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E. KERSTEN.

APPARATUS FOR PRODUCING WORT, HOP BEER, WASHING FILTER PULP, &c.

(Application filed July 21, 1897.)

(No Model.)

Fig. 2.

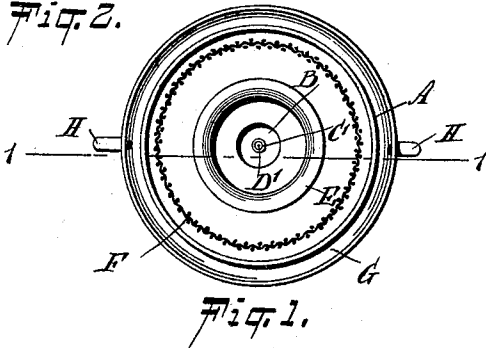


Fig. 4.

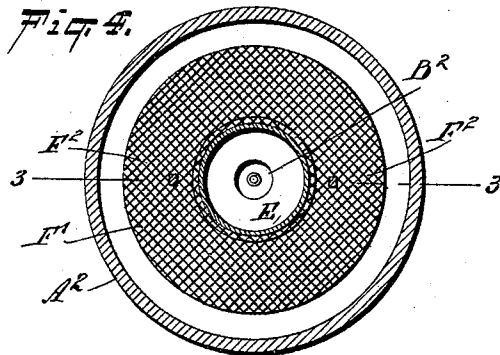


Fig. 1.

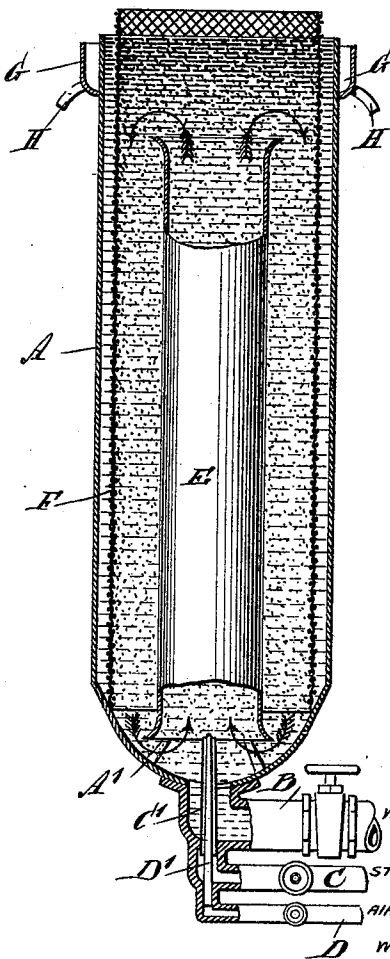
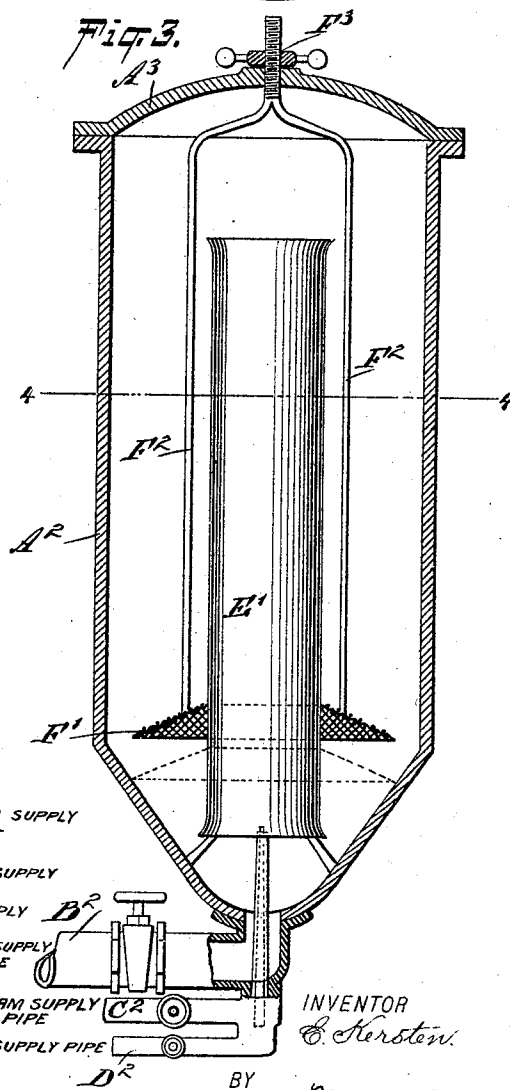


Fig. 3.



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APPARATUS FOR PRODUCING WORT, HOP-BEER, WASHING FILTER-PULP, &c.

SPECIFICATION forming part of Letters Patent No. 642,460, dated January 30, 1900.

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To all whom it may concern:

Be it known that I, EMIL KERSTEN, of Richmond, in the county of Henrico and State of Virginia, have invented a new and Improved
5 Apparatus for Producing Wort, Hop-Beer, Washing Filter-Pulp, &c., of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved apparatus for use in brew-
10 eries for washing and sterilizing the pulp used in filtering or for mashing and hopping purposes, to agitate and leach the pulverized or ground malt with water for producing wort, and to treat the wort with the hops in such a
15 manner as to produce an unfermented liquor of a high quality and in such a state as to facilitate the fermenting process.

The invention consists of certain parts and details and combinations of the same, as will
20 be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indi-
25 cate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the apparatus more especially arranged for wash-
ing purposes, the section being on the line 1 1 of Fig. 2. Fig. 2 is a plan view of the same.
30 Fig. 3 is a sectional side elevation of a modified form of the apparatus as arranged for mashing purposes and producing hop-beer, and Fig. 4 is a sectional plan view of the same on the line 4 4 of Fig. 3.

The apparatus illustrated in Figs. 1 and 2 is provided with an open-top vessel A, having a contracted bottom A', into which discharges a pipe B, connected with a water-supply and having a suitable valve for regulating the
40 amount of water passing into the vessel A. A valved steam-pipe C, connected with a steam-supply, is provided with a nozzle C', which extends through the contracted bottom A' and contains an air-supply nozzle D', con-
45 nected with an air-supply pipe D, leading from a reservoir, air-compressor, or other suitable source of compressed-air supply. The nozzles C' and D' open into the lower end of a circulating-pipe E, suspended within the ves-
50 sel A, preferably at the center thereof, and concentric to the pipe E is arranged a cylindrical screen or sieve F, adapted to contain the material to be washed or otherwise treated, the lower end of the said sieve resting on the

contracted bottom A' of the vessel A, as is
55 plainly indicated in Fig. 1. The upper end of the vessel A is provided with an overflow for discharging water into a circular trough G, provided with outlet-spouts H.

Now when it is desired to wash the pulp 60 used for filtering purposes in Stockheim or other filters used in breweries, for instance, I place the said pulp into the sieve F and then fill the vessel A with water from the pipe B. When this has been done, the valves in
65 the pipes C and D are opened to introduce air under pressure into the water and material contained in the lower end of the circulating-pipe E, and at the same time steam is intro-
70 duced into the material at this point to cause a joint action of the steam and air to insure a circulation of the mixture—that is, the pulp and the water—and at the same time a heat-
ing thereof. The action of the air on the un-
75 clean pulp is to assist the steam to remove the impurities from the pulp, thus facilitating the washing and rendering the pulp fit for reuse. The material and water flows up-
ward in the circulating tube or pipe E and then down outside of the tube E within the
80 sieve F to again enter the lower end of the said tube for repeating the operation. Thus a forced circulation is established at the same time the material and water is heated to com-
pletely separate the impurities adhering to
85 the material, so as to wash the same. By supplying water constantly to the vessel A the impurities are washed or discharged at the upper end of the said vessel into the trough G. The washed material can be readily dis-
90 charged from the vessel A through the pipe or outlet B when the latter is disconnected from the water-supply.

The sieve F extends at its upper end be-
yond the top of the vessel A, so that the ma-
95 terial to be washed cannot pass out of the sieve; but the removed impurities can readily pass through the meshes of the sieve into the space between the sieve and the vessel A, and as a constant flow of fresh water enters the
100 lower end of the vessel through the pipe B a constant overflow is had over the upper edge of the vessel into the annular trough G, the overflow carrying along the impurities, such as yeast, albuminates, and the like.
105

When it is desired to produce wort, I prefer the apparatus illustrated in Figs. 3 and 4, in which the vessel A² is closed and is pro-

vided with a water-supply B², a steam-supply C², and an air-supply D², the nozzles of the two latter discharging into the lower end of a circulating-pipe E', contained within the vessel A². The sieve F is omitted, and only a vertically-adjustable sieve F' is used, held on rods F², connected with a raising and lowering device F³, arranged on the top or cover A³ of the vessel A² and under the control of the operator from the outside of the vessel. By this arrangement the sieve F' can be readily raised or lowered from the outside of the vessel, and, if desired, the sieve can be moved so far downward as to rest with its edge on the contracted or funnel-shaped bottom of the vessel A², as indicated in dotted lines in Fig. 3. Now it will be seen that the pulverized malt and water contained in the vessel A² is constantly circulated and thoroughly heated as long as air and steam is supplied by the pipes C² and D² to insure a proper leaching of the pulverized malt by the water and a complete disintegration of the valuable particles contained in the malt, so that finally a wort of very high quality is produced and some of the substances, notably the albumen, are oxidized. When this has been done, the wort is discharged in a filtered condition through the pipe B², disconnected temporarily from the water-supply, it being understood that the liquid filters through the bottom sieve F' to be further treated for producing beer in the usual manner.

The lower and upper ends of the circulating-pipes E E' are flared outwardly to insure a ready entrance and exit of the material and water without danger of clogging the pipe.

The action of the air on the mixture is to oxidize some of the substances contained in the malt, principally the albumen, the latter in the oxidized state being more easily retained in the malt when the wort liquor is drawn off. Thus when the beer finally reaches the fermentation-cask the yeast in the fermenting process remains more pure and active, owing to the decrease of the quantity of the albumen in the beer.

When the wort has been withdrawn from the vessel A², it is passed into a second vessel, similar to the vessel A², and the hops are now added to the wort. The above-described operation is then repeated—that is, the mixture is agitated by the introduction of air and boiled by the admission of steam, so that any remaining albumen and other undesirable substances are oxidized and remain with the hops in the vessel when the liquor is drawn off and run to the coolers and fermentation-casks for further treatment. If desired, the operation of forming the wort and the hop-beer can be carried on in the same vessel, it being, however, understood that the wort is first produced and the hops subsequently added to the wort.

From the foregoing it is evident that the action of both apparatus (shown in Figs. 1 and 3) is practically the same, as only differ-

ent forms of sieves are used and one vessel is open and the other closed. Either apparatus can be readily used for other purposes besides the ones mentioned.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for producing wort, hop-beer, washing filter-pulp &c., comprising a vessel connected with a water-supply, a circulating-pipe held in the said vessel and opening at both ends into the same, a sieve within the vessel, said sieve surrounding the circulating-pipe and arranged to engage the wall of the vessel, and air and steam nozzles connected with suitable supplies, the air and steam nozzles opening separately and independently of each other into the vessel at the bottom thereof at or below the lower end of the said pipe, substantially as shown and described.

2. An apparatus of the character described, comprising a vessel having a pipe opening into its bottom, and connected with a source of water-supply, an open-ended circulating-pipe held in the vessel above the bottom thereof, a sieve within the vessel, said sieve surrounding the circulating-pipe and arranged to engage the wall of the vessel, a steam-pipe provided with a nozzle leading up through the bottom of the vessel beneath the circulating-pipe, and an air-supply pipe provided with a nozzle within the steam-nozzle, substantially as herein shown and described.

3. An apparatus of the character described, comprising a vessel connected with a water-supply, and having its upper end open, an open-ended circulating-pipe held within the vessel above the bottom thereof, a cylindrical screen having its lower end resting upon the bottom of the vessel and its upper end projecting above the top of the said vessel, a steam-nozzle projecting through the bottom of the vessel beneath the circulating-pipe, and an air-nozzle within the steam-nozzle, substantially as described.

4. An apparatus of the character described, comprising a vessel open at its top and having a contracted bottom, an annular trough at the upper end of the vessel, an open-ended circulating-pipe held in the vessel above the bottom of the same, a cylindrical screen having its lower end resting upon the contracted bottom of the vessel and its upper end projecting above the top of the said vessel, a water-supply pipe opening into the bottom of the vessel, a steam-pipe connected with the water-supply pipe and provided with a nozzle extending through the water-supply pipe into the vessel, and an air-pipe connected with the steam-pipe and provided with a nozzle projecting up within the steam-nozzle, substantially as described.

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