and righteousness (which they regarded as one, as they are one), and they knew of no higher duty than to give their children a Christian, that is, a sensible, education. His father died, finally overcome by the blow, just as he was on the way to the church, where, as a frail old man, he let a boy lead him every day, in his 87th year.

Of Benno's siblings, only his brother still lives in Munich, an old man of 81, distinguished for his science and virtue. Father Placidus Scharl, Benedictine of the former Andechs monastery, who works as a professor in Neuburg, as a prior in his monastery, and as a secretary at the school directorate in Munich has enjoyed and earned the trust of those high and low.

The boy Benno learned everything that a country school could teach him, reading, writing, arithmetic, and how to express himself, especially the three “F”s of the good student, being pious, cheerful and hard-working. He had to get acquainted with household chores at an early age, and as he gained strength, the heavier agricultural work also became his occupation.

He often asked his father if he would let him study too; for his spirit moved early. But since his older brother had already devoted himself to the Muses, the younger brother’s request to his father was in vain. He finally decided to learn to brew beer at the behest

of his father, who was himself a master at it. In his sixteenth year he went to Munich to do an apprenticeship at the Faberbraü. When Benno came to his father, his first words were: “Lord, here I am.” The elder brewer smiled and replied in his usual simple tone: “Now I can see you.”

During his apprenticeship, Benno had to serve beer and stand bowling pins up for patrons in the summer. As far as the work of brewing beer was concerned, there was none that he disliked more than cooling the beer, and this dislike was the first driving force behind a change that he later made. As soon as he was allowed to work in the brewery in Grünbach with his hands free, he banished the cooling of beer as a superfluous job with the best results. The fact that some master brewers accused him of being a heretic didn't affect him.

After his three years of apprenticeship, he remained in the service of his master as a brewer for several years until the wish arose in him: “if only I could come to the Jesuit brewery!”

His request was heard and the young man was employed there as a brewery worker where he worked as such for three years, two as a manual laborer and then one more as a head laborer. During this time he developed a desire to be accepted into the Jesuit order. This request was also granted and he was immediately sent to Landsberg to become a novitiate there. This probationary period only lasted one year. Scharl was quite happy in this new school. In Landsberg, he often said, I enjoyed the most pleasant days of my life.

From there he went to Ingolstadt, and as he expressed the desire to also learn to cook, he was assigned to the kitchen and became a journeyman cook. A year later he was sent to Burghausen as a Dispensator, where he remained for three years until Pope Clement XIV abolished the institute.

After his order was abolished, he was replaced by a deputized commission, which consisted of the president, Count von La Rosee

and the former court chamber councilor, Mr. V. Dreern who insisted at the suggestion of Dispensator Christl insisted on being called to Ingolstadt. Here he was given the following areas to supervise:

1) The brewery in the Collegium in Ingolstadt, with the finances of the Hahnenhof;
2) The Hainstadt brewery, half an hour from Ingolstadt;
3) The finances of the Wallerschwaige, an hour from Ingolstadt;
4) The finances of the Stockau estate;
5) The finances of Hellmannsberg, two and a half hours from Ingolstadt;
6) The finances of the Muenchmuenster Estate;
7) The Essing brewery;
8) The large sheep farm in Brun, 5 hours from Ingolstadt, with 300-500 single-minded sheep.
9) The sheep farm in Randeck, seven hours from Ingolstadt, with just as many sheep;
10) Several forests and fishing waters

This new office, which could have employed ten and a half men was satisfied by one, Benno Scharl, through his activity, loyalty, insight and cleverness.

For ten years he was the soul of this sprawling administration. For ten years he kept an account of each year, sending it to the Electoral Goods Administration for revision every year. All purchases and sales required by the management of these assets were settled by him. This life of putting things in order was one of commotion. A single horse was enough for him, upon which he rode from one estate to another to bring about the best condition of the assets he was charged with managing. Either loved or feared by his colleagues [literally: “housemates”] he was present even where his eyes and hands were absent. He didn't need any instructions they lay in his insight and loyalty. He didn't fast and what little he ate was always accounted for. When he later reflected on this term of office, the first in which his talent for managing finances [literally: economic talent]

could develop in all directions, he made the important remark:

“It is impossible to calculate how many thousands and thousands of guilders passed through my hands but not one remained in my hand (Hail to all rulers whose administrators can give this testimony!); and I can well understand how another financial manager could have enriched himself in my place, who would not have been content with food and a small annual salary, like me.”

Anyone who wanted to get to know even a vague outline of the diversity of his activities and the subjects under his supervision would have to be able to gain a local knowledge of the branches of his administration. What can be judged from a brief description is this:

The estate in Haunstadt, where he built his first cellar in a rock and rebuilt the brewery, which was in danger of collapsing, as well as laid out his first hop garden with particular skill consisting of an a field

which required 6 horses for its cultivation. There were always 10 fattening oxen, 15 cows and several pigs there.

At Hellmansberg, where winter farming required 36 bushers of grain and wheat, there were 6 horses and 6 to 8 oxen, 30 head of cows and a sheep farm of 800 - 900 sheep. While managing this property a misfortune befell him which we have often heard him recount: 900 sheep perished due to the shepherd's careless supervision. One sheep got mange and infected all the others with this incurable disease. Misfortunes also teach and educate – he added.

The management of Münchsmünster produced a lot of grain and hay. He also had several forests and fishing waters to supervise there. This gave new fuel to his zeal for improvement; He endeavored to dry up the fish ponds and moss beds and was happy to see the most beautiful meadows and a large hay harvest grow up before his eyes.

There were 18 horses,

24 cows, 36 young cattle, 8 mother pigs, 200 muttons and 24 fattening oxen on the Hahnenhof. To cultivate the winter field he had to have 28 - 30 bushels of wheat and grain. The brewery of the former Jesuit college was also connected to the administration of the Hahnenhof and he oversaw and kept the accounts of both.

He planted his second hop garden on the Hahnenhof, which produced 24 to 28 hundredweight of hops in good vintages. Already back then, in 1773-74, Scharl had come to the conclusion that Bavarian agriculturists were producing the best hops in their country and he could do without the Bohemian hops.

The brewery works in Ingolstadt, Essing and Haunstadt were mediocre but were set up according to the local market.

In Stockau the assets were small; a paper mill and a small sheep farm.

At Wallerschwaig he had 100 head of cows, mostly young cattle because there were a lot of meadows here.

On this farm he also imitated the production of Swiss cheese, an attempt that provided the neighbors with good cheese and brought in a lot of money for the estate's coffers. Here he had the misfortune of losing 50 head due to the cattle epidemic even though he had spent over 300 guilders on attempts to cure them. He bought the horses kept here himself at the Käferloh market which he visited diligently. He sought to protect himself from fraud through knowledge and self-action.

He oversaw Randeck with an "iron hammer" but only for a short time.

In these varied administrative activities he followed two strict principles:

I. Write as little as possible and do as much as possible!

II. Where the eye itself can see, it should see; Where the voice itself can command, it should command; Where the hand itself can engage, it should engage: the rest must be entrusted to the loyalty and skill of the immediate workers who should have been chosen with great care.

His hard work left him little time for recreation, and even among those he only loved ones which helped develop his technical talent. Target shooting was his favorite activity and he himself said he had probably shot so much [“Barchent” literaly translates to “Fustian” which modern dictionaries define as a fabric made of camels hair or a thick, rough cotton cloth: hence the meaning here is not clear though the author does not seem to mean any particular animal] that I could dress myself in it from head to toe. He also knew how to make this game useful from a financial point of view through sociable conversations with clever friends who also gathered at the shooting range. And although he didn't like playing chess he is known to have once said to a friend in Ingolstadt “Today I won't go to sleep until I have checkmated you.” He kept his word not going to bed until midnight as it until that hour for him to become victorious.

After he had served as a manager for 10 years in Ingolstadt, the center from which he made his visits to all the properties entrusted to him

{with the greatest satisfaction of his supervisory board} the properties of the abolished order were given to the Maltese. When assessing this step Benno Scharl was consulted as a man who had the best knowledge and the most unadulterated open-heartedness. This business brought him into close acquaintance with the Councilor, and later Chancellor, of the Bavarian Maltese spokesman Eisenreich. Eisenreich found in this so-called Jesuit brother so much knowledge acquired from his own experience and tested in successful experiments (i.e. practical knowledge), and so much order, simplicity, activity and unselfishness in his official conduct that he brought Scharl with him everywhere, making him his secret advisor in all his financial negotiations and recommended him to the government as one of the best financial advisors. He {Eisenreich} wanted to honor the man and bring his unknown merit to light!

At the same time the assets Scharl managed in connection with this transfer (to the Maltese) had to be divided into small parts

in order to narrow the sphere of the previous financial activities and better establish their oversight by the incoming Maltese administrators. Moreover, it was believed that the management of the agricultural assets of the Grand Priory of Ebersberg were going poorly [literally: sluggishly]. Thus Scharl was chosen by Eisenreich as the man to oversee it and who would be the most able to bring new life into such extensive holdings. This resulted in his becoming employed as the manager for the Grand Priory.

He marked the start of this new office with beneficial changes in the brewery, the building yard and in the adjacent Kapsers alpine dairy farm. In his first year there he started a new, large hop garden with the most beautiful flowers; in the second he set up a brick factory and lime kiln. His operating principle was to draw from every asset the most profit which could be easily and safely gained from it. Since the tall, healthy hay brought in plenty {of income} this made it easy for him to improve the livestock breeding. New, better stables were built and the cattle were separated which was particularly beneficial for the financial situation and made supervision of the livestock easier for the farmer. He had all the young cattle brought to the Kaps alpine dairy farm while only the productive cattle were allowed to stay on the Maierhofe.

His spirited management of the Grand Priory in C for two years brought out its best. However he came into conflict with the nurse there at the time which could not be alleviated by his giving in, a situation he disclosed to Eisenreich and for which he asked to be dismissed from his duties there. He {Eisenreich} found the manager's {Scharl} complaint justified and in order to alleviate his concerns recommended him to His Excellency, the then minister, Count von. Seinsheim, who immediately took him on as manager at Sinching.

After honorably resigning his duties Scharl traveled from Ebersberg to Sinching and from then on became the servant of one of the noblest families in Bavaria,

whose members vied to show him their respect, honoring the Administrator {Scharl} by treating him as more of a friend of the house than as servant. In return he viewed the family's interest as his own in all branches of administration even to the extent that he put his own best interests aside in order to focus his efforts on his managerial tasks.

His financial genius was not to rule Sinching for long for two years later when the Minister of Seinsheim died in 1787 Benno Scharl took over the administration of Grünbach. In order to help improve this asset, which to date had not been a priority for the family though it had been put together fully 20 years earlier, a unique talent combining insight with unselfishness and restless activity was required. Grünbach received that talent in Benno Scharl.

No sooner had he been entrusted with this new task than it became clear to him, even in the first days of his

Management, that there was only one way to get this estate back into prosperity: namely by producing brown beer of a particularly good quality and brewed in such quantities that one could safely count on widespread consumption throughout the surrounding area. Convinced of the merit and feasibility of this idea he immediately set about improving the brewing system by building the necessary equipment. He did not rest until the brewery brought in greater income with each passing year and beer the brewing of beer became the most productive activity under his care.

Spurred on by the fortunate success of his endeavor [literally: speculation] he made one improvement after another in the brewery. He built an ox powered malt mill, had the summer beer cellars expanded, set up a hop garden, and, as has already been mentioned, abolished refrigeration as useless work. Through his small scale experiments he became so familiar {i.e. experienced}

with brewing on a large scale with the result that he was often asked to provide the government with information on various issues that affected the brewing industry. And while others knew how to pave a path from theory to practice he was asked to show the way from practice to theory while at the same time improving [literally: sharpened] theory to better practice. The Councilor Steiner of Munich was one of those who particularly valued his knowledge because it bore the stamp of experience.

The success of his designs for improving beer brewing enabled him to attempt larger ventures. After introducing clover farming in Grünbach, planting a hop garden, and building a brick factory the increased profit [literally: yield] had given him the energy [and means] for new experiments. He carried out a long-standing plan to build new farm buildings in place of all the old ones.

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As soon as these were finished the old castle was torn down and a new manor rose from the rubble of the old one.

For a long time he had desired [literally: his heart's wish] to build a better and more convenient brewery according to his own well thought out design. Although the costs prevented him from doing so for a long time he also made this wish come true.

He finally moved forward and built the brewery with such excellent furnishings and conveniences that every expert was amazed at the work he had done. All the equipment was designed in such a way that every part worked hand in hand with the others. The fact that in this brewery in an entire year one would not need a single sack to move the materials of production from one place to the other it can be considered that a lot had been gained.

But his new malt mill, which he had built in the brewery himself and for which he had to divert the water into channels onto a large rolling wheel for half an hour was even more advantageous. This big wheel caused the architect Scharl many sleepless nights; he read, he studied, he questioned mathematicians and mechanics. He calculated, experimented, adjusted again and again until finally, after much thought and a great expenditure of money and time there it was. Written in large words in one of his letters:

Friend! Finally the big wheel {i.e. the malt mill} works!

One can only guess at the joy of the inventor. Every stranger who visits the brewery and the surrounding area cannot without amazement see the big wheel and the small stream, which one can stop with the hand, but which through an ingenious invention gains so much power that in this new mill all the flour for the household and all the malt for the brewery can be ground [literally: broken].

He oversaw [literally: ordered] the construction of the entire brewery himself thereby proving that he not only developed the talent of a financial administrator but also that of a construction expert.

With respect to the actual finances of Grünbach this problem was shared sisterly between it and the brewery. And although the budget was small, not even amount to that of an entire farm, he still set it up so efficiently that his effort and work did not go unrewarded. In the very first years of his administration he set out to round up the fields [Note: this appears to be a means of managing fields such that equipment can more easily make turns at the corners thereby improving the speed with which the fields can be plowed, cut, etc.] and although he often had to take shortcuts to do so any damage made to an individual field was quickly compensated through the improved administration of the whole farm. Clover farming, which was not known in his area, but he recommended it everywhere, and through his example there is now no farmer in the area who does not grow clover every year. He was just as enthusiastic about cultivating

potatoes and turnips. These provided him with food for the cows and pigs, a strong trade where the butchering of them could make a lot of money.

He also showed a great inclination for fruit cultivation. He planted over 600 trees in his region and would have done even more if he had not been taught by experience how much the trees are mistreated once they bear fruit. With respect to the culturing of fruit, he used to say, we will not make any progress until human culture thrives better. He also had solid knowledge of forestry gained from having managed many forests that were part of his previous administrations, e.g. the Eberspergerforst. This forced him to open his eyes everywhere when buying, selling, making and disposing of all kinds of goods. He became wiser [literally: opened his eyes] obtain information through

reading, dealing with experts, experience and experiments, and seeking good advice.

In short, let us consider any branch of fiscal management and we will find that he dealt with it and understood the matter from the ground up.

You can recognize the tree from the fruits, by which it was meant: go to Grünbach and you will get to know the man we describe!

The attentive reader will ask themselves the question: How could a man without a scholarly education acquire so much knowledge and achieve within his circle everything that he has actually achieved?

As far as knowledge is concerned, he {Scharl} owes it to his common sense. He always wanted to see everything for himself and with his lively curiosity could never be idle. He acquainted himself early with financial management by his association with skillful farmers, reading through the best economic writing and through his own experiments.

Even with all this knowledge, however, he would not have been able to achieve what he really did if his sound mind had not been combined with a pure, noble and invincible activity. I call his mind pure because it was truly pure from all self-interest; I call his mind noble because he worked tirelessly out of respect for duty, out of love for his dominion and out of love for the people with whom his office and heart had brought him into contact. He worked tirelessly and was a rare example of perfect loyalty to his office knew nothing more blessed than doing right and doing good in the area he administered.

But this purity of his mind free from all stains of self-interest, this nobility, which did not display generosity but rather exercised it, was not rooted in Benno Scharl in beautiful moral sayings.

Goodness cannot be rooted everywhere in any person, but in the living recognition of God, in what religion is and is alone worth calling. From this pure source flowed his pure virtue: justice, equity, goodness, hard work, loyalty and perseverance in the fulfillment of his duties. This wealth of religion also assisted him as an invisible angel, both in choosing the members of the household, the workers, and the subordinate overseers, as well as in the direction of them. He had convinced himself early enough that conscientiousness was the only reliable guide [literally: control] in all administrations, and that conscientiousness itself was nothing other than practical religion. This conviction not only made his path through life, but also the conduct of his business, safe and smooth.

So: the nobility, the dignity of his relationship to infinity, to eternity, has given his relationship to time, to finiteness, value and security.

The second thing that enabled the financial manager in him to achieve what he did was the unconditional confidence which the Counts placed in him. His local family, and especially the current owner of Grünbach, was honored. This trust passed from father to son. This confidence gave the administrator a free, open hand to try and undertake to change everything in a way that could be prosperous for the good of the dominion. Without this trust, Grünbach would never have become what it is. This confidence, which left the steward's hands unbound, was combined with the noblest participation in everything that concerned the person and well-being of the steward, a participation that moved the honored and beloved man to the point of tears. Not only the Count Karl von Seinsheim, the royal district councilor in Salzburg and owner of Grünbach,

but also the Countess Mother did everything they could to save the deserving man. The latter sent her doctor down from Munich and wanted to be informed about the progress of the illness by daily letters. This tender participation of the family lightened the burden of the office for the steward and the physical suffering for the sick person.

But neither the family's participation nor the doctor's art could withstand the consequences of exhaustion. It was March 2nd 1812, in his 71st year that the brilliant man was no more [literally: no longer visible]. He died as he had lived, with the Christian's resignation and confidence. The tears that accompanied him to his grave would have proven in themselves that they were burying a good man. His memory does not die; for it is the memory of the righteous.

Count August V. Seinsheim, who knew how to combine

science and art with sociability, stayed in Grünbach for several days in 1811 to complete the portrait of the honored man. The portrait does honor to the artist because it is so similar to the original as to be the inscription of the truth:

Benno Scharl,

Financial Manager of Grünbach

to the Counts of Seinsheim

Attached to the throne for

years of serious and meritorious service.

He painted a septuagenarian

Augustus Count of Seinsheim

MDCCCXI

WRITINGS

ON

BROWN BEER BREWERIES

CHAPTER I

OF THE WATER

Water is the first and most necessary item for brewing beer. Any brewer who has good water at their brewery will be happy.

There are different types of water: river water, rain water, snow water, and all of these waters have different properties. Some carry more, some less, and some carry almost no foreign components. The components themselves are as different as the types of earth are different in each area. Some carry with them minerals of different kinds, and this water has the name of “hard water”. That which is in muddy (boggy) grounds, swamps, ponds and stagnant lakes carries with it components of the plant and animal kingdom and this water is known by the name of “soft water”. Rain and snow water is undoubtedly the best [literally: easiest] water

of all and in my opinion also the best for brewing beer. It isn’t always available [literally: one can't always have it] and even if you can collect it in containers and reservoirs [literally: reserves] if it has to stand for a long time it will not only become unpalatable but also putrify [literally: turn into rot].

Every beer brewer must therefore use the water that he has in his area whatever components it may contain. For example, if one assumes that a river flows past a city or a town the underground area around this place is certainly filled with this same river water. Everyone gets the same water from the river itself but if someone digs a well that is a little further away from the river where the water encounters sandy parts in the layer of earth through which it has to penetrate he will receive purer water than the other who takes it directly from the river will especially if persistent rainy weather and floods occur. Even where the water is drawn from a spring at some distance via pipes it loses many of the components that this source has received from the type of earth through which it has flown especially if it is also conveyed into a large water container where it may stand quietly.

It would certainly have good consequences for a brewery if a pond were dug close to it and the spring water led into it the pond. Such a pond would have to contain river sand itself or have to be filled with it. From this pond the water would then have to be channeled into a reserve where it can stand. In this way the water would be cleaned of foreign components in the best manner. However a general implementation of this idea, which has occurred [literally: occupied] me very often, will have to remain a silent wish.

It is beyond all doubt that all spring waters carry foreign components with them, namely those which they find in the lower layers of the earth from which they flow. Most of them, however, carry limestone and various acidic substances (salty compounds), some more, others less, and I believe that even if the water did not carry any acidic substances (salty compounds) with it, it would still not be tasty to drink. However this mixing of sour substances and other components is not very harmful to the dissolution of the malt grist or to the beer brewing process at all and it can therefore be used to produce good and tasty beer.

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In my younger years I was in a brewery where I was told that I would not be able to produce a clear [literally: lautered] beer if I did not let the water boil in the hot liquor tank [literally: vat] a good hour beforehand and then in the brewing kettle [literally: pan] afterwards. I didn't believe it but the prediction came true. After three brews in a row the beer wouldn't clarify despite all my hard work. For the fourth brew I still had to heat the water in the hot liquor tank using a lot of wood for an hour and then boil it just as long in the brew kettle before commencing brewing. This fourth brew now became brighter and clarified.

For a long time I thought about whether it was necessary to waste as much wood [i.e. to pre boil the water] with each batch as is almost required to brew the beer itself. There was never a water reserve at this brewery because a mountain spring close to it provided enough water which was easily fed into the brew kettle and hot liquor tank using no more than four pipes. Since at the beginning of October brewing wasn't done every day I let as much water run into the cold water tank [literally: cooler] as I needed to make a brew and then let it sit quietly for three days.

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On the fourth day we'd brow. I let the water boil in the kettle for just half an hour and the beer became wonderfully good and clear. Now I was close to knowing what would help [correct the problem with the water]. I had a large stone water reservoir made [on the spot] in which enough water for more than three brews could be kept and from that time on I always got a good, clear and tasty beer.

In another brewery I had the following experience. Here, where there were no water containers, [although] there was a pond nearby through which an arm of the large Laber River ran. When this river started to flow it was either because of long periods of rain, snow or ice but it happened in such a way that the pond became full of feces and mud from the nearby dark (clay) fields. From this pond a large pipe went into the well that stood in the brewery from which all the water required for brewing beer and for other needs was drawn. If, as happened often during the year, the water in the pond became muddy and unclean due to the flooding of the Laber you could never produce a clear and tasty beer,

no matter what you did or how much you tried [literally: wanted to]. The idea therefore came to us to build an artificial waterworks and channel the water into a large oak reservoir. After this was built good, light and tasty beer was brewed from that time on and up until now.

It is not always the faut of the water's if some breweries don't brew good and tasty beer, or at least don't brew clear beer. God knows what various circumstances are to blame which occur in beer brewing in a variety of ways(*) especially in the course [literally: business] of malting and fermentation. It is not uncommon for a lot [of things] to contribute to this if the various brewing utensils are not kept clean.

(*) *An example of what seemingly minor circumstances influence the success of brewing is the following experience. Located in the brewery of a dominial estate, which derived a great deal of income from that brewery, was a trap door in the floorboards of the ceiling which had always been left open. When it was repaired it was closed off because it had been of no use. Since this repair the previously excellent beer, which was sold far and wide, has become worse. Sales fell to a minimum and the tenant farmer was near ruin. No other changes had been made to brewing; the same good materials, the same workers were there. Every possible means was used; Commissions of experts were brought in [literally: ordered]. They could find no*

The more complicated aspects of this will be reported in the appropriate place {in this work}.

It is therefore quite certain, as has already been said, that the soft water which carries with it the fewest foreign components is the best for brewing beer and also undisputedly for dissolving the malt grist. However it is not of such great importance if the water also carries with it some foreign components, [though] I only want to exclude various metals and a certain amount of muddy earth from this. It is inevitable that sometimes in persistent rainy weather, snow and ice chalky parts and various other parts of the earth (especially mud), plants and animals come under the water. I myself have often seen at such times that the water

reason for the bad quality of the beer given the very artistic process and the good quality of the materials. Finally the tenant farmer visited an old friend to whom he complained of his distress. Fortunately, the topic of the repair was brought up and it was the introspection [of the old friend] who asked whether any changes had been made to the facility. No, he [the tenant farmer] said, there was just a small trap door up in the ceiling which has since been closed. But let it be opened again. It was done and from that hour on we got the same good beer again.

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has run cloudy and dirty into the brewing kettle and tanks. Therefore what was in the kettle was simmered for an hour and the beer was still tasty and moreclear. But in such fortuitous circumstances it seems to me to be extremely necessary that before the water comes to boiling, and as long as it raises foam and sludge while boiling, where through the heat of the boil [such foam and sludge] is brought together, not only the foam but also the sludge is skimmed off (scummed off) by means of a ladle (or Eimer) and such cloudy water is poured away. It would be even better if the water that comes into the tank was treated in the same way but this water would have to stand again and become a little cold, which is common [practice?] elsewhere. (*)

Incidentally, from what is written about different types of water; their various components; about the dissolution of water and its purification; about the way to make hard water soft and its multiple components

(*) *Pouring a proportionate amount of potash or ash - to be determined according to the circumstances - into the hard water and letting it stand for 12-14 hours is also possible on a large scale and is not very expensive.*

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simple; and the like, I take all of this as theoretically and chemically feasible. But the applicability of this for brewing beer, for which water is required in such large quantities, is impossible. At most you could perhaps make a trial brew. But what is the point? It is too difficult and expensive, or simply impossible, to do in most breweries.

With respect to this subject [literaly: article] I have to add a comment. I have already noticed in many breweries that they have large copper water reservoirs in which the water for the brewing plant is kept. It is known that copper, when gets damp and or wet, has the property of accumulating green shavings which are a very pungent poison. Since all of these copper water reservoirs are in moist places green chips will accumulate on them and moreover they are sometimes [literally: now] empty and sometimes filled depending on the need. Isn't water standing in such copper reservoirs very harmful to human health? I leave this investigation to the physicists and chemists. In my opinion I would rather choose stone or wooden reservoirs. It will be objected that the stone ones are exposed to the danger

of being torn apart by the cold [i.e. freezing] and wooden ones of being spoiled by rapid decay. The former can be protected against this danger [i.e. freezing] and the latter can be preserved for a much longer time through frequent cleaning. This cleansing should and must happen. Unfortunately it is the least observed {practice} and is often neglected for years, which has a damaging effect on both these containers and the brewery itself.

CHAPTER II
OF THE BARLEY

From the four types of grains that are grown most in the Kingdom of Bavaria, namely wheat, rye, barley and oats [Haber in original is Bavarian dialect for Hafer] for brown beer brewing barley is the one selected and used and the beer produced from it is then called brown beer or lager beer. (*) Beer is also brewed from wheat; but this type of beer has the well-known name: white wheat beer,

(*) *Lager beer is the brown beer brewed in winter and tapped in summer*

and the yeast [literally: fermentation agent] for this is different from that of lager beer.

However, in many places white beer is also brewed from barley, for which the {same} yeast is used as is {used} with white wheat beer. As far as fermentation is concerned more details will be discussed in its appropriate place.

Barley is a plant that grows throughout the summer every year and becomes ripe for harvest. It is usually sown [literally: built] in April and by the end of August the barley harvest is mostly over. It loves good, rich, finely worked soil. The field is worked over in the autumn, where there was previously winter grain, wheat or (other) grain, and in the spring as soon as the earth thaws and the weather permits it is plowed and tilled again and then further plowed and sown. The finer the barley field is prepared the better it {the barley} is. A little moisture in the field is very good for the germination [literally: growth] of the seeds. But heavy rains before the grain has sprouted into a blade of grass (sprout) are very damaging to barley because such heavy rain turns the Mollen [literally transalates as beer glass?] (top soil), or upper layer of earth, into a somewhat solid crust which the extremely fine blade of grass [germ, shoots] of the barley corn cannot sprout through

and when such a field of barley is not cultivated with a small {or low} harrow an enormous number of barley seed remain behind and suffocate in the ground. Barley actually doesn't like a lot of rain or moisture and in a field that has wet ground barley {cultivation} [literally: farming] certainly won't thrive. Barley, as the farmer says, {needs} only three rains: the first to germinate, the second to bolt {shoot up}, and the third to mature or ripen. If there is long continuous rain while the barley stands in the field it becomes sick; the stalk takes on a yellow color and it tends to stand up in the depths or furrows.

Barley grows everywhere in Bavaria, but not equally good everywhere. If there is a moderately good growing year [literally: vintage] on average one can receive 12 seeds on a good soil [literally; ground], 8 on a mediocre {soil}, and on poor, wet or sandy soil only 4 or at most 5 seeds.

Barley consists mainly of two types [literally: forms]. One sprouts in its ear two rows of seeds and the second four rows. There are several different types of barley which are not much sought after for brewing beer. The best kind of barley is undoubtedly two-rowed. The grains are stronger

and have more flour and sweet matter [literally: stuff] in them than those of the four-rowed. But even in this case there always remains a big difference between good, mediocre and bad barley. Good soil will produce good and strong grain, medium soil {will produce} medium grain and bad soil small, meager and almost [aftere: archaic, not translateable] (useless) grain. But Bavaria produces [literally: gives] far more good than bad barley.

Barley is also, when harvested, very sensitive. It needs to be well dried. Its straw is not as long as corn {generic term Korn used here doesnt denote“Maize” but not clear what author means} or wheat straw, but is somewhat softer; the seeds are stronger and has a lot of moisture in them. Therefore it often happens that the farmer doesn't let them dry enough and it is brought badly {i.e. insufficiently dried} into the barn. Then it gets warm in the {barn} [literally: hive], starts to ferment, the grains turn red, and it is almost useless for brewing beer. This happens more often when rain falls during the barley harvest.

Barley cultivation is very profitable for the farmer in that it is sought for purchase by all breweries and is almost {always sold} at the same price as {other} grain. After the harvest, it is the first type of grain to be converted into money and therefore

represents a certain and significant income for the farmer. It also seems to me that it is not as strongly subject to bad harvest as the winter crops, namely wheat and grain. – When also in some years less barley grows it is all the more expensive. Yes, it sometimes happens that the farmer in one year gets less than half the barley than in the previous one, but he then receives half {again} more money for this because for the brewers the barley is an indispensable item.

So the price of barley varies greatly. I have noticably experienced this for fifty years. In 1770 and 1771 I bought a bushel {of barley} for 24 Gulden and in 1777 and 1778 for 2 Fl {Floren} 30kr {Krone}. Since then {it has cost} from 7 to 20 Gulden. The main cause of this is quite natural. Every year every beer manufacturer needs several hundred bushels of barley and this comes to [literally: makes] an enormous number in our kingdom, and there are few, possibly no, brewers who can or will buy barley in advance for a whole subsequent year of brewing. Since barley must be bought every year for brewing so it is easy to understand why in years when there is less growth the price increases.

Barley is therefore undeniably one of the main

items belonging to the food [literally: victual] products of Bavaria. The income which the state receives from it through the malt surcharge is, after taxes, the most profitable thing for the state since every bushel of barley used for the brewery costs 4 Fl 24 Kr, as well as [literally: also] {a} 4 Fl. 30 Kr. (currently 5 Fl) surcharge, which {when combined} across the entire kingdom amounts to a very large sum of money. However I thereby note mainly that barley farming is one of the most pre-eminent and important {pursuits} in our fatherland.

I now come to a main question, namely: why do we only look for and use barley to brew brown or lager beer?

The answer to this question is far too difficult for me to be able to do with my limited knowledge. I just want to present my personal opinion about it.

Of all the grains, the barley grain has the most sweetness in its flour substance from sugar or honey.

When you use the broken barley malt grist if the wort [literally: broth] has completely cooked before hops are added to it, it has a sweetness to it as if there was sugar or honey underneath. The flour of the barley itself already has sweetness in it and because in

our country it is common practice that on the fertilized winter fields where previously wheat or grain once stood a year later barley is grown, where in the field the rough, oily and salty quality of animal and vegetable fertilizers has completely dissolved from the previous year, the barley grain contains a far more pleasant sweetness than is possible in a freshly fertilized field. The evidence of this is clear. I make a test of this every year. The fields on which over winter wheat or grain was grown are well fertilized. The following summer, at the end of July, when the wheat and grain have been harvested the stubble is plowed {under} and the so-called sweet {turnips} or turnips are grown, which are good, healthy food for people and excellent fodder for livestock, especially cows which produce good, fat milk {from them}. The farmers grow these turnips at the same time, but not in the stubble, but in a fallow field and for this {purpose} they fertilize the field very heavily. These turnips grown in the latter way, although the same,are not nearly as pleasant and sweet as the late {literally: stubble] turnips. The cause of this is the fresh fertilizer. They {the turnips} draw from this an unpleasant roughness and bitterness and are therefore not as pleasant to enjoy {eat}

as the late turnips. If these latter turnips are cooked they are as sweet as if a lot of sugar or honey had been added to them. And this is exactly how it is with the beer wort described above before hops have been mixed into it.

One can therefore assume that of all types of grain, barley is the preferred choice for making brown or lager beer:

1) because of the pleasant sweetness in the rich flour;
2) because of the clarification that the rich flour sweetener gives when the coarse particles, namely the roots or the so-called malt germ, come out of the grains during malt making;
3) Through the cooking the barley malt meal is completely dissolved and therefore produces a vigorous wort;
4) The keeping quality of the beer is finally achieved by combining this wort with the hops and thus the sweet with the bitter, oily and salty parts.

All of these good qualities for a long-lasting lager can be attributed to barley. (*)

(*) *Wheat malt is much richer in sugar than barley malt; It can also be*

Among the types of barley known in our country the first and most sought after is the so-called large two-row barley otherwise also called leaf barley.

The second is known as four-row barley; the ears are thicker, but shorter, and the kernel (grain) is smaller. Nevertheless it {four-row barley} is still often bought for the brewery but {it's} not as expensive as the two-row kind. Also one must in many places be content with it {four-row barley} because, according to the farmers' statements and experience, the two-rowed doesn't grow so well everywhere.

The third variety of barley is known as winter or pole barley. It is planted early in the fall and is in spring the first of all types of grain to ripen, has six or more rows, but does not grow well every year, and loves good soil and a dry winter.

A fourth variety of barley is the so-called bearded or Turkish barley. It

used with brown lager, as the color does not depend on the type of grain, but rather on the way it is dried and kilned. The barley is so commonly used lies not in its greater suitability but because it can be grown more widely [literally: generally] and is almost always relatively cheaper. By the way, one can here in Munich really have wheat beer all summer long

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grows like summer wheat, but here in the country unlike the previous types it is not sought after for brewing. In France and England, however, it is used more for brewing than our two-row large leaf barley. It is said to be even more productive in the harvest and to produce excellent, good beer.

I want to now also list some other types of barley here which are still little known in our country. This includes:

the four-row naked barley of David or heaven;
leaf or perennial barley;
the Siberian two-row naked barley;
the two-, four-, six- or even eight-row barley;
the hollow barley;
the wild barley;
the two-row naked barley.

All of these, particularly the latter types of barley, are in our country still little or not at all known.

It is everywhere known that from wheat a good beer can be produced, which is called white wheat beer.

This beer, however, has a completely different taste than brown lager partly because of the wheat itself, partly because of the yeast which is called top fermentation. This type of fermentation can tolerate more heat than fermentation in lager beer. That's why this beer can be brewed even in the hottest summer when it's warmest. I will talk about this later where I will discuss fermentation more widely [literally: instruct].

From the barley malt white barley beer is also brewed, which has almost the same top fermentation as wheat beer. This barley beer is a good, healthy drink, even for some sick people.

In some places Haberbier is even brewed. This type of beer is rough to drink and, if not consumed in moderation, causes headaches.

CHAPTER III

ABOUT A BREWHOUSE AND ITS DESIGN.

Above all a building or brewery, together with the malt works belonging to it, should be built large, medium or small according to the proportions of the plant's operation and its wear and tear

As a benchmark [literally: standard] one can take a average brewery in which 6,500 Eimer {117478Gal} of beer are consumed [literally: wasted] every year and which requires 1,000 bushels of barley.

The construction of a brewery not only requires skilled builders but also brewery experts who have sufficient knowledge and experience in the layout [literally: manipulation] of the building so that everything is installed in the proper order, both the beer brewery or brewhouse as well as the malt works, and where possible the brandy distillery or the brandy house. Where it is possible and feasible a malt mill, which is driven by water or by oxen or horses, is also a major requirement.

One of the most advantageous features [literally: fittings/furnishings] of a brewery is when one can

lift up into the brewing pan and vat the required water and that you can then also dig into the earth fermenting and winter beer cellars in such a way that there is no risk [literally: fear] of an underground spring or other water penetrating {it}.. It is also very good if the summer beer cellars can be installed [literally: attached] at such a depth that the beer can flow from the fermentation vats into the summer beer barrels. In this way much work [literally: many human hands] is saved {i.e fewer men are needed}.

In the malting plant it’s a best practice [literally: is excellent to observe] that everything can be thrown from one place to another with the malt shovel. The barley can be easily lowered from the barley floor through a roller nailed to one of the boards into the malt steep {tank} (steep, steeping place). From the steeping tank the barley should be {able to be} shoveled onto the {malt} sprouting or heap floor, {then} from the heap floor onto the withering floor (withering place) (that's why the heap floor should never have a vault over 10 feet high) from the withering floor to the {malt} kiln, and from the kiln thrown with a shovel back onto the malt floor. Through such a design of the malting plant fewer men are needed.

It is very advantageous to install the kiln in a new brewery in such a way that

that it is close to the brewing pan in order to be able to conduct the heat from the brewing chimney into the kiln which saves a lot of wood.

Now the question is: how big, wide, long and high must a brewery and all its accessories be built?

The answer to this question, and addressing, is extremely important. I will try to do this piece by piece to the greatest extent possible.

I'll take a brewery as an example in which from Michaelmas to St. George's Day every year 1,000 bushels of barley are brewed. The parts of such a brewery consist of:

1) The brewery or brewhouse;
2) The Cooler
3) The Fermenting Room or Cellar
4) The Winter Beer Cellar
5) The Summer Beer Cellar

Making malt or malting requires:

1) A Stone Malt Steeping Floor
2) A Malt Threshing Floor
3) A Withering Floor (?)
4) A Kiln
5) A Barley and Malt Floor
6) A means to "sprinkle" (i.e. wet) the Malt
7) A malt or grist mill

A spacious brandy house is required for the brandy distillery.

As far as the first or lower floor in the brewery is concerned, everything should be well sloped (i.e. for drainage).

1 The Brewery or Brewhouse has nothing to contain other than the beer or brewing pan, a small post-beer pan, and the mash tun; then a spacious place for washing barrels and dishes. The flat space of this place can have 46 ft in length, and 20 ft in width clearance; the height of the vault in terms of clearance is 13 ft according to the Bohemian vaulting style, of which the side walls must be 3 feetfeet thick and the belts 18 inches thick.

The beer kettle, including the walling, can be 10-10.5 feet long across the width of the brewhouse; The rest of the width is used to heat the beer kettle and the small kettle. However, the heating should not be in the brewhouse itself, but rather it should run through the main wall from outside via an entrance.

According to the brewing process assumed above, where 7 bushels of malt are taken to make a brew of winter beer and 8 bushels are taken to make a brew of summer beer,

the brewing pan can have a base or bottom area of 56 square feet of area, and 3.5 ft of depth, in total 196 cubic ft in volume. If you now assume the cubic “shoe” to be 23 Maß { 6.5Gal}, then such a brewing kettle, assuming the Bavarian Eimer to be 64 Maß, will hold 70 Eimer {1265 Gal} of water. Anyone who has a new brewing kettle like this made will save a little, perhaps 2200 florins.

Now a small kettle is also very necessary for both boiling the beer and heating the water. This can have 3.5 ft on each side at the bottom, therefore 12.25 square feet, then 2.5 ft deep, and therefore contain 30.625 cubic feet. It therefore holds 11 Eimer {199Gal}.

Now comes the mash tun. The wood for this should come from oak or lark trees. If the brewery is operated on a single boil larger and more powerful than was assumed here, several smaller mash tuns are better for this because the vats would have to be made too large and especially too wide, and then the mash paddles would not be able to reach into the middle of the vat when mashing and the malt meal {starch} would remain immobile, which would be extremely disadvantageous.

For a tun based on the brewing plant, the panels should be 5 feet long and 3 inches thick, but the middle bottom piece should be 11 ft long and 4 inches thick. You therefore get a tub that holds 4 feet, 7 inches in the inner height, but 10.5 ft in the bottom or bottom diameter, in the upper 9 feet and 3 inches. This amounts to 351 cubic feet. The tun therefore contains 126 Eimer { 2277 Gal}, counting the cubic “shoe” of 23 Maß and the Eimer of 64 Maß, although the small decimal fractions are omitted.

Now it should be noted that there has to be a fairly large grant underneath the mash tun, which can easily hold 30 Eimer { 542 Gal}. This grant can be made from wood, stone, or copper. Nothing goes into this beer grant except the Lautermaisch with each brew, then the beer from the mash tun, and the secondary beer: finally the so-called last runnings, which are used for distilling brandy; and other warm liquids, so the copper never becomes dirty.

2 The Beer Cooler. This should never be in the brewhouse itself. It is a big mistake if the beer cooler is in the brewhouse or brewery; because if the steam from the brewing kettle or from the mash tun

is able to move over the {beer} cooler, no matter how high the vault is, it will condense on the top (precipitate) and fall down [i.e. from the ceiling] in impure drops into the beer on the beer cooler and therefore contaminate the beer.

I have already seen many breweries that have incredibly high vaults like churches and are therefore built at great expense simply because of the coolers. This is very unseemly. Because you can’t do more with the malthouse building, as was said above, it is no longer sufficient that everything can be thrown from one place to the other with a shovel, as the height of the brewery prevents this. If you want to build the malting plant so high it avoids this, it becomes a burden and discomfort to raise the malt from the malt floor barn. It is not uncommon for it to have to be carried on the kiln, and then you also have to take the box into account, which is usually installed under the roof. To what an enormous height so many hundred bushels of barley have to be raised with great effort in a busy brewery, which is not only expensive, but because one is forced to raise the barley so high, accidents often occur,

and this all because the beer cooler is located in the brewery or brewhouse.

Any place is suitable for a beer cooler, except the brewhouse. It should have a separate space and may be placed on either side of the brewhouse where practical. Through a small opening in the wall, where a wooden channel can be pushed through, the boiling hot beer can be easily poured from the brewing pan to the cooler or into the hop tank [Hop Back?].

The place where the beer cooler is located, or rather the cooling building, does not need to be bricked up. A well-covered wooden hut through which drafts can pass is best for this.

The space in the cooling house must be large enough to accommodate a cooling pan [aka “cool ship”] 28 feet long and 24 feet wide, so that the beer in it will not be more than 4 inches high. But it should be installed in such a way that it is lowered by 2 inches when draining, so that the beer can flow from it completely into the fermentation tank. The fermenting cellar should therefore be located near the cooling house.

The depth of this large refrigerator vessel [“box”] can be 8 or 10 inches. The beer remains stationary here,

which will be discussed in more detail at its location.

Most of the time you also have a small beer cooler in the cold storage.. This box can be 11 feet and 8 wide.

If it is possible, it is very good to have a water reserve in the cold house; but it has to be located high enough szo that the water can be directed into the brewing kettle, mash tun and all other places.

3 The Fermenting Cellar. This should be at least 4-5 feet deep into the ground to ward off the extreme cold. It should also be able to hold at least 6 brews worth in fermentation vessels.

The fermentation tanks must be installed in such a way that the beer can flow from the cooler into each of them.

The crockery is most elegantly set up when three vats, each with 20-22 Eimer {361-397Gal}, hold a brew. Three or four small vats, each with 9 or 10 Eimer {165-183Gal}, are also necessary for additional beer. The fermenting celler therefore requires an internal empty space of 54 feet long and 16, or a content of 864 square feet.

If the fermentation cellar is built according to the length and width described above, it can

be made in the following way. You make the foundation 4 feet in the earth, if there is good foundation, 3.5 feet deep. Above the ground from the pavement onwards, the wall is given a thickness of 3 feet and a height of 6 feet up to the abutments. The vault must form a pressed semicircle 5 feet high and consist of a whole stone. Such a fermenting cellar is built solidly enough. If there is still 6 to 6.5 feet of good dry soil under the fermenting cellar in order to build a winter beer cellar, this is very good because then the beer in the fermenting vats can immediately run into the winter beer barrels, which saves the brewers a lot of work as otherwise they have to carry the beer into the barrels. It would be even better if, as far as the situation allows, the beer from the fermenting vats could also flow into the summer beer barrels, i.e. into the summer beer cellar.

4 The Winterbeer Cellar. The winter beer cellars must not be dug too deep into the ground. It is sufficient if the winter beer cellar is protected from the cold down to freezing point. It should be at least big enough to hold 300 Eimer {5422 Gallons} of beer so that the new beer can sit for three to four weeks before it is released.

Storing winter beer in barrels varies in many places. Some give the hosts [.i.e. bars, restaurants, etc.] the winter beer in large barrels, others in medium-sized barrels, and many in 2- or 1-Eimer {36-18Gal} barrels, depending on how it is used somewhere, so a brewery owner has to provide himself with the necessary barrel utensils.

The construction of the winter beer cellar must be arranged according to the location of the brewery and other circumstances. Some build it under the brewhouse; however, this requires great caution, because a lot of water is spilled in the brewhouse, so that none of it penetrates or flows down onto the vault, which would be extremely harmful to it.

Others build it under the heap or malt sprouting floor. I wouldn't recommend this either, for two reasons: first, because the tank must be installed under the malt sprouting floor and if this is not made very well, or if it gets a crack or if the water runs of its own accord in a hidden place, it sits on the vault which therefore suffers damage. Secondly, it is difficult to put as much clay on the cellar vault as is necessary to moisten the malt heap and the paving so that the barley grain grows.

The question still remains, how big should the winter beer cellar be based on the assumed brewery? I already said above that it should hold at least 300 Eimer {5422Gal } of beer. I now calculate 25 barrels, each with 12 Eimer {216Gal}. Such a barrel requires 24 square feet of surface space, so 600 square feet are required for 25 barrels. But since you also need space for the additional beer kegs and for walking back and forth, the surface area of such a winter beer cellar may amount to 1000 square feet. If the cellar is built in a square shape, i.e. 33 feet on each side, it must have a pillar in the middle. If you want to build it in the form of an elongated square, the length is 50 ft and the width is 20 ft. By the way, the design is the same as the fermentation cellar, only with the difference that the abutments can be 2 feet lower, i.e. they can only be 4 feet because the winter beer barrels are not as high as the fermentation vat.

5 The Summerbeer Cellar. In a brewery where a lot of lager is brewed, the summer beer cellar is of the utmost importance. The best are undoubtedly those set in a dry rock; but those deeply embedded in solid, dry, clay soil are also good. Those in

gravel or sand mountains are worse; But the worst are those where there is a risk of water ingress, especially if such water cannot be drained or drained away from the cellar.

There are many places in Bavaria where it is not possible to produce good summer beer cellars. That's why the brewery owners have to build them a quarter of an hour or even further away from their breweries. However, they are even happier than those who have no opportunity to build their summer beer cellars in dry, or at least 7-8 feet deep, good soil. There are many places like this in Bavaria.

The difference between good and bad summer beer cellars also makes the brewing of lager beer strikingly different. Anyone who has cellars in dry rocks or in deep, dry clay can produce 1 Eimer {18 Gal} more beer from a bushel of malt, and can also use 2 or 3 pounds less hops per bushel of malt than someone who has poor cellars. The beer will still last better and last longer in good cellars than in bad cellars if it has received more malt and hops.

There are rock cellars in which, around Jakobi [Jakobidult is a church holiday which takes place in summer at the end of July or beginning of August] i.e. at the time of the greatest summer

heat, there is ice and frozen foam on the barrels, so that you can hardly drink the beer because of the cold, and these are of course the best cellars of all. But a summer beer cellar is still very good, where a heat meter [i.e. thermometer] shows only 5 degrees above freezing point according to Reaumur [See Translator's Notes] {43F} in this hot season. Even those cellars that are built in dry gravel or sandy soil and have 10 to 12 feet of earth above the vault can still be considered good cellars and will maintain 16F (7 degrees R) above the ice point {freezing, i.e. 48F} in the great heat of summer, so the beer is maintained in good condition.

All other cellars, on the other hand, which either cannot be dug deep into the earth because of the moist ground below, perhaps only so deep that the vault is outside the edge, or where, as always, water penetrates due to various accidents and circumstances it is to be feared that those in which there is actually standing water will be more than 22.5 F (10 degrees R) above the ice point in summer {54.5F}. Yes, for some the temperature will probably even rise to 27-29F (12 and 13R) degrees {above freezing, i.e. 59-61F}. The beer cannot therefore be well preserved in such cellars; a new fermentation will arise in the barrels; the beer will be foul, thick and soon turn sour.

According to the assumed brewery, one can assume 3000 Eimer {54,220 Gal} of summer beer for the summer cellar, which are in 100 barrels, each with 30 Eimer {542Gal}; is stored, and in this cellar it has to lie on platforms or slanted slats just like in the winter beer cellar.

This cellar can be built in different ways, with single or double vaults, with one, two, three or four rows of barrels. It is best to make two rows of barrels, which will require a length of 260 and a width of 16 feet. If this cellar was reinforced three times, you would actually get four cellars, which would be very good so that the warm air could not reach all areas at the same time when the beer was being served. In each of these four cellars there was space for 26 barrels on two racks or rows. The fact that there are now 4 barrels more cannot be taken very precisely, as the boiling of a few brews cannot be calculated with any certainty, and besides that, the empty space resulting from this could be for the Nachbier {Nachbier, or “small beer” a low gravity, low alcohol beer made from 2nd runnings of the mash and sold cheaply}, if one is necessary, to be used. But if you want to build the summer beer cellar with four rows of barrels, the vault would be too wide and too high. So it is better to make two vaults. However, one may build the summer beer cellars in one way

or another, but they must always be solid and durable. In the first type, the length is 260, the width is 16 feet of dimension, and is done as follows:

It must (which is clear in advance) be built on solid ground. If you don't have this, posts (piles) have to be struck. A wall 4 feet deep should be built at the base. Rocks, if you can get them, would be best for the foundation wall. Starting from the paving, the wall is given a height of 5 and a thickness or width of 3 to the abutments. A circle with a width of 15 feet with a height of 8, or, when not possible, 6 feet. If the basement is to be good and durable, the arching must start with 1.5 feet. You can also create a curvature 1 foot thick; but then every 10 feet should be made with two braces. The lining of the abutments and the lining (start of the vault), the diligent and good in fill of the side walls with clay, make the cellar really good and durable.

Such a summer cellar should now be filled with dry clay at least 14 feet high above the vault, and this should be packed in well.

Then it must be provided with a good roof so that water cannot penetrate the vault from any side. It should also be noted that there should be draft holes on the doors of all four underpinned cellars so that the cellar air can escape.

What is Required for malting or making of malt:

1 A Stone Malt Steeping Tank. In an emergency, a wooden one can also be of service; but the stone ones are more durable and better. In Bavaria, Salzburg marble quarry stone is used for this purpose. There are other quarries that provide just as useful stones. The assumed brewing plant requires a malt steeping tank that can hold 20 bushels of barley. It should therefore have 9.5 feet in length, 8.5 feet in width or breadth and 4 feet in depth; then it holds 320 cubic feet. The stones for this must be a little more than 4 inches thick.

The water not only has to flow into the malt steeping tank, but also has to be able to drain out again on its own. For the latter, a pipe is also used, which is attached below; however, there must be a sieve (a screen) inside so that the barley seeds don't pass through at the same time.

The malt steeping tank should stand next to or in the malt sprouting room. If it's possible for you to direct the water higher then you can also install the malt steeping tank over the malt sprouting floor. However, once the barley has been soaked enough, it must be able to be brought into the sprouting room easily and with little effort.

The malt steeping tank does not do well when exposed to the cold because if the water at the top of the tank were to freeze the barley would grow very unevenly. The lower barley would moisten [literally "dissolve"] sooner than the upper one.

2 A Malt Sprouting Floor. This should have a capacity of at least 20 bushels, a length of 36 feet and a width of 30 feet , i.e. 1080 square feet in area.

The malt floor should necessarily be arched; It is very good if it is 3 to 4 feet deep in the earth in order to have the necessary warmth for the growth of the grain.

When building the malt sprouting floor, it is best to use the Bohemian vault with 4 squares. The malting floor should have a round, strong stone column in the middle, on which the four arched places rest; other vaults would, as has often been said, become too high such that the grown barley malt

can therefore no longer be thrown up into the withering floor with a shovel.

If the malting floor is free, the main walls must be 3 feet thick: but between other vaults 2.5 feet are sufficient. The main wall stands 3 feet high from the floor to the abutments. The supports [literally “braces”] must be 2 feet thick. The curvature of the supports themselves should be 4 feet in height using a pressed circle. Then the squares are arched out nicely flat with half a stone from your free hand, so that the inner space in the sprouting room from the floor or pavement to the top of the vault is a maximum of 9 feet. In two squares over the cross in the middle of the same, two openings of 3 to 3-1/2 feet are made using a wooden guide in order to be able to easily throw the malt from the pile on the malting floor onto the withering floor with a shovel.

The floor or pavement in the sprouting room is one of the main parts. Anyone who knows how to use this correctly will produce good and consistent growth in the malt.

It has already been reported that no sprouting room should be built over a cellar unless good clay soil can be poured 8-10 feet deep onto the vault, compacted and sprinkled with salt

in layers. If this cannot be achieved, then absolutely no malt sprouting floor should be placed above a cellar.

The lower layer of soil in a malt sprouting floor must always be able to maintain a consistently moist layer; Therefore, anyone who is building a malt sprouting floor is advised to lay good clay 4-5 feet deep, sprinkle it with salt, compact it firmly, and cover the top with pieces of marble or Kellheim paving about 2 inches thick in fine sandy mortar, so that from neither one side nor the the other, more heat or cold can come into the growth [sprout], and the pavement is always moist due to condensation of moisture that the barley grain produces such that it can take root when it begins to grow.

Light is just as good in the malt sprouting floor as it is necessary in all parts of the brewery and in the malthouse; because dark corners are not good. But the malt steeping floor should not have too many window frames, because this usually brings more cold into it. Two, at most three window frames in a malt sprouting floor {room} are sufficient.

3 A Withering Floor – [for letting moisture evaporate from the partially sprouted malt] The withering floor is usually placed above the malt sprouting floor because the malt has to come directly from there into the withering floor in order to get away from the

warmth and moisture that the grain has absorbed as it grew. The further procedure will be explained during {the section on} malting. If you can make the withering floor a little bigger than the malt sprouting floor {the malt} is more likely to wilt {i.e. lose moisture}.

The withering floor itself is actually nothing other than a grain floor. This floor can be paved with boards or brick paving pieces, also with marble. You just have to be very careful to ensure that the plaster [mortar] is well dried. The usual height is 10 to 11 feet. The withering floor does not need a vault. However, it must be located right next to or not far from the kiln so that the malt can always be easily brought to the kiln.

4 A Malt Kiln. The most common and best malt kilns are those of Dutch design. Inside they look like an upside down flour hopper. Three openings are made underneath in the foot, the fire is started in the middle one, and the malt germ falls through into the two side openings, as well as small grains of malt, which can easily be raked out. The middle opening, where the fire burns,

has a little house about two feet wide across the entire length of the lower floor, which is supported on both sides with half a stone, and is also provided with many small openings on both sides so that the heat of the fire can penetrate. The height of this fire house can be 4 feet high at its wall, and on top a pointed roof made of sheet iron attached so that the fire flame cannot penetrate through and so that malt grains or germs do not remain at the height of this roof.

The fire furnace can be installed in the following way. The foot must have a wall 1-1/2 feet thick. The length of the fire floor must be 8 {feet} and the width 7 feet of internal light {space} so that an ash or draft vault can be installed under the fire floor. This inner light [space] extends at least to a height of 12 feet on the copper or iron plate of the kiln, and extends out as far as the kiln itself is large. At the bottom the light [space] has 8 and 7 feet {i.e. as noted above}, the top has 20 square feet. Then comes a strong iron grate, which must have 20 bars along its length and 4 strong crossbars along the breadth, the latter of which must rest on 8 supports. All of this must be made of iron, nothing of wood, because of the danger of fire.

Such a grate, if well made, requires 40 hundredweight of iron.

The copper or iron plate is then placed on this grate. Copper is better and more durable than iron because sheet iron rusts in a short time, whereas copper takes 1000 years.

This copper or iron drying plate must be pierced or punched through with small holes, so that there is a hole for every half square inch, so that the heat, steam and smoke can pass through, thereby saving [preventing] smoke drafts under the plate.

The upper part of the kiln from the copper or iron plate can have a height of 3 feet, and that of the wooden cross vault can have a height of about 4 feet. This wooden cross vault has a tin ceiling [Weißdecke literally “white ceiling” but more means a tin ceiling as Weißblech is a term for tin plate] and a steam chimney in the middle; then on one side an opening to throw the malt through into it and another opening on another side to throw the malt back out onto the malt box when it has dried. The doors to these openings and those to the entrance are usually made of sheet iron.

In more recent times, however, a completely different type of malt kiln has been invented.

The heat is led into it from the brewing or brewing pan [kettle] chimney. This invention is extremely good in many respects and anyone who builds a new brewery or installs a new malting plant should not fail to make use of this advantage. First of all, the wood that is specifically required for kilning is almost entirely saved; secondly, the malt becomes much better and clearer because the smoke no longer has to go through it, and thirdly, finally, any combustible material can be used for this heating, since for the method of kilning first described only beech, alder, and in an emergency, birch wood must be used. All of these types of wood are more expensive than Ferch [??], spruce and fir wood. The design of these newly invented kilns is like this. From the brewing chimney a separate fireproof draft is directed to the kiln through which the flame and heat is conducted by means of a large iron sheet which is attached to the brewing or kiln chimney and can be removed or raised for this purpose. If the heat from the brewing chimney is not quite enough to completely dry out the malt, a separate heater must be installed which directs the fire into the other chimney, which comes from the brewing pan. The height at which the heat trapped by these two fire trains is blocked and where the many

fire pipes come to rest should not be more than 5 feet. If there is no vault at the bottom and it rests on wooden boards the pavement must be covered with double stones especially where the heat of the fire tends to spread.

Depending on the dryer being small or large, 6, 8, 10 and more pipes can run through these heat containers. All these fire pipes are made of sheet iron in a two foot square [probably square cross section]. The pipe at the end through which the draft goes out must again be provided with a fireproof chimney. All these fireplaces and pipes, like the chimneys, must be cleaned several times a year. Therefore they should have several places where they can be opened in order to sweep them out because they lie horizontally in the kiln's heat chamber of the door and therefore require more cleaning than the vertical pipes or chimneys. Not only will there be soot and ash, but also pitch [literal but probably what we now call Creosote], especially at the exits where cold and warm air come together. Anyone who doesn't do this cleaning diligently will sooner or later be in danger of fire.

It should also be noted that a draft of cold air must be brought into the kiln's heat chamber

in order to maintain the heat and warmth carried up to the plate. I would advise attaching these small pipes up through the iron sheet to avoid any combustible materials.

The design of these newer kilns over the copper or iron plate {type} is pretty much the same as that first described.

5 A Barley and Malt Floor. Usually all breweries are two floors high, each of which is 12 feet high, and the lower one is sometimes 13 feet high. Only where the kiln is located can the height with its vault be 4-5 feet more {i.e. higher}. Now on the second floor, where the wall still has to be 2.5 feet thick, comes the wall bench [i.e. a sill to support the floors above]. Strong boards must be placed on these, and then a horizontal roof truss placed on the entire building with 3 floors {placed one} on top of each other. These three floors are sufficient for storing barley and malt supplies. Only you have to make sure that if large containers are installed on the second floor and the central walls are 30-40 feet apart, split pegs [??] are placed under the boards so that the heavy load of barley and malt does not fall press solely on the boards but rather the support ties help to carry it. But if you want to incorporate hanging columns in the middle of the lying roof truss,

and if the building is 50 feet deep, then columns can also be placed in the middle especially in a long return, or if there is a lot of weight on the floors that are supported on the collar beams. Sleepers and fat [Fetten - literally “fat” but likely a type joinery used in timber frame construction] must be hewn out of strong wood. The roof truss should not be flat, but rather slightly steep (rising), and a strong collar should be attached after every four boards. In general, the roof structure should be made from strong and freshly dried spruce trees.

6 A means to “sprinkle” (i.e. wet) the Malt. This can be installed on the first or second floor, where it is more appropriate. However, if possible, it should not be far from the malt crushing mill so that the malt must not be carried far and the water can be directed to the sprinkler so that the brewers are spared another job.

The sprinkler requires a space of 30 feet long and 15 feet wide. The floor should be paved with pieces of paving {stone}, and a 1 inch deep channel [Gesenk] should be made in the middle so that the water that is poured onto the malt cannot run off.

The sprinkler should not be placed in a place that is too cold,

in order that the wetted malt not be exposed to freezing in winter because this would be harmful to it.

In most places the malt is lowered from the malt floor by a malt rider (reuter). This should be 1-1/2 feet wide, 10-12 feet long, and braided with brass wire so tightly that no malt grains but only the malt germ can fall through. On both sides it must be provided with boards like an open cylinder [Rolle], in which the malt is cleaned of the germs and rolls down from the ground onto the wetting {area}.

If the malt rider cannot be placed in a side stall in such a way that the malt germ falls into this separate area and the pure malt into the wetting {area}, a sack must still be attached to the riders so that the germ falls into it and the malt falls into the wetting {area}.

7 A Malt or Grist Mill. It is a very necessary thing for a brewery, especially in the country, to have a grist or malt crushing mill where there is no river water or you have to drive a long way to a mill. If you can't find a water pipe for this, a horse or ox grist mill can be built anywhere. There are different types

of gristmills, and mechanics are always working on improving them.

After the water mill, the oxen mill is undisputedly preferable, especially where oxen are fattened anyway. I have made good use of such an oxen mill for many years in the following way. At the beginning of the brewing season I bought 8 oxen. These had to break my malt in the month of October. As soon as the brewing {season} started 8 more oxen were purchased. These 16 oxen had to take turns breaking the malt, four oxen at a time. In 8 hours 8 bushels were ground. Every ox therefore had to work two hours a day. The malt mill was well made; {such that} the oxen were therefore not allowed to exert themselves {too much}. Every one was harnessed to one of the four sides on its own. This was how it went throughout the brewing period . The oxen became fat during fattening, so much so that it seemed as if they had done no work and three or four weeks after the end of the brewing period they were sold. However, at the end of the brewing period when they become very fat they do not have to be fed immediately after the brew, much less watered. In this way the malt could be ground in the easiest way.

The malt mill should be close to the wetting area,

as already said above, so that the malt miller can easily bring the malt to the mill. The malt mill requires a square {area}, each side of which is 40 feet so that the whole contains 1600 square feet. Such a large space is necessary so that the levers are somewhat long from the Grindel [hub of the malt mill where it attaches to the mill stones?], which makes the work much easier than if they were short.

- The malt mill is built standing. The large Hirn [literally brain maybe one of the millstones] or comb wheel has a diameter of 12 feet 3 inches, and 126 combs [probably furrows]; the Wurf [??] is 3-1/2 inches; the combs protrude 2-1/2 inches.
- The standing work has a drive of 19 inches in diameter with 16 spindles, which also have a Wurf of 3-1/2 inches.
- This Trieb [literally “drive”] has a comb wheel of 4 feet in diameter with 48 combs, of which the throw is 3 inches, and the combs project 2 inches.
- The Trieb in which the mill rod runs is a size 6 and has a Wurf of 3 inches.
- The main grinder is 2 feet thick, and the levers to which the oxen are harnessed are each 13 feet long.
- The stone runs 63-4/6 times as often as the grindel turns around.

In this way the malt mill will work quite well and, if the oxen walk only {at an} average {pace}, you can crush 2 bushels of malt in an hour.

Of the Brandy House

The brandy house should have a spacious place to store everything that belongs to the brandy distillery.

So a space of 40 feet long and just as many feet wide is required. In the Brandy House everything should be bright and light, and not a dark corner at all. Running water is also extremely necessary.

There are various facilities here. Some love large Blasen [Blase – boiler, copper, still, alembic] or kettles, others medium {sized} ones. Some have coiled tubes for cooling, others have bottles in the cooling barrel. Still others direct the water onto the still or lid [Hut literally hat] of the brandy kettle to cool it down. The most common or customary type is with straight tubes through the cooling fins. Everyone can set up the furnace for mash and the kettles for burning according to their own style and in the way that suits them best.

The brandy house should not be very far from the brewhouse,

and the floor must be 3 feet deeper than in the latter, so that a channel made of stones can be installed under the ground in order to direct the so-called last runnings [Glatwasser but this usage is from a Verlag Hans Carl German-English brewing dictionary] along with the refrigerated [??Kühlgeleger] and others into a level place in the Brandy House. This small construction precaution saves the brewers a lot of difficult work.

The Brandy House is usually vaulted in the Bohemian style with the vault resting on two pillars so that 9 squares are created. There boilers, furnace and cooling tanks (cooling barrels), will then have be sufficient space in two of them. Four of the other squares are used for the sediment {lees} tubs [Geläger-kästen again from brewing dictionary] and the last three are used for the mash barrels and other necessities. In this way the distribution {of equipment} in the Brandy House is arranged.

Now the entire construction of a complete brewery would be described and explained in the most advantageous way.

I'll now move on to the process at the brewery itself starting with malting or malted barley.

Chapter IV

THE WAY OF MALTING OR MAKING BARLEY MALT, THE PREPARATION AND EXECUTION

The Malt Steeping Tank. Before the barley is let into the steep there must be the necessary water in it, so much so that it rises above the barley, such that everything unclean and the dead (deaf) grains can float on it first. This after product must be pounded in (submerged) five to six times every half hour so that the good barley grains within which are still contained some flour (floury parts) fall through. After about 6 hours whatever floats above the water can be lifted off, and this is then called skimming {the} barley.

After about 24 hours the first water should be drained from the barley and fresh water added to it again. This is repeated at least three times, especially in warm weather, so that the barley does not acquire a bad smell from the long standing water.

The time for how long the barley has to soak in water is undetermined. Immediately after

the harvest, when the grains have not yet fully absorbed {moisture} and are dry they soften in 1-1/2 or 2 days. If, on the other hand, it came into the barn well dry and has been in the box for two to three months it will need 3-4 days, especially in cold weather.

A sign of sufficient softness is {that} when you want to bend the grain over your thumbnail and it no longer breaks off: or even better, when you take the grain by its two tips between two fingers and can squeeze it together without it hurting your fingers; because if the barley has not yet been soaked enough it cannot be pressed together {like this}.

But it is better if the barley is soaked a bit too little than if it is soaked too much. The growth becomes more uniform and there are not as many grains left.

When the barley has soaked enough the water is completely drained off and the soaked barley is then thrown into the growing or malting floor heap.

The Growing or Malting Floor Heap. The soaked barley must initially be thrown quite far apart in the heap so that it dries out quickly. After 5-6 hours it should be stirred

or turned over for the first time, to be precise on two pricks [Stiche], which is called to sicken [widern literally] according to the brewing language. This Widern {turning} should happen every six hours until the grains begin to grow or swell. In warm weather this turning may be continued more often and the pile of barley should not be made more than a foot thick.

If it is cold and the temperature in the heap is 11F (5 degrees R}, or even less, above the ice point {freezing, i.e. 43F}, the barley heap must be put together as soon as the barley grain swell, and, depending on the cold in the heap, or the moisture on the pavement, the barley heap is made thicker or thinner.

As soon as the pile is assembled you have to let it lie still until you notice that the little grains are sweating underneath the top layer; then it is time for the malt pile to be moved.

The malt or barley conversion happens as follows. The first upper Stich [amount turned] with the shovel goes in the middle. The second or middle Stich is dispersed so that the grains that lie in the middle come partly to the ground and partly to the middle and partly to the top. The third or bottom Stich must be placed back in the middle. Every brewer must know this and fulfill it precisely

otherwise you won't get the same [i.e. consistent] growth in the malt. The malt pile must be worked over at least four times in the manner described above until the barley grains have grown enough.

If this malting work is carried out diligently there will not be {too} many grains that have not sprouted roots or germs, or have failed to come out [i.e. start sprouting]. Not all years are the same and a lot depends on the growth of the barley and a good harvest. There are vintages where not one of the 1000 or more grains is missing. Some years, however, one or two grains are missing for every 10 or 20.

Such ungrown malt is often the reason that the beer does not become bright and clear.

The water also has a lot of influence on the clarity (purity) of the beer. In some waters the growth of the grains may not be {to a} very long {length}. The beer does become clear. But with others the growth has to be carried out longer if you want to achieve clarity in the beer. Every manager of a brewery must know {this} and know how to manage the growth of the malt.

It is better if the malt is not left to grow for too long {since}

more sweet flour (sugar) remains in the grains than if the malt has to sprout the roots for too long.

There is a lot to this process if you want to produce good beer. This work not only has to be done diligently but also at the right time. The first turning over or turning cannot happen too often and is never harmful. But if they aren’t turned for too long damage can occur because the upper barley grains become dry while the lower ones remain wet. Because if the barley does not begin to grow at the same time, many grains will shoot {sprout} with the growth but others will lag behind or not grow at all.

But it is even more damaging if the malt pile is growing and is not turned over at the right time. At the beginning, when the grain begins to grow, the pile of malt under the upper cover sweats. Then it's time to turn it over to 3 Stiche in the manner described above, but carefully so that you don't throw the grain too high with the shovel otherwise they sweat too much and no longer like to grow.

It is much more, indeed most damaging, to neglect the pile of malt when it is growing so much that it remains lying around for a long time

without being turned over. Then it gets warm, the middle seeds sprout (germinate), the ones at the bottom and top remain behind and the long and frequent heat causes fermentation in the pile which gives the malt an unpleasant smell. The beer from such a malt not only becomes not good tasting but also soon becomes sour.

Generally when the malt heap is first turned over to three Stiche it has a temperature of 77F {20 degrees according to Reaumur}. But it becomes warmest before it is turned for the last time. Then it reaches 90.5F degrees (26 R). But you shouldn't let it get to an even greater level of warmth.

When the malt has grown enough on the sprouting floor it is thrown or brought to the withering [or wilting] floor.

The Withering Floor. As already mentioned above, the withering floor is the place where the malt has to become dry and wilted before it goes to the kiln.

The work on the withering floor consists in handling the grown barley malt and is no small work if it is carried out correctly. The malt should be thrown into the air with small shovels every four to five hours, especially

on the first day when the malt from the malting floor heap came to the withering floor damp and wet.

If the malt is left undisturbed on the wall for too long it will heat up again, especially in warm weather, and begin to grow but {now it} no longer sprouts at the root but rather half the germ [grass shoots], which is very harmful to the malt because when this growth or so-called saber shoots out of the grains by about half an inch there is no longer any sweetener (sugar) to be found in the grain.

The malt should be turned on the withering floor at least six times before it goes into the kiln and it is not at all good if it is brought into the kiln while wet because it will then take on a bad smell.

The malt pile is not dried all at once, but three or four times. The malt which is therefore left on the withering floor, already wilted, should be turned four times every 24 hours. That's why less malt is thrown into the first kiln {load} and more into the last one. It will still dry more easily than the first one because it has not wilted enough.

The Kiln. If the malt is in the kiln, it is heated straight away

or the heat is directed to the kiln. Initially, after an hour, the malt should be turned over for the first time, i.e. you turn over the malt with a shovel so that the lower malt goes up and the upper {malt} goes down onto the drying plate. This work must be repeated every half or three quarters of an hour so that the malt dries uniformly and the heating is not excessive. If the temperature rises to 158F {56 degrees Reaumur} it is sufficient. If the heat in the kiln becomes even greater there is a risk that the malt will burn. The beer, which {would become} too brown produces an unpleasant, harsh drink and loses the sweet flour substance [i.e. malt body] especially if the malt is not diligently turned over in the kiln, which the brewers often neglect. The beer takes on the same color as the malt germ that falls from the malt when it has dried out. One should therefore strive to ensure that every kiln [i.e. batch dried] has as much of the same color as possible [i.e. is kilned consistently], but this requires a lot of hard work.

If the malt has already partially dried out the heating should be stopped. Then it has to be turned over on the dryer four to five times depending on whether it is drying well or poorly.

A sign that the malt is properly

and well dried is the following. You put a grain in your mouth and bite it together. If it is now well dried it must crack like freshly baked crusty bread. the flour in the grain must be white, like wafer flour. As a test you also make a mark on the wall with the broken grain.

Bad malt, which is called stone malt or burnt malt, can be recognized by the fact that if you try to bite the grains they are almost as hard as stone. The causes of this are many: 1. when the barley grows out in the field or comes into the barn poorly; 2. when it heats up in the barn; 3. if the barley in the {storage} box is spoiled by moisture, i.e. if it rains; 4. if it gets over-soaked in the steeping tank; 5. if the of malt pile {on the malting floor} is left lying around for too long and heats up too much; 6. if the same thing happens on the withering floor; 7. if the malt does not wilt [dry on the withering floor] sufficiently and comes into the kiln wet.

A second way in which the dried malt goes bad is if it is not handled diligently in the kiln so that many grains remain on the drying plate at the bottom for a long time. Then the grains are burned and if you bite into one of these grains you will find a brown-black gritty powder in the middle

instead of the flour substance.

When the malt has dried the kiln is cleared and the malt is thrown into the malt {storage} box.

Malt Storage Box. The malt box is the container in which the malt is stored until it is delivered for brewing beer. It goes without saying that the malt containers must be kept clean, protected from moisture, provided with a draft [to help the malt stays dry], but closed in such a way that nothing is stolen and no pigeons or other birds can get into the box.

As often as the malt is brought from the kiln to the {storage} box it should be separated [i.e. incoming malt not mixed with older malt], {and} depending on the length of the box, as long and wide as you want to make the malt pile. But when it is taken away again for wetting it should be taken across its length [Quere – literally in the “transverse direction”] such that it then occurs that each brew contains malt from several kilnings. In this way the beer will always have a consistent color; for it often happens that one kilning turns out to be browner and another paler.

The malt should not be sent straight from the kiln to be boiled [i.e. used for brewing]. It must remain in the {storage} box for at least two months

so that it airs out and the grains become somewhat enlarged. The malt meal also tends to dissolve in the water.

If the malt is stored in the box for the following brewing year it is better to leave the germs on it than to clean it of them. But it should be turned over three times throughout the summer.

If you want to prepare a special and better maltyou're your summer beer then it should be heaped up immediately on being taken from the kiln and moved into a special place.

It is also advisable that a hopper be placed on the malt floor or box above the wetting {area} which, when it is emptied, holds exactly as many bushels of malt, including the germs, as is needed to mash in for a brew, i.e. around 7 or 8 bushels . From this hopper the malt comes to the malt reuter described above and then, cleaned of the germs, runs onto the wetting {area}. In this way work is saved measuring the malt.

Barley and Malt Measurement. In a properly furnished brewery the measuring should proceed and occur in the following manner :

Firstly: the exact Munich bushel, along with the small or Minuto measure,

quadruplets, etc. should be taken as a benchmark. Secondly: there should be just as many bushels of ?? [gereutertes] malt allocated as were measured of barley from the brewing box. Thirdly: the skimmed [Abschöpf literally means skim] barley and the malt germ must not be counted here because these two articles are to be replaced by malting.

It is to be noted here that no badly cleaned barley should be bought or accepted, otherwise the above measure would not be achieved.

It is true that the barley growth of each year [Jahrgang – literally vintage] is not the same because if there is a good year where the barley grows well {and} if the harvest is good and the barley comes into the barn dry you can still get a malting. However if there is a bad vintage where the barley grows in the field, or becomes “two-season”, then the measure assumed above cannot be achieved.

As far as further measurement of the wetted malt is concerned this will be discussed later.

Wetting {Area}. The wetting {area} is the place where, as has already been said, the malt is sprinkled with water for a brew of beer and prepared for crushing in the mill.

If there are now 8 bushels of malt that has been purified or cleaned of germs on the wetting {area} a heap about 24 feet long is made of this malt. At the top of this heap of malt a furrow is made with a shovel so that the water can be held more easily by the heap and doesn't run off.

When it is wetted four brewers have to dig into the malt pile with their shovels and a fifth has to pour water onto it.

This turning of the malt heap must be done at least six times in a row so that the appropriate {amount of} water gradually reaches [soaks into] the malt heap and the malt immediately becomes wet.

Now the wetting is over. Immediately afterwards the malt pile is pulled apart a little and turned over. This turning of the now so-called “mill” pile has to happen every half hour, initially 3 to 4 times, so that the water penetrates all the malt grains equally. When these have drawn all the water into themselves so that the lower layer is as moist as the upper one the turning is finished. Then this pile of “mill” is put together thickly and remains motionless for 8 to 10 hours so that it is ready for grinding.

There is a regulation in the Kingdom of Bavaria that the malt, after it has been sprinkled and left to stand, but before it is put into the mill, must be measured according to the authentic Munich measure, down to half a quadruplet. After this measuring, a surcharge of 3 fl. 45 kr (currently 5 fl.) is paid per bushel of such measured malt.

However, this malt measurement does not have a secure and always valid standpoint. For sometimes more can be measured, sometimes less, depending on the circumstances. The circumstances lie partly in the malt itself, partly in the change in the weather. Even the water that is sprinkled onto the malt may not be used straight away at any time. A relationship can be casually assumed in the following way.

For every 1,000 bushels of well-drying and refined?? [gereuterten] malt, 1,210 bushels of malt that has been broken and left standing [abgestanden – stale, worn out] can be assumed. So 1 bushel of refined malt equals 1 bushel 1 M. 1-1/8 V. so the increase for 1000 bushels is 210 bushels. This is the amount of water that has to be poured onto the malt when wetting it.

So a dry, refined bushel of malt comes to 4 fl. 33 kr. Surcharge.

Malt mill. The malt mill should not be far from the wetting area so that the malt can be easily brought to the mill, as was already noted before.

In the country a malt mill is extremely necessary in many places, especially if you have to drive a long way to a grain mill, and even there various circumstances can arise where you cannot drive to the mill at all because of water or too much snow which means brewing would {have to} be completely discontinued.

The broken [i.e. ground] malt should 1. come out of the breakage [Bruch] completely light or mild (soft); 2. not be broken too small, but 3. as roughly as is possible; 4. no longer contain whole grains; 5. shouldn't come out of the mill gritty.

The malt must not become warm after breaking. Therefore it is not good to leave it lying or standing in a pile or in sacks for a long time. The broken malt should not be laid on top of each other in thick {piles} for 24 hours for the heat would soon cause fermentation.

Chapter V.
OF THE BEER BREWING ITSELF

Preparation. First water is poured into the pan and mash tun, as much water as is necessary for a brew of beer. This {[the pan}] includes graduations {for measuring}. Usually the brewing pan is left full and what else is necessary is directed into the vat. [liquid is left in the pan so the fire under it won't get damaged]

If you don't know how much water you need for a brew of beer, including all boiling and evaporation [Vertrocknen is drying but really reduction in volume from boiling], and you don't have a measuring stick or marker, you won't be able to guess whether you will have too much, too little, or just enough beer yielded.

Sample Brew. I want to give a sample brew here. All the dishes were carefully calibrated for this purpose: the brewing kettle, mash tun, cooler, fermentation tank and barrels were measured according to the Bavarian Eimer of 64 Maß and the design was made according to the decimal calculation.

To make a brew of winter beer with 7 bushels of dried malt and 8 pounds of hops, water is added to the pan and mash tun requires 115 Eimer, 45.440 Maß. {2091Gal}.

- After mashing, where the water had boiled for three quarters of an hour, two thick mashes and the Lauter mash were over, the beer remaining was 83 Eimer 10.432 Maß. So 32.547 Eimer {588 Gal} was lost.

- After brewing [i.e. boiling] the beer with hops, hot beer from the brew was 64 Eimer 30.528 Maß was added to the cooler. 18.686 Eimer {338Gal} lost.

- By the time the beer on the cooler got cold (i.e. until it cooled on its own without forced cooling) it was still 62 Eimer 1.528 Maß. 1.453 Eimer {23.25 Gal} lost.
- 61 Eimer 24.576 Maß went into the fermenting vat. 1.640 Eimer {29.6 Gal} lost.
- Beer put into the barrels was 59 Eimer 50.048 Maß. 1.602 Eimer {29Gal} lost.
- The result sold as a whole without any Maß having been given away is 52 Eimer 5.056 Maß. 7.703 Eimer {139Gal} lost.

The total loss from the accepted [literally “angenommenen” but in this context original or starting] water mass was 63 Eimer 40.384 Maß {1150Gal}.

The crushed malt now goes into the mash tun, in which there is already cold water, and is mashed well with the mash shovels or “Scheitern” [in modern usage “failure” or shipwreck, but seems to mean a mixing implement here], i.e. stirred together so that no malt mass stays together [clumps], but rather all the malt is combined with the water.

This first work is called mashing.

The malt mashed in this way can remain in the vat for 3-4 hours before the first mashing begins.

But if, what one calls “anlauben” [no translation available], {when} warm water is drawn into the vat, one must be very careful that the malt is not burned or, if the weather is warm, that it does not ferment, both of which are extremely harmful.

First Thick Mash. As soon as the water in the pan is boiling strongly you can proceed to the first thick mash: Some let the water boil longer than others,

The boiling hot water is immediately ladled from the pan into the mash tun and this while ladling {occurs, mashing} takes place in the mashing vat, a job that belongs to all the brewery workers. The mashing itself takes place in the same way as mashing in. The mash shovel is used to reach the bottom of the mash tun, {it’s} then pulled along the widest way, then the shovel is twisted and brought up such that the malt is properly combined with the water and mixed. This mashing continues until the pan is emptied of {the boiling} water. Then this mass, as much of the malt as possible, is scooped {back} into the pan from the vat until the pan

is full. Now {that} the first thick mash is in the pan the rest remains in the vat. During this time the fire oven {under the pan} is heated so that the thick mash can soon be brewed [“Sud” literally, but boiled seems better here].

Initially the malt in the pan must be stirred from the bottom with a specially prepared shovel so that the malt at the bottom of the pan does not burn. As the heat increases the malt rises by itself. When this thick mash comes to the {boil} the fire must be reduced slightly and the pan must be mixed so that the thick mash does not overflow. This mash should remain in brew {boiling?} for 1-1/2 hours.

Second Thick Mash. After the first thick mash has boiled [gesotten] for 1-1/2 hours it is ladled back into the mash tun. The procedure is now the same as with the first thick mash only with the change that after the second thick mash you don't scoop any more thick malt starch into the pan. When the mashing of the thick mash is over the entire mass remains quietly in the mash tun for about a quarter of an hour.

Half an hour earlier, when the second thick mash is started, about 3 Eimer {54-1/4 Gal} are left in the mash tun. {This is} lautered, i.e. run down into the Grant without any grain {i.e. just the liquid}, and

when the pan is scooped out during the second thick mash and cleaned of spent grain [Träbern or Treber in modern usage, per Hans Carl Practical Dictionary of Brewing] (floated together), the above 3 Eimer {54Gal} are scooped {back} into the pan so that it does not stand empty and burn until the lauter mash is mixed up.

Lautermash. After the mass has stood in the mash tun for half an hour it is raised, i.e. the pipe is rubbed (the tap is opened) or the spigot is pulled out and the lauter mash is let out into the Grant until the pan is completely full again. Then the heating is started again so that the Lauter mash comes to a boil.

As soon as the Lautermaisch is boiling it is scooped back into the mash tun and the mashing begins again as described above.

However, because this is the last mash it is mashed longer, at least half an hour. In the meantime water is put back into the pan, as much as you need for brewing Nachbier (in brewing language), for washing the cooler and other dishes.

When the final mashing is over, the whole mass remains quietly in the mash tun for at least one or two hours, which one calls resting the beer.

During this rest period, the brewers do all sorts of work.

Boiling The Beer. When the beer has stood in the mash tun for about two hours, it is wound up, i.e. the beer is let down from the mash tun into the Grant. But you have to work carefully; the beer must be quite light and clear in the Grant. If the beer is not clear the fault is in the malt.

Meanwhile the water is scooped out of the pan and it must be cleared carefully.

Then {when} the beer from the Grant is raked (scooped) about 1 bushel deep in the pan and the appropriate hops thrown in the pan is heated and the hops with the little beer should stand in a strong boil for a quarter of an hour.

But you can also make a hop extract {by} dissolving the hops beforehand and pressing them out so that only the bitter mass without hops gets into the beer. But this method is not yet in use in our country.

Once the hop beer has simmered for a quarter of an hour all the beer is ladled {back} into the pan and left to boil with the hops for at least 1 or 1-1/2 hours.

After this time the beer is ladled out of the pan into a hop strainer where the boiled hops remain, then {the beer} is left in the cooler and the beer is now cooling {down}.

Now I want to describe what to do with the remaining spent grain and the dough mass {left} in the mash tun.

Small or “After”-beer [Nachbier]. As soon as the good beer has been completely drained from the mash tun the top dough lying on the spent grain is first removed with a shovel and brought to the brandy house.

The spent grain is now diligently mixed and then as much water as you want to make Nachbier is poured onto them. If there is water on it the spent grain should be turned again and then everything should be left standing for half an hour. The mash tun is then opened and the remaining beer is let down into the Grant which is boiled in a small pan or, if there is no such thing, in the large pan. A large part of the previously boiled hops is now boiled for half an hour with this new beer. Then the Nachbier goes back into the hop strainer and from there into the Nachbier cooler. About 30-40 Maß of Nachbier is made per bushel of malt.

Smooth Water [Glatwasser]. As soon as the additional beer has been let down from the spent grain, you draw as much water back to them as you need for smooth water in the brandy house, about 16 to 18 Eimer { 289-325 Gal}. When this water is on the spent grain it should be mixed again so that all the mealy {starchy} matter they contain can be extracted. This so-called Glattwasser comes into the brandy house and in this Glattwasser the dough, beer stuff, the dregs, and all the rest of the waste from the beer brewery (all other waste) come together to then ferment into brandy.

Spent Grain [Träbern]. When the smooth water has stood on the spent grain for half an hour it is drained off, the spent grain are carefully strained, then turned {shoveled} out of the vat and sold or used for animal feed.

Under Dough [Unterteig]. Once the spent grain have been turned out from the mash tun remaining under the sieve is the under or bottom dough. If the strainer is wooden there will be more dough – but if it is copper, which is better, there will be less dough: This dough, along with what it is washed out along with it, will be taken back to the brandy house.

Cleanliness and cleaning of the beer pan {kettle}

and the mash tun cannot be recommended enough.

Beer Cooler. What the beer cooler should be like has already been described. The beer is poured from the pan onto the cooler while it is boiling hot. If the beer is in the cooler cooling it {down} is common practice in most breweries; i.e. the beer is mixed up [aufgeworfen literally tossed up] and whipped [gepeitscht] using a rake/crook [Krücke] on a long pole. This is arduous and long-lasting work requires a dedicated man and often takes 8-10 hours. The beer at the top of the cooler gets a strong plum [Pflaum] (foam), especially the summer beer which has more hop wort, and this “plum” {foam} lies over the beer like the fur on the fox and is the reason that the beer cannot cool down for a long time.

This extremely arduous work in brewing seems to me to be extremely unnecessary from the very beginning until now.

I can say with all truth and from personal {that} this is unnecessary experience.

It's already been 9 years since I stopped letting things cool down. The beer is no longer brought into the slightest movement on the cooler. It stays on the same level from the brew, so it doesn't produce “plum” {foam}.

It cools down two to three hours earlier and it also lies 5-1/2 to 6 inches higher in the cooler. However, this has a draft from two sides, namely from rising and falling. {This sentence seems to be equivalent to the English “cuts both ways”}. The unchilled beer seems to me to be stronger and more pleasant.

I have already explained and shown this type of treatment to many brewery owners. Some followed my advice but others continue the old sloppiness because it has always been {done} that way.

What could be a deterrent to this method of mine would be the fact that the beer, if it is not chilled, does not run clear from the cooler, which is the case when it is chilled. This fact alone means nothing because the dregs, which do not completely remain behind in the cooler, fall entirely into the fermentation tank due to the fermentation agent and the beer becomes as clear as the cooled beer, even clearer when poured into the barrels.

This process has been tested in both cold and warm weather for it has already passed the test more than 1500 times.

The beer from the cooler is let into the fermentation tank at a temperature of 54.5F (10 R). In winter, when it

is very cold even with a temperature of 25 degrees (11 R) above freezing {i.e. 57F}. If you don't have a thermometer you can't easily guess when to pour the beer into the fermentation tank.

With the Nachbier it has the same consistency as with the good beer. But first, when the last of {what's} on the cooler has run out, it should be left on this cooler in order to get some strength from the beer and dregs that were left behind.

The cold dregs are also brought to the brandy house and then the cooler is washed clean.

If the beer is left on the cooler in a thunderstorm the cooler must be closed as much as possible because the glow of lightning, like the sun's rays, is harmful to beer.

If the weather is warm at the beginning and at the end of the brewing process, brewing should take place during the day and the beer should only be put on the cooler at 5 or 6 o'clock in the evening because it is always cooler at night than during the day.

By the way, how the cooler is built and how it should stand has already been sufficiently explained but I would like to repeatedly advise anyone who is building a new brewery not to build the cooler in the brewhouse, but separately from it.

Fermenting Cellar. In the fermenting cellar many things can be observed because fermentation is a key aspect of brown beer brewing.

As soon as the beer has cooled down to the appropriate degree on the cooler it is let into the fermentation cellar, into the already cleaned prepared vats.

Fermenting vats that are too large are not suitable, especially in warm weather. There should be at least 3 or 4 vats of beer per brew, especially when a lot of beer is made in one brew in a brewery. However, in winter when the weather is cold, two {fermenting} vats may be enough.

If the beer in the tubes from the cooler has to run a little far into the vat it will become 4.5-7F (2 to 3 R) degrees colder during this run. You can then request that the cooler be run 2-5F (1 or 2 R) degrees warmer. The beer should come equally cold into the fermentation tanks. . Never below 18F (8 R) degrees colder and above 25F (11 R) degrees warmer than the freezing point (i.e. between 50-57F). It is a correct rule and therefore necessary for every brewer to have a thermometer, even though many do not yet believe or want to see this necessity.

A lot depends on the cold and warmth of the beer during fermentation. If the beer

is 13.5F (6 R) or even just 11.5 (5 R) degrees above the ice point {43.5-45.5F} you need a lot of fermentation agent or stuff. And if the fermentation cellar itself is even colder the fermentation agent must be increased and I assure you that the beer will still not retain its proper integrity.

On the other hand if the beer in the fermentation tanks has a temperature of 27F (12 R) to 29F (13 R) degrees above the freezing point {i.e. 59-61F}, or, what is equivalent, 4.5F (2 R) to 7F (3 R) degrees above the accepted temperature, then you cannot give it little enough {i.e. too much} fermentation agent. The beer ferments too quickly, is heated too strongly, and produces a so-called pelt, i.e. at the height of the beer in the vat, a lot of unclean stuff and dregs remain and no longer falls through the beer. The beer becomes unclean, soon sours, and is therefore not suitable for storage.

The Fermenting Agent [Gärungsmittel] (and the beer giving) [Biergeben]. The fermentation agent is called the lower beer stuff. It is to the brewer what the yeast is to the baker for baking bread, a leavening agent for fermentation.

The beer undergoes a change in its components during fermentation. It becomes very foul and cloudy, makes a high foam, which settles again and finally

falls through the beer. This immediately becomes clearer and tastier again but still not drinkable until a little fermentation has taken place in the barrels again. This final fermentation must have taken place not only in every barrel, but also in every container no matter how small, if it is kept for a long time otherwise the beer will not be tasty.

Through, or during, fermentation beer develops a large proportion of carbonated air, which is called carbonic acid gas, and it is this gas to which the beer owes its good taste.

This is why it happens that {in} the beer, when the foam begins to fall in the fermentation tank, the smell of this gas is so strong that you can't stand it, and if there are several brews of beer in such fermentation and the cellar is closed you can't can stay in it. The person becomes numb, loses his breath and would suffocate.

This sour air must be in the beer because without this it is not tasty. Anyone who drinks too much will become drugged and intoxicated by this beer.

If you want to get rid of this acidic gas from the beer just take sugar and throw it into the beer because sugar has

the property of removing these atmospheric acids from the beer. You can then drink as much as you want, won't become drugged or intoxicated. But drinking too much will not benefit your health.

As soon as the beer comes into the fermentation tank the “stuff” [Zeug], or fermentation agent {yeast}, is given {added} to it. It is undisputed {that} the best “beer giving” {i.e. way to ferment beer} is if it is introduced with the fermentation agent [Gärungsmittel]. This is to be understood this way.

There are from a brew 3 Eimer {54Gal} of beer placed in a small vat. If the beer is 57F (11 R) degrees warm 6 Maß {6L 1.6Gal} of stuff are taken, if it is 54.5F (10 R) degrees 8 Maß {8L 2.1Gal}, if it is 52F (9 R) degrees 10 Maß {10L 2.6Gal{, if it is 50F (8 R) degrees 12 Maß {12L 3.2Gal} of stuff.

This quantity of beer stuff must be mixed with beer and well cultivated [aufgezogen] in “Schäffeln” so that the beer and the stuff combine well with each other. Then this mass is poured into the 3 Eimer {54Gal} of beer and everything is stirred up in the small vat with a hand ladle so that the stuff in the beer dissolves properly and combines with it. Then the vat is covered. Within 3 hours time the beer in the vat will come into fermentation. Now this mass is mixed again with the ladle and distributed evenly

into the fermentation vats. Then it will also mixed in the vats so that the stuff is mixed suitably with the beer. Finally the vats are covered or left uncovered and the beer remains quietly in the vats. This is now called: “bringing the beer when giving it” [Das Bier beim Geben herführen – archaic, translation unclear].

If you don't want to make this effort of “beer giving” pouring beer, take the stuff and throw it into the BierSchäffel (but almost as much again as was noted above), pour some beer underneath, mix it, and pour the cultivated beer stuff straight into the vat, and do the same with every vat. In the vats, however, you have to mix them with a hand ladle. This is now called: “Giving Dry” [Trocken geben another archaic, and likely untranslateable phrase]. However the fermentation will not be the same as with {adding} beer.

If the fermentation agent has been properly added to the beer, it {the start of fermentation} should arrive in 12 hours, i.e. the beer should show a white ring at the edge of the vat and the top should become a little white. In another 2 hours the thick white plum (foam) should stand in the vat, curled up, and one now says the beer is in “Kräusen”. In another 12 hours the white

Kräusen beer will disappear and turn into a brownish thin plum {foam}, but this will rise even higher than the Kräusen, especially in the summer beer which has more malt and hops. This foam disappears again in about 20 to 24 hours and falls through the beer but there's still some plum {foam} left at the top and the beer isn't quite clear yet. This is called the green beer.

Now it depends on an indefinite amount of time as to how long the stuff or the green beer has to stand before it can be put in the cask. A lot depends on the weather. If it is cold it stays longer, but if it's warm the stuff falls through faster. The entire fermentation period should be over in 5-6 days.

It's not good if the beer sits in the oven for too long, because then it no longer likes to be clear, but rather tasteless, especially if too little stuff is added to the beer in cold weather, which is then expressed in the brewing language like this: The beer has wild fermentation. And the beer is the master and not the stuff {i.e. the good added yeast}. Such a beer can stand in the fermentation for a long time, has to be transferred to another vat, and still won't get the proper purity. Also,

even if it were summer beer it is not suitable for storage. The stuff and the dregs {lees} still contained in the beer dissolve in the barrel. The beer becomes cloudy, undergoes sour fermentation, and therefore becomes sour itself and has a bad smell.

The heat is even more damaging to the lager beer than the cold. That is why there is a decree in our kingdom that brewing should begin around Michaelmas and end around St. George. {This is} because you can no longer maintain a temperature of just 18F degrees (8 R) above freezing point {i.e. 50F} and if the beer gets even warmer, it's absolutely the case that the bottom fermentation agent can no longer be used, but the top or bung {Spund – bung' plug' spigot] fermentation, with which the white barley and wheat beer is brewed, can still be used because this fermentation can tolerate more heat.

If the temperature on the thermometer shows 59F (12 R) to 61F (13 R) degrees the brown beer brew must be handled carefully. Everything must happen more quickly. The water, the mash and the beer are not allowed to boil for as long as in winter, otherwise everything will overheat. You have to boil during the day and at night the beer has to be left on the cooler. If fermentation lasts more than three days it is already too long. Despite all the accuracy a

beer like this will not last too long and will soon turn sour. Anyone who boils brown beer at such a time must, instead of using under {i.e. bottom fermenting “stuff”} use top beer stuff for fermentation.

The brew or fermentation agent is made from the beer itself and is taken from one brew to the other throughout the winter. At the end of the brewing process some dry out the bottom stuff and dissolve it again at the beginning of the future brewing process and continue to use it in this way. Most people take the bottom fermentation agent from other breweries where people used to start boiling or where stuff {yeast} was dried out. If you still have good summer beer until Michaelmas you can easily make a fermentation agent from beer in the barrel. One takes half a Metzen {a Metzen is 37L, so 18.5L or 4.9Gal) of finely broken {ground} malt meal {starch}, boil it with water, remove the latter; take {add} 2-3 pounds of hops among {to} it, let it boil again, cool it down to 22.5F (10 R) degrees above the freezing point {according to Reaumur}. Take the fresh barrel {and} pour 1/8 measure of good Kirschwasser into it, mix it well so that everything blends well together, then let it ferment as usual with beer, and in this way you will receive good, fresh under “stuff” {i.e. bottom fermenting yeast}.

Various things about the means of fermentation

are written but mostly only on the top fermentation. Some make a major secret [Arcanum] out of it and in the end there isn't much to it. There will be few or no brewers in our country who will make a new fermentation agent as their bottom stuff.

Most beer brewers and master brewers are proud of the fact that they believe they know a secret way to give the beer a good taste. They therefore include spices and the like among the beer stuff so that sometimes the beer itself has a different smell of all kinds of spices from the pharmacies or from the materialists.

All these so-called secrets are worthless and sometimes even harmful to human health. The government should therefore strictly ban the use of such substances for brewing beer.

It can be said with all truth and certainty that nothing is needed for a good and healthy beer but water, good malt, good hops, and good ingredients, which are made from the beer itself. Only if the stuff {yeast} is a bit dull can you mix in some spirit brandy, or rather cherry brandy. However, this should not happen too often, but only three, at most four times

throughout the winter. The spirit brandy is only a leavening agent so that the stuff can ferment more quickly.

The Beer Kegging. We now come to the beer kegging, i.e. when the beer has undergone the necessary fermentation it is put into the barrels. The winter beer should be kegged a little greener so that, whether in small or large barrels, it soon goes into the so-called small {secondary} fermentation, which is called taking hold or foaming over.

If the winter beer has been in the barrel for 5 to 6 days it should already have the appropriate clarity but it should not be drunk before four weeks otherwise it is still too new and the taste is not so pleasant.

The winter beer, if it is boiled well, lasts for a long time, four, five and even more months. There are many people who prefer to drink winter beer over summer beer because there is not as much hop bitterness as in summer beer.

The summer beer, on the other hand, should be kegged clearer, i.e. there should be no more stuff {yeast} or lees in the beer because all of this must have already fallen through the beer in the fermentation vessel. The summer beer should be kegged in the following way.

The summer beer barrels or the barrels in the summer beer cellar may not be filled all at once. For example, if you pour it {the summer beer} into 10 barrels each barrel gets a tenth part of the brew. Now you don't go back to the same barrel where you started before with a new brew {instead you start} at the second one. And so it goes through in order. The cause of this is twofold. Firstly, because when the fermentation vessel is tapped some stuff {yeast} initially comes out with the beer. So there would be too much stuff {yeast} or lees in a barrel which would be harmful to the beer. Secondly, because if barrelling were started from the same barrel every time, the last barrel would get all the dregs, or, what is equivalent the top of the {fermentation?} vat, {the} beer {from} which has evaporated the most, or from which the atmospheric acid {i.e CO_2} has been emitted. This beer would no longer go into the small {secondary} fermentation in the barrel or you would have to pour Kraeusen {green, still fermenting} beer into it.

But it is even more advisable not to fill the barrels in the summer beer cellar completely full with beer one after the other if you want to or can do so. When the first 10 barrels are a little over half full you should pour again into another 10 or 12 and do this throughout the entire cellar until

you get to the first barrels again. However, the rule stated first should always be observed and only then should the barrels be completely filled.

It should also be noted that the beer that should last the longest, {that which is} a little stronger in malt and with better hops, should be boiled {brewed} at the best time for this, for which the months of December and January are the best.

As soon as the beer is barreled from the {fermentation} vats the beer is strained clean and the bottom stuff {yeast} taken from it. If there is something unclean on it, it must be separated off [herabgestrichen from abstrichen – reduce, curtail, swab] with a crook. Then the stuff {yeast} is removed and only after that the dregs that lie under the stuff {yeast} is removed.

The vats are washed cleanly. The lees and the rest of the stuff goes into the brandy house and everything has to be cleaned in the fermentation cellar.

Everything that is observed with {brewing} beer must also be followed with Nachbier. From the cooler it is let into the fermentation vat in the fermentation cellar and the same fermentation agent is given to it as that of the beer. It must now remain in the vats until it becomes ready to barrel. What you now do for

your own people and need for various deliveries is filled into special barrels. The rest can be distributed among the winter beer.

Winter Beer Cellar. In the winter beer cellar there should be 20 barrels, each of 15 Eimer {271Gal}, on racks, and about 5 or 6 Nachbier bota [panzen, modern pansen – literally first stomach of a ruminant probably a type of soft sided container for liquids made from an animal stomach] should be added. All of this tableware should be well made and durable. It would be best if all these barrels were tied with iron hoops.

Putting pitch inside of the winter beer barrels is not necessary. Only new barrels have to be washed initially with very hot water and some crushed crown berries (juniper berries) so that the beer does not take on the smell of wood. Otherwise, when the barrels are empty, they are always cleaned again with just hot water.

So if these barrels are filled one after the other, they must be completely filled so that they can soon go into small {secondary} fermentation. You should not close the bung tightly, as is customary in some places where people pour Kraeusen beer and then bung it tightly. This beer, when tapped, foams up enormously and is not healthy at all.

If the beer has been in the barrels for 14 days, three or even four weeks, it can be given to the innkeepers and other buyers. Meanwhile, it is recommended the barrels of both the innkeepers and others with water according to the real Munich oak, calibrate the Eimer to 64 Maß, burn {i.e. permanently mark} the measure on it, and renew this every year so that you do not come to harm through changes made to the the barrels.

In many places the practice has been introduced of giving the winter beer to the innkeepers straight from the fermentation tanks and filling it into the barrels. The beer is now made a little greener, or Kräusen put in it, in order for the beer to be ready [ankommen – to arrive, but be ready is better in this context] in the barrels sooner, foam up, or the appropriate fermentation begins.

It goes without saying that beer should never go into an unclean barrel, be it large or small. Cleanliness of the {brewing} utensils is one of the most necessary requirements if the beer is to remain good and last for a long time.

However, some carelessness creeps in at many breweries. Hundreds of Eimer of beer are spoiled in this way. The public receives bad

beer and nothing is the cause of this except the uncleanliness of the {brewing} utensils.

Summer Beer Cellar. The summer beer cellar is the place where the lager beer in summer, when it is greatest heat is present, is stored and preserved. The brewery owner is lucky who has a good, fresh, dry summer beer cellar protected from all heat penetration.

The best summer beer cellars are, as has already been said, those which are built in dry rocks, in deep, solid clay, or other (loamy) layers of earth. Gravel or sand is a little worse. However, if the cellar is dug about 30 feet deep into the earth or into a mountain without water being able to penetrate, so is such a cellar is still considered to be in the middle category. However, those cellars in which water stands or penetrates are among the bad ones.

The summer beer cellar should be cold to the point of ice in winter. However, in winter the cold air must be drawn in. The beer in the barrels must not freeze or form ice.

The best way to determine the quality of the summer beer cellars is to use a thermometer in the summer when it is warmest.

If a cellar is only 11F (5 R) degrees above the ice point {freezing, i.e. 43F} during the hottest summer so it is already counted to be among the good ones. The warmer a cellar is from degree to degree, the worse it is. If a summer cellar reaches a temperature of 57F (11 R) or 59F (12 R) degrees the beer will no longer hold up unless you add an excessive amount of hops. But such a beer is not pleasant to drink because of its bitterness.

We now come back to the beer barrels in the summer beer cellar. The barrels should not be completely filled, but instead should be left a few Eimer empty {i.e. short of full}. An indefinite period of time after this, before the barrels are completely filled, you have to look through the bung to see whether the beer on the top of the barrel has a plum (foam) or not. The top plum {foam} is the sign whether the beer is exhausted, or what is equivalent, whether the small {secondary} fermentation has taken place. If the beer is in the barrel without plum {foam}, Kraeusen beer must be poured onto it so that a small {secondary} fermentation occurs.

Now when the barrels are completely filled it can be observed that the plum {foam} is not completely up to the bung but {rather} there is still an inch deep empty space in between

so that the beer in the barrel does not get foam out. Some do the opposite and claim that the summer beer is supposed to foam out of the barrel. But I am of the opinion that the summer beer, which has matured in the barrels and doesn't foam over, lasts longer than others.

Once the filling has been done the bung is closed well so that no air comes in or out, but not too tightly so that when it starts to foam you hear the beer whistling.

In the summer beer cellar you should check often to make sure that: no barrel is starting to leak; whether there was no wooden or iron ring broken {on any barrels}; whether the barrels all filled equally; whether the cellar has been cleaned of all rubbish; whether the {air} draft openings (in summer) are properly closed, but in such a way that the damp, foul air can be let out in another way; whether the outside of the barrels is also free of mildew; whether there is no bad smell in the cellar; whether the doors are closed properly; whether water flows into the {beer} cellar during persistent rain or otherwise. Tobacco smoking and other bad smells are harmful in the {beer} cellar.

When the summer beer is delivered it should be noted that the barrels of the beer buyers are clean and are provided {made with} real oak.

Before these barrels, big and small, go into the cellar, they should be properly registered in the manual.

No one should come into the cellar except the people necessary who barrel the beer because {too} many people brings heat into the cellar.

The brewery workers who make the beer not only have to fill the barrels full and smash the plum {foam} down well, but also give to everyone the same beer as much as possible, not just a clear fresh one from a newly tapped barrel {for some} and dregs for another.

If the summer beer barrels are kept on the back side {of the summer beer cellar} a barrel should never be completely filled with this beer because that's where the top layer that has been spewing out comes in and this beer is tasteless and not drinkable.

The same is true with the dregs when the barrels are strained. You have to be careful that no dregs {sediment} gets into the beer and only small amounts of the dregs must come into the barrel.

A lot of hard work has to be done in the summer cellar so that everyone can get a good beer that is worth their penny, but this is often overlooked due to the negligence of the brewery workers.

If the barrels in the summer cellar are empty they should not remain in the cellar for much longer, otherwise an souring will get into the dregs and the barrels will be contaminated.

The Beer Mash Liquor [Guß]. The beer mash liquor or the volume of winter and summer beer to be produced from a bushel of malt, in order for it to remain good and nutritious and is a penny-worthy drink, can at most be accomplished in the following way.

It is important to adopt a certain standard {measure}. This standard is a dry bushel of malt that has been cleaned of malt germs and is dry. A wetted bushel of malt, according to which the surcharge {malt tax} must be paid, cannot be accepted because this is subject to change; because sometimes there is more, sometimes less. The causes of this change have already been stated. Even the weather has an influence on this; and even the water for witting {the malt} may not always be taken in the same quantity. If it is cold and dry, more water is required. If it is warm and humid, less water is required. If the malt has come straight from the kiln, more must be used, but if it is already stale [abgestanden literally has stood around], less {is needed}. If the same {malt} is well dried out, more water should be used, and if it is not, less water should be

used. From a bushel of dry malt, a maximum of 7 Eimer {126.5Gal} of winter beer and 6 Eimer {108.5Gal} of summer beer, each of 64 Maß {18Gal} each, can at most be produced, but in such a way that the necessary drink for the brewery workers can be provided for separately and is therefore not included in the calculation { i.e. more beer was made than allowed by regulations of the time, the extra going to brewery workers who were partly paid in beer }.

An additional 30 Maß {8.5Gal} of beer can be made from each such dry bushel of malt, because the Nachbier is largely used for the helpers required for the brewing work because everyone who works also wants to drink.

This mash liquor produced must now come into the hands of the beer manufacturer purely in terms of money. So from the 7 Eimer {126.5Gal} of winter beer and 6 Eimer {108.5Gal} of summer beer produced, the drink for the brewing and house staff of the manufacturer himself, the drink for the innkeepers and their servants, the evaporated, the waste of the dregs, the spilling when the beer is poured {into barrels}, etc. {must be} taken into account. Because of all this loss, the brewer is allowed to put 1 Eimer {18Gal} more of beer into the cooler for every bushel of malt. It still sufficies miserably.

An excess of winter beer by those who do not give too much free and good beer at their brewery {but} has Nachbier to offer, {because} merely from the Nachbier,

and mainly from the summer Nachbier can {this} be obtained.

With summer beer, however, you can't achieve anything more than the 6 Eimer {108.5Gal} produced from a bushel of milled malt, and it can be pushed higher if you want to serve the public with good and nutritious beer in a different way.

However, it is understood this way: the beer manufacturer must be able to bring 6 Eimer {108.5Gal} of beer into his accounting through the beer retail trade, in addition to all the waste that has already been reported for winter beer. The evaporation in the barrels and the lees are greater for summer beer than for winter beer, especially in the last two months of August and September.

If you put 6 Eimer {108.5Gal} of milled malt into the barrels for the last two months {of the brewing season}, you almost have too much. I would like to advise every brewer not to make more than 5-1/2 Eimer {99.4Gal} of beer per bushel of malt during this time. Otherwise it is in danger of becoming sour. Furthermore, he must use the best malt and the best hops for this beer that is destined for the last time {batch brewed at end of the brewing season}. Yes, if he doesn't have very good cellars, which at this time are only 13.5F (6 R) degrees above the ice {freezing} point, he must use

6-7 pounds of the best hops for every bushel of malt.

There is no specific number that can be given for the amount of hops, because what really matters here is the quality and freshness of the summer beer cellar. Every beer brewer has to know his cellar and therefore has to know for himself and then judge how much more hops he has to use for the beer that should last into the months of August and September. Some people use too much hops. Such beer is therefore bitter and not pleasant to drink. Whereas most people don't use enough and that's why there are sour, stale beers every year.

BRANDY DISTILLERY

The beer brandy distillery includes the so-called Glattwasser (clear water), the top and bottom dough, the cooling lees, the stuff {yeast}, and the lees from the fermentation tanks, then the lees from the barrels. All of this comes together in a box or vat and remains for at least 6-7 days, depending on whether the brandy house is more cold or warm. In this box or vat all this stuff must now ferment. Initially, the fermentation lifts everything thick up or onto the surface,

and then it usually falls through again. Once fermentation is over, you have to see whether wine acid [Weinsäure] (wine fermentation) has been created However, it should not be too long or too short.

The boxes or vats and barrels should be so large that all the above stuff that remains from a brew of beer can go into it and so from brew to brew.

If these lees have received the wine acid during fermentation they are stirred up with a ladle or mash paddle and scooped into the mash copper or kettle so that each kettle receives the same amount of thick lees.

The kettles must not be filled completely, but must remain empty at least half a foot below the neck. Then it is heated until the dregs in the kettle become warm, but not to the boiling point, it has to be stirred more often with a small stirring shovel so that the bottom thick stuff and the spent grains that come with the top and bottom dough and are on the bottom of the boiler do not burn.

When the dregs are almost at the boiling point, the lid is placed on the copper and everything is tied up with linen rags both around the neck of the copper and in the tubes and plugged

so that no moisture can escape anywhere.

Once this has happened the fire in the heating stove must be closed {stopped} immediately, but in such a way that the kettle can start to heat.

When the kettle starts to heat up you have to be very careful that it doesn't get warm. The kettle should start to drip very slowly because if the stuff in the kettle gets too warm, or even comes to a boil, the mash in the cooling tubes will not only warm up but will even start to shoot, or, in the brewing language, start to spit.

Therefore the heating of the mash kettle must be designed in such a way that the fire can be stuffed [stopfen] {put out} through the opening and rekindled through the same and, as soon as the kettle is heated, as much combustible material such as wood, peat or hard coal must be put onto it as is necessary to separate the spirituous parts from the mash using steam.

The cooling barrels (cooling barrels) must always be filled with fresh, cold water so that the cooling bottles or tubes convey the appropriate precipitation {away} and so that the mash does not run down warm; because in the warm steam many spirituous parts disappear.

To ensure cleanliness when distilling the brandy mash it is highly recommended that nothing burns in the kettles, that dirt doesn't stick in the hat, {and} that the tubes are cleaned from time to time; Otherwise the mash will have a stinky, fusel smell which you can no longer get rid of even when distilling brandy.

How much mash should be evaporated from the lees is very uncertain. Since, depending on the approach, if the dregs contains many or few spirituous parts you can get more or less mash.

One can assume that from a brew of 7 or 8 bushels of malt the amount of stuff that descends from the brandy house consists of smooth water [Glatwasser], top and bottom dough, cool and other lees that together would amount to 20 Eimer {361.5Gal}. Of these 20 Eimer of lees, only 4 Eimer {73.3Gal} of good mash can be distilled.

This mash is then stored in barrels for four to five weeks, or even longer, until it is distilled into brandy. Whatever remains in the mash tuns must be left or scooped out and the kettle must at least be washed out (rinsed) cleanly.

What comes out of the mash from the kettle is called the draught,

{or} distilled draught, [Trank and Brenntrank respectively where trank can mean drink or draught, but in this case refers to the spent grain not the liquor produced] and serves as excellent feed for the cattle and pigs.

You can fill the kettles two, three or four times a day depending on how many kettles you have, or how the brewery works, but it is best if the filling is done twice a day.

Now we first come to distilling the brandy itself, namely, when the mash in the barrels has stood enough, at least four to five weeks, or even longer because it doesn't get worse as it ages but gets better even if it sits in the barrels for half a year.

If you want to start distilling brandy everything must first be clean: the kettles, lids or fixtures, the tubes or bottles, the utensils where the brandy runs in {is collected}, the small strainers, in which a thick woolen patch is placed at the top so that nothing unclean gets into the brandy.

Then the mash is carried into the brandy kettle, which is filled up to the neck. As soon as this has happened the lid is immediately put on it and everything is well connected and tightly closed so that no steam can escape anywhere. This connection must be done particularly diligently.

Now the heating is carried out, but in such a way that care is taken so that when the tubes in the lid become a little warm the fire in the oven is then closed.

The tubes initially only let a few drops fall, but then more and more drops until they finally begin to flow as thin as a thread and this first brandy, which is called advance, should not even be a little lukewarm, much less warm. All of this can be managed with the movement of the fire and its tamping. Anyone who does not follow this caution and initially lets the brandy warm, or as they say, lets it shoot, will lose the best spirit of the brandy. Since the brandy, or advance, that runs out first is the most spirituous {i.e. has the highest alcohol content} and must make good for all the rest.

Five Eimer {90.3Gal} of good mash should make 1 Eimer {18 Gal} of good brandy if everything is diligently taken care of and observed in the manner described above.

But there isn't much use in distilling brandy because it requires a lot of labor, wood or other combustible materials; expensive copper and other equipment and apparatus are needed.

If someone has the facility fattening cattle, feeding pigs and various poultry and using all the brewery's waste (waste) for this purpose which is used for distilling brandy, would earn just as much this way as with the brandy distillery itself. Whoever can sell the spent grains, top and bottom dough can earn the most.

Anyone who does not get 5 Maß {5.3L 1.4Gal} of good brandy from a bushel of dry and wetted malt is not working diligently and putting work in {at} the brandy distillery.

The brandy can be stored in barrels for years and gets better and better. But there is always considerable disadvantage if you cannot sell it at a high price because it evaporates badly. The spirituous part remains completely behind but the watery parts dry up.

It is known everywhere that brandy can be made from all spirituous plants. The grape plant has the preference above all. Then comes fruit brandy which is produced on a large scale in many countries. Brandy is also made from all types of grain. Cherry

and plum brandy is distilled in large quantities in many places and in years when this fruit yields well. Good brandy can be distilled from all edible tree fruits, berries and even potatoes.

In some places there are various berries that are completely exposed to spoilage because they cannot be used for money. It is a shame for such plants that they are not used. Several years ago I started having old people and children collect all kinds of berries for me and made a lot of brandy from them. But since in our kingdom the distilling of brandy is made from other articles than from barley malt that is brewed, if a new surcharge has to be paid (it currently no longer exists) no one will bother with it anymore especially since there wasn't much to be gained from this {even} before. My purpose in this fruit brandy brewery, primarily from berries, was mainly to provide a little food for old and poor people, and then for children.

MAKING VINEGAR

The vinegar boiling process does not work as well when brewing brown lager beer as it does when brewing white barley or wheat beer. The cause of this is the type of malt, and mainly the fermentation; because the vinegar actually requires top fermentation. But you can also make vinegar from the bottom yeast.

Is there a heating chamber that does not require too much wood to heat? If you also have a supply of vinegar utensils, and then retail trade and marketing you can of course make vinegar at a profit. But if you don't make too much Nachbier and keeps it well so that you can distribute it among the winter beer, and whoever doesn't overdo it so that the beer is still nutritious and worth a penny, will rather stick to Nachbier than making vinegar from it; because the vinegar, if you want to make it good and strong, requires the same flour substance and strength as the beer itself.

The vinegar boiling process is kept as secret as possible. I would therefore like to briefly explain how you can prepare vinegar from beer or from Nachbier.

If you don't have a special vinegar boiler where you use malt grist and only want to make vinegar from your boiled beer, after the good beer has drained from the spent grain, add warm water to a bushel of boiled malt, about 30-40 Maß {8.5-11.25Gal}. Mix the spent grain very well before and after, let the wort stand in the spent grain for half an hour {and} steep it like you would with the Nachbier. Bring the liquid into the small pot and let it boil for a quarter of an hour, but without hops, or at most with just a shovelful of wet {previously boiled} hops. Then put the vinegar in the cooling container, let it stand at 34F (15 R) degrees above the ice point {freezing, i.e. 66F}, so it goes into fermentation itself, although as was already said above, the top fermentation would be better than the bottom fermentation. The fermentation takes at most two days to complete. But you have to let the vinegar become quite clear so that neither the stuff {yeast} nor the lees are contained in it; the clearer the better.

Now you must yourself cleanly {draw off the vinegar} while the necessary sour {i.e. dedicated for vinegar use} utensils have already been prepared so that you can start the vinegar in them.

These dishes must be brushed clean and dried in the sun,

and, before the vinegar is brought in you must acidify them with good vinegar or even wine vinegar. If this were to happen two or three times and the dishes were dried again in the sun the effort would be rewarded and the vinegar would turn sour much sooner.

Now comes the main thing, namely making the vinegar. When the vinegar is well fermented it is placed in the storage barrels. These must be in a warm place in which the thermometer is at least 45F (20 R) degrees above the ice point {freezing, 77F}. This warmth {temperature} should be constant for the first two to three days and should continue to increase.

As soon as the vinegar comes into the storage barrels oxygen is given to it. You take baked sourdough with pepper, mix it with good vinegar, take raw crushed tartar, and throw all this into the barrel, cover it with a wooden lid [Deckel] and then with a coarse canvas so that no air can get in {and} keep the vinegar in the same warmth {temperature} as above and within 14 days, a maximum of 3 weeks, the vinegar must be able to be removed.

If you already have a good vinegar mother and a good sharp vinegar, pour

both into the new vinegar. You will receive vinegar in an even shorter time but the warmth {temperature} must be maintained at all times.

When making vinegar you also use grape stems, spices, pepper, ginger [Imber is a Yiddish word for Ginger which is Ingwer in modern German], a few cloves, Bertram roots, galangal, and gentian root, Kreen?? or horseradish. Premature dried grapes are even better. Pulverize them and mix the powder with the leaven [Sauerteig also sourdough] then throw it into the barrels and the vinegar will soon become good.

If you make vinegar which has cooled down significantly during fermentation you must leave the preparation {or mixing} barrel [Ansetzfass] open until the mass receives the necessary heat. Only then must the preparation barrels be covered as described above.

If you want to make yourself a good vinegar mother, which you can always use with good results, use white or raw tartar. But the latter should be washed until the water runs clean from it {and} then dry it again in the sun. Now crush this tartar into powder, pour good vinegar into it, and boil it gently again so that all the moisture comes away. But one should careful regard that it does not

burn. This pouring of tartar with good vinegar, drying and cooking should be repeated often and you will then get a very good acidic powder that can be used to make vinegar.

It should also be noted that if the vinegar in the starting or pitching barrel [Anstellfasse per Hans Calrl brewing terms dictionary] still has fermentation particles, stuff or sediment in it, and therefore still foams on the surface, this should be carefully removed.

Once the vinegar in the starting or pitching barrel has turned into its proper acidity and has a nice clarity it is time to draw it off and put it in the storage barrels.

The storage barrels in which the vinegar is kept are usually made of oak. Wine barrels are best used for this purpose. Before you pour in the vinegar it must be washed thoroughly and dried in the sun. But first add some good vinegar, but only so much that the wood inside is mointened by it. This treatment is even good for barrels that have often contained vinegar.

But if you want to use new barrels to store the vinegar that have never had vinegar in them you have to protect them

so that the vinegar doesn't take on the smell of wood. Initially these new barrels are cleaned two or three times with boiling water. Then comes the vinegar dregs, or if you don't have that, at least beer dregs, which often serve {the purpose}. Then you only move on to the internal aspect already described, acidification. This latter can happen two to three times. If you do not observe this procedure you will end up with bad vinegar in the new utensils.

If the vinegar is now brought from the starting or pitching barrel into the storage barrels then, as I said, it should be completely pure and clear. The barrels must be filled to capacity and then well bunged {closed} so that no air gets in.

To achieve this even more effectively the barrel is turned slightly so that the bung is on the side just to prevent air from penetrating and thereby preventing the vinegar from becoming germ imbued.

There are many other secrets in making vinegar but these cannot be obtained from the vinegar makers without paying a lot of money. They really make a major Arcanum out of it and in the end it is nothing different than what I have already described and shown. I myself could write a lot about the different

methods of vinegar production but I don't think it's necessary anymore because I've already explained the main point sufficiently myself.

It is already well known that good vinegar can be made from fruit. In all countries and areas where a lot of fruit grows good vinegar is made from pears and apples, as well as from crab apples and similar pears, and even from grape-apple berries (barberries).

The best vinegar is undoubtedly made in the wine countries from the grapes and the better they are, the better the vinegar will be. Fruit also has the same properties. Vinegar is also made from sour grapes and bad fruit but it goes without saying that it is not as pleasant to use as those {what is mentioned above}.

Anyone who wants to get involved in the production of wine and fruit vinegar can read and use the various treatises that have been published on the subject for this purpose.

COUNTRY BREWHOUSE PLAN

The main parts required to build a brewery (see attached profile) are as follows:

1) The brewery or brewhouse;
2) The cooling house;
3) The fermentation cellar;
4) The winter beer cellar;
5) The summer beer cellar;
6) The stone malt steeping tank;
7) The malt pile or malting floor;
8) The wilting (withering) floor;
9) The kiln;
10) The barley and malt floor;
11) The malt sprinkler (wetting) ;
12) The malt or grist mill;
13) The brandy house.

These parts, which are precisely shown on the enclosed three floor plans, namely from the basement to the ground floor and over a staircase, should all be arranged in such a way that one work {job} is facilitated by the other; You should especially make sure that you have enough light everywhere. A brewery where 1000 bushels of barley are brewed every year and where all the parts are placed together as a whole requires a fairly large space

1. To the brewhouse, where there is nothing other than the beer pan {kettle}, a

small Nachbier pot, the mash tun, a spacious place for washing utensils and a flat area of 46 feet long and 10 feet wide with internal light {space}.

The height, arched in a Bohemian style, 13 foot inner lights; the side walls should be 3 feet thick, and the braces 18 inches thick.

The beer pan and the masonry can take up about 10 to 10-1/2 feet of the length and the rest of the width takes up the fire box opening [Einschür; schürenschaufel a fire shovel] of the beer pan and the small pan.

The heating or fire box opening should not be in the brewhouse but outside the main wall, where a separate entrance should lead. The beer pan, in which 8 bushels of malt are boiled, can in the inner space hold 7-1/2 feet square area and 3-1/2 feet depth {26.25 cubic ft, 743.25L 196-1/3 Gal} . The Nachbier pan is 3-1/2 feet square and 2-1/2 feet deep {8.75 cubic ft, 247.75L, 65.5Gal}.

The mash tun can hold 4 feet 7 inches high and 10-1/2 feet wide {most likely diameter: 148 cubic ft, 4201L, 1110Gal}.

2. The Cooler- For cooling, which should never be {done} in the brewhouse, a special room is required which can be found on each side of the brewhouse where it is convenient. You need only make an opening through the wall and run a spout through it. Within this room there are 2 coolers, one for the beer, the other for the Nachbier. The former requires

a space of 28 feet length and 24 feet width, the latter 10 foot length and 8 foot width.

3. The fermenting cellar requires an internal space of 54 feet long and 16 feet wide or 864 feet square. The foundation should be 4 feet deep in the earth but when a good foundation exists it should be 3-1/2 feet deep, except for above the earth it should be 3 feet. The walls should be vaulted 6 feet to the abutment and the vault with a centered circle at a height of 5 feet with whole stones.

4. The Winter Beer Cellar. It would be excellent if the winter beer cellar could be located directly below the cooler and the summer beer cellar under that. If this is not possible due to the natural layout of the place then one should ensure that neither the former nor the latter is placed too far from the cooler otherwise one would have to undergo great difficulties when pouring {transferring} beer.

The winter beer cellar, which should hold at least 300 Eimer {5422Gal}, requires a space of 1000 square feet. If the basement is built square 33 feet {per side}. If it is built in an elongated square, it can be assumed to be 50 feet long and 20 feet wide. By the way, the design is like the fermenting celler only the storage in this cellar may be 2 feet lower

than in any other cellar because the barrels are not as high as the fermentation barrels.

5. The Summer Beer Cellar. This can be built in different ways, with single or double arches. The barrels can be placed in 1, 2, 3 or 4 rows. It would be best suited in two rows and if you make it 260 feet long and 16 feet wide, and have three supporting {load bearing} walls, {so} then it will be 4 cellars. But if you want to build the summer cellar with 4 rows of barrels it must have 2 {supporting} arches.

The footing should be created with a wall 4 feet deep. It should be 5 feet high starting from the pavement and the wall up to the abutment should be 3 feet thick. The entire circle of 16 foot width is 8 feet high but you can also use a centered circle 6 feet high. Above the vault clay 15 feet high should be poured.

6. A space is required for the malt steeping tank which is 10 feet long, 9 feet wide and 4 feet deep, holds 360 cubic feet {10.19HL 2693Gal}.

7. The Malt Pile or Malting Floor. This should be at least 36 feet long and 30 feet wide. Consequently it measures 1080 square feet of internal light {space}. It should be arched in a Bohemian manner. The main walls must be 3 feet thick but if it stands

between other vaults 2-1/2 feet are sufficient. The vaults of the cross braces from the main wall of the floor {should be} 3 feet high. Up to the abutment 2 foot thick braces, the curvature of the braces with a centered circle of 4 foot height. The little places [Plätzchen – biscuits in modern usage but that doesn't make any sense] must be arched out nice and flat with half stones with a free hand, so that the inner light {space} in the sprouting floor can reach a maximum of 9 feet to the top of the vault.

8. The wilting {withering} floor is usually placed above the malting floor because the malt from the malting floor comes onto the wilting floor. Anyone who can make it a little larger than the malting floor is acting wisely. The height is 10-11 feet. It also needs neither a vault nor a white ceiling.

9. The kiln should have 20 feet squared internal light {space}. The upper part of the kiln can be 3 feet high and the vault 4 feet high.

The kiln, because it can be heated by the short lived [flüchtigen - also volatile] heat of the brewing chimney must not be too far away from it. The heat chamber must not be more than 5 feet high.

10. Barley and Malt Floor. The first floor should be 13 feet high and the second floor should be 12 feet high. The kiln can stand about 4 to 5 feet higher with its vault. On the second floor of the brewery there are 3 floors one above

The other with a horizontal roof structure. These are sufficient for storing the malt and barley.

11. The sprinkler {malt wetting area} can be placed on the first or second floor, whereever it is more appropriate, but it should never be too far away from the malt mill. It requires a space of 30 feet long and 15 feet wide.

12. The mill for crushing the malt can be a water mill or an ox mill, depending on the facility. The latter requires a space of 40 square feet in length and width. It is built in a standing manner. The large millstone {see page 80 2nd paragraph} or comb wheel has a diameter of 12 feet 3 inches.

13. The brandy house should have a spacious place to neatly accommodate everything that belongs to the brandy distillery. This requires a space of 40 feet long and 40 feet wide. It shouldn't be very far from the brewhouse. The floor should be 3 feet deeper than that of the brewhouse. It should be arched in the Bohemian style, for example on 2 columns, so that 9 little places {squares} [see Pg 140 1st paragraph] come out. The kettles, furnaces and cooling racks can be placed on 2 squares.

END OF BOOK