

Reduction of beer losses after dry hopping by using a special sieve

Willi Mitter, Frank Peifer

Hopsteiner, Simon H. Steiner, Hopfen, GmbH, Mainburg, Germany

Introduction

Beers with a large variability in strong hop flavors are becoming more and more popular with consumers all around the world. In the past 50 to 60 years hop additions mainly took place in the brew house and only a few breweries remained, which still dry hopped their beers. This has changed tremendously now. Particularly in the USA, where an average of 500 g of hops is added per hl in those breweries producing hop-intensive or hop-forward beers.

Typically hops are added as whole hops or pellets. In the latter case the yield of hop oils is better, as it is difficult to extract aroma substances directly from the cone (1). For both types of products brewers have the same problem that beer is adsorbed by the plant material and the volume of whole hops and hop powder / pellets increases. Beer losses, however, are even higher, as large quantities of hop particles remain in the lower part of the storage tank. With a special sieve, hereafter referred as "Beer Cleaner", even very small particles can be separated from the beer and removed. Consequently only the beer, which was adsorbed by the hops is lost. The function of the Beer Cleaner is described below.

Function of the sieve

Prior to the filtering process, the interior of the sieve has to be injected with CO₂ to remove the oxygen and achieve a similar pressure than the one in the beer tank. Under these conditions the beer will keep its CO₂ concentration.

The dry hopped beer is then pumped from the tank to the Beer Cleaner, where it first goes into a small chamber which will be filled until the beer finally flows over the sieve. The screen consists of slots with a width of 250 µm. It is important that the flow point is placed absolutely horizontal to guarantee an even liquid flow over the whole surface of the sieve. The hop particles pass over the sieve, carried by the beer flow, while the beer itself passes through the slots of the sieve. By the end, or lower part of the sieve, there should no longer be liquid present as it should have passed through the sieve at this stage. The most important parameter to achieve this is adjusting the beer stream.

The green valves show the regular process as described above. In the event that beer flows over the sieve and enters into the lower part of the sieve, where the hop particles are collected, it can be recirculated back. The green valves (V1, V3 and V4) will be closed and V2 and V5 opened, so the beer can be transferred back into the process.

V6 is only opened after the filtering is complete, at which time all other valves will be closed. The hop solids will then be removed.

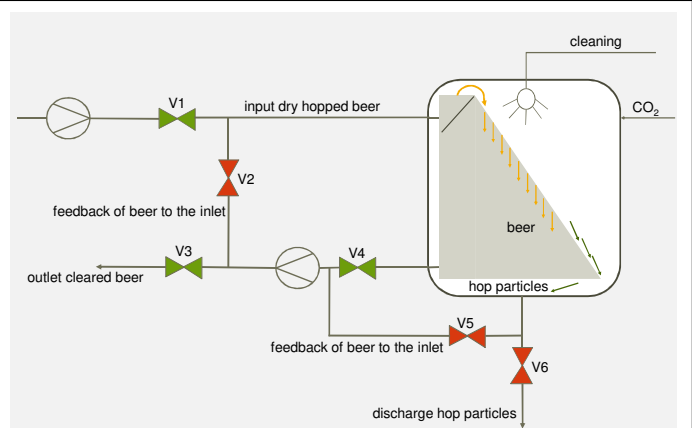


fig. 1

Possibilities how to use the sieve

1. In a separate tank pellets can be blended with beer or de-aerated water. This slurry is recirculated for several hours till the optimal extraction of aroma substances is completed. Then the slurry settles in the tank and stays there for another one or two weeks (fig. 2a). Prior to filling, the beer passes the sieve and is transferred to the filling line. It could be useful to inject CO₂ into the tank prior to pumping the beer, in order to get the hop solids a bit better spread in the beer (fig.2b).
2. A slurry like in 1. is prepared (fig. 3a). After recirculation the beer is transferred via the sieve to a clean tank, where the maturation takes place (fig. 3b). This procedure might even help to achieve a homogeneous distribution of aroma in the tank, as there are no more hops in the second tank, which still could contribute to a hoppy aroma, particularly in the lower part of the tank.

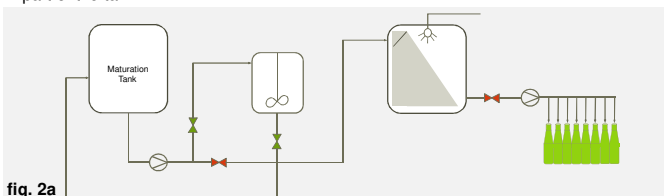


fig. 2a

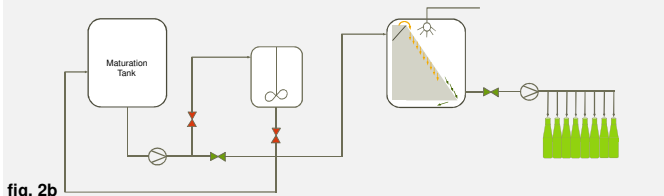


fig. 2b

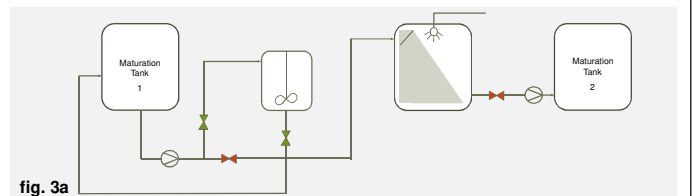


fig. 3a

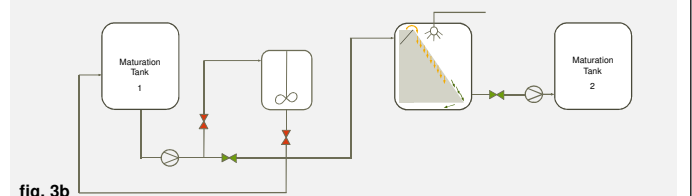


fig. 3b

Summary

- The Beer Cleaner allows for a simple removal of hop particles, where no moving parts are involved.
- At the same time beer losses are clearly reduced.
- Due to the principle of the sieve, particles are removed, which are even smaller than 250 µm.
- Further investigations on different quantities of hops used, on particle sizes etc. will follow.
- The sieve could also be used for the hot wort between hop back and wort cooler.

References

- (1) Mitter, W., Cocuzza, S.: Dry hopping – a study of various parameters, Brauindustrie 4/2014, p.70
- (2) Patent application EP 15003168, November 2015