

(No Model.)

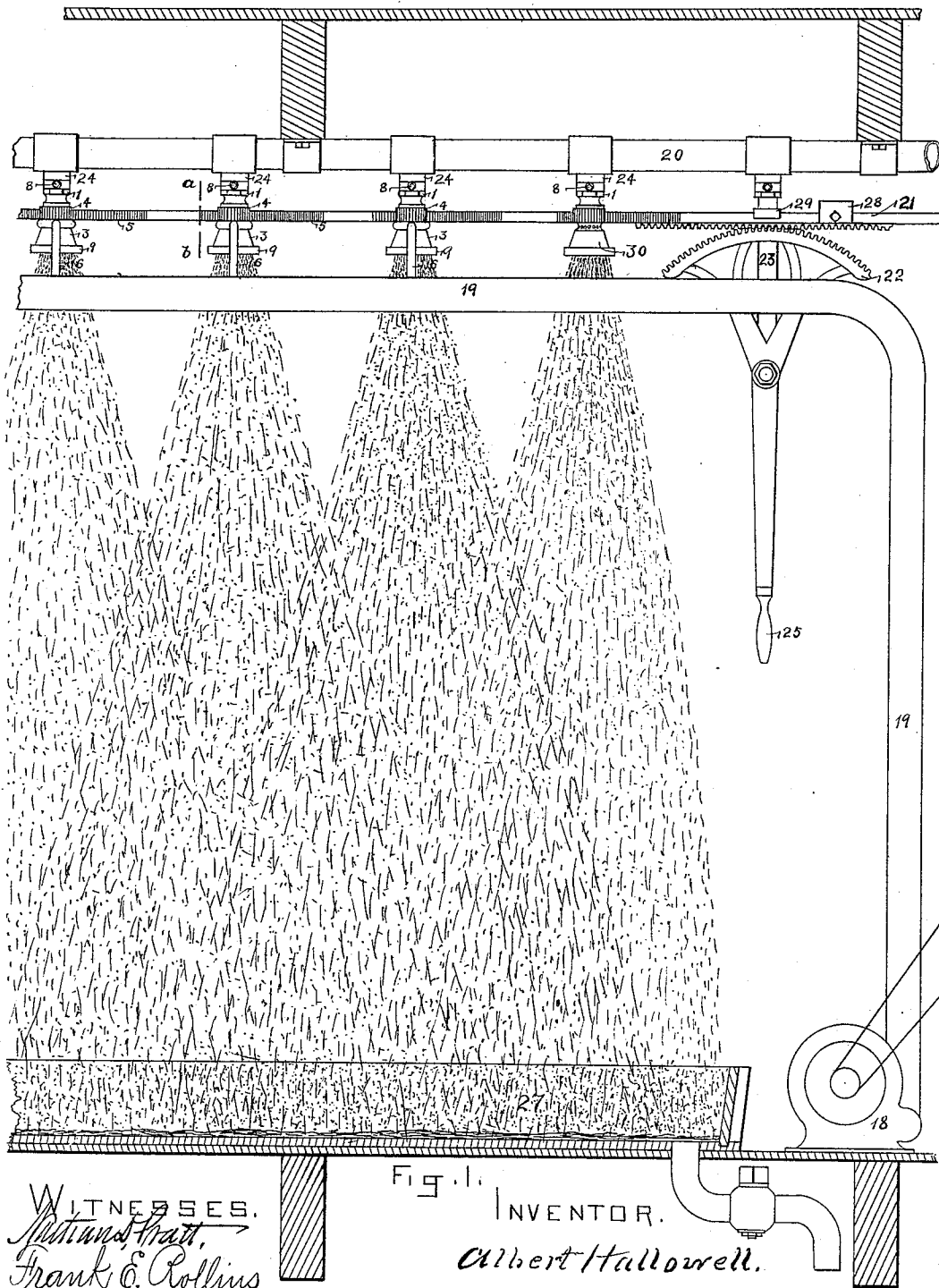
2 Sheets—Sheet 1.

A. HALLOWELL.

APPARATUS FOR COOLING BEER.

No. 394,921.

Patented Dec. 18, 1888.

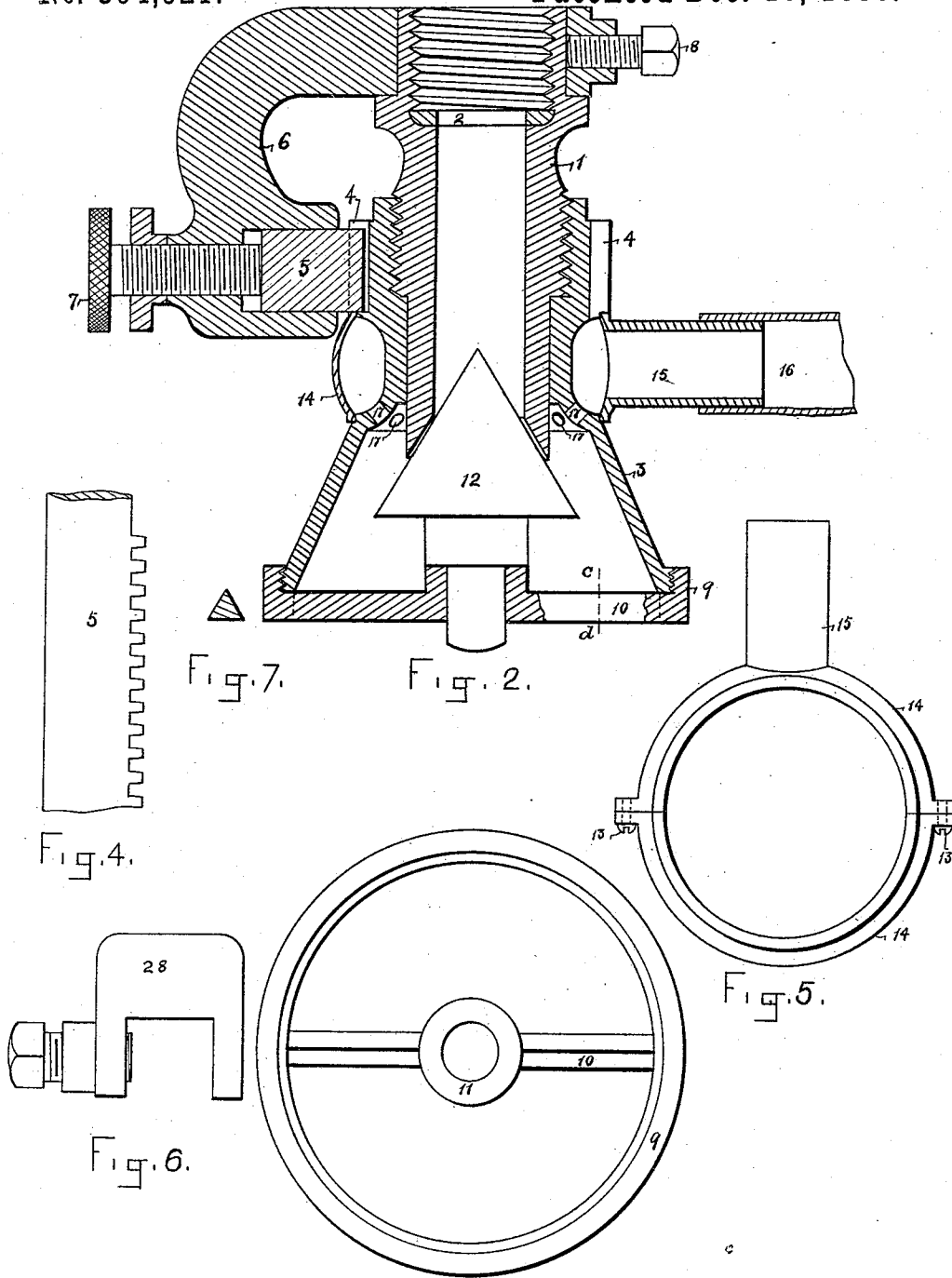


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APPARATUS FOR COOLING BEER.

SPECIFICATION forming part of Letters Patent No. 394,921, dated December 18, 1888.

Application filed July 13, 1887. Serial No. 244,155. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HALLOWELL, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Apparatus for Cooling Beer and other Substances, of which the following is a specification.

My invention relates to that class of beer-coolers where hot wort is cooled by being sprayed into the atmosphere or submitted when in a finely-divided state to the action of air; and its object is to provide a more satisfactory and less expensive apparatus than has hitherto been available for the purpose of carrying on this process.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of a portion of a wort-cooling apparatus, showing the manner in which a number of spraying devices may be attached to a single pipe and simultaneously controlled at a single point. Fig. 2 is an elevation, partly in central vertical section, of one of the spraying devices shown in Fig. 1, showing the rack and the support therefor, which is there illustrated as being used to adjust the position of the spraying-cone of the device, and is the view seen when looking to the right at the line *a b* in Fig. 1. Fig. 3 is a plan of the ring at the bottom of the spraying device, and which serves to support the spraying-cone. Fig. 4 is a view of a portion of the rack that is sometimes used to adjust the position of the spraying-cone. Fig. 5 is a plan of a ring which is sometimes clasped around the main cone-support, forming therewith an air-chamber. Fig. 6 is an elevation of a piece that I sometimes use to clamp upon the rack-carrying rod to limit its motion in one direction. Fig. 7 is a section at the line *c d* of the cross-bar of the spraying-cone supporting-ring.

Similar reference-numbers refer to similar parts in all of the views.

I make use in my invention of the well-known principles that evaporation takes place very rapidly among very fine particles of liquid when freely exposed to the air, and that in consequence of this evaporation large quantities of heat are absorbed in changing

the liquid to vapor. This heat may be absorbed both from the unevaporated liquid and from the surrounding air, in which case the temperature of both is lowered in the operation. It is well known that this evaporation ceases when a certain definite amount of vapor has been absorbed by a given volume of air, and that in order to make the operation continuous it is necessary to allow a free access of unsaturated air to the spray that is produced or to remove from the surrounding air the vapor that is produced. Fresh and unsaturated air may be provided in making use of my invention in any of the usual ways which have been hitherto adopted—such as placing the spraying apparatus in the open air or in a space freely communicating therewith when the liquid only is to be cooled, placing it in a chamber into which air is forced by a fan, or by placing it in a chamber through which air is drawn by a fan or other equivalent means, since my invention relates more especially to the means of producing the spray. I sometimes, however, make use of a special means, hereinafter set forth, of supplying a portion of the requisite air to the apparatus.

The spraying device here illustrated may be used either singly or in connection with others of the same construction, as shown in Fig. 1, and an important element in its construction is that which provides means of adjusting from a distance the position of the spray-producing cone, although this element may in some cases be omitted with advantage.

The spray-producing device is clearly shown in Fig. 2, where the main delivery-tube 1 is shown as having a valve-seat formed in its lower end and as provided with means of attachment to a nipple that is connected to a liquid-supplying pipe. The packing-washer 2, or equivalent means, prevents leakage at the point of attachment. The main cone-support 3 is shown as engaging with the exterior of the tube 1 by means of a screw-thread, which serves as a means of adjusting the longitudinal position of the said cone-support upon the said tube. The main cone-support is shown as having formed upon its surface a gear-wheel whose teeth are shown at 4, and

which engage with the teeth upon the rack 5, that is supported near the spraying device in some convenient manner. In the case illustrated the rack is supported by the rack-support 6, that is supported upon the top of the main delivery-tube 1, and fixed thereto by the set-screw 8. A screw, 7, provided with a check-nut may be used, as shown, to keep the rack and the gear upon the main cone-support engaged with each other, and to allow them to be disengaged at will upon retracting the screw. When it is desirable to do so, this rack and gear may be dispensed with and the main cone-support turned directly by the hand of the operator of the apparatus.

Upon the bottom of the main cone-support is shown secured the cone-supporting ring 9, that is provided with the cross-bar 10 and the central ring, 11, in which the spraying-cone 12 is supported. The spraying-cone is made so that it deflects the entire amount of liquid that is discharged along its surface and diffuses it into the air below and outside of its base, and is loosely supported in the ring 11, and is preferably made of such an acute angle that the liquid deflected from its surface will not strike the under side of the cone-support. The cross-bar 10 is preferably made as shown in Fig. 7, in order that the spray may be readily divided to pass the cross-bar without being splashed about the apparatus. This upwardly-sharpened shape of the cross-bar is also desirable on account of the fact that the liquid does not issue in streams so much as it would were this bar formed otherwise, and I have found it very desirable to prevent, as much as possible, the formation of such streams.

The spray-producing deflector 12 is shown as a true cone; but it is not necessary that it should be so shaped, since the requirements of the apparatus will be met if the lower portion thereof, at and below the point where it touches the valve-seat in the tube 1, be made to flare outwardly in such a manner as to throw the spray outwardly to a considerable distance as it falls.

I sometimes make use of an air-chamber that is made up of the half-rings 14, held together by the screws 13 or other equivalent means, one of the half-rings being provided with the pipe 15, the whole fitting loosely around the main cone-support 3, which is then provided with holes 17, leading from the interior of the air-chamber to the lower side of the support 3, as shown. A pipe, 16, attached to the pipe 15, forms therewith and with said air-chamber an air-conduit which leads from the air-chamber to some suitable means of supplying fresh air. In the case illustrated in Fig. 1 the air is shown as provided by a fan, 18, which leads air from outside the room where the spraying devices are placed, and forces it through the pipe 19 to the pipes 16. The pipes 16 should either be flexible or connected to the ring 14 in such a manner that the main cone-support 3 will not

be impeded in its longitudinal motion by the pipe 16. The fan, the pipe 19, and the ring 14 may be dispensed with sometimes, as may also the holes 17, while at other times the fan may be dispensed with and the pipe 19 led directly out of the chamber in which the apparatus is placed to a source of supply of fresh air. In the latter case the fresh air will be drawn into the spraying device in considerable amount by the inductive action of the liquid escaping therefrom.

In Fig. 1 is shown at 30 a spraying device having the holes 17, but with no means of bringing air thereto from without the chamber where the apparatus is placed—a construction which might be advantageously adopted when the apparatus is to be used in the open air. I do not, however, usually supply a very large proportion of air through the holes 17, when compared with the total amount which should be supplied.

When a number of these spraying devices are to be used together, as shown in Fig. 1, they are preferably screwed upon nipples 24 that are secured to a main liquid-supply pipe, 20, and the racks which turn the main cone-supports 3, attached to a bar, 21, that is provided with a means by which it may be readily moved longitudinally with respect to the pipe 20. This means is shown as a segment of a gear, 22, supported from the pipe 20 by the bar 23, and provided with the handle 25.

The mode of operation of this device is as follows: The liquid to be cooled is, by some suitable and ordinary means, fed into the pipe 20 in such a manner as to maintain therein a considerable pressure. The main cone-supports are then revolved sufficiently to remove the spraying-cones 12 from the valve-seats in the bottom of the tubes 1. The liquid in the pipe 20 will then flow out, be deflected over the cones 12, and thereby changed into a spray, which will fall into a suitable tub or vat, 27, placed to receive it. Evaporation will at once begin when the liquid leaves the cone 12 and continue until the liquid is materially cooled; and I have found that it is easy to thus abstract enormous amounts of heat from hot wort in a very short time. This action is aided by the air, which is sometimes forced through the holes 17 upon the liquid that passes over the surface of the cone 12.

Should it at any time be desirable to stop the flow of the liquid through the spraying devices, it may be done by bringing the cone tightly in contact with the valve-seat in the bottom of the tube 1, by rotating the main cone-support in the proper direction.

In order to make all of the spraying devices close simultaneously and tightly, if necessary, they should be adjusted at first by closing them all before the rack 5 is put in place. They will then remain adjusted with respect to each other in operation.

I have found it desirable to periodically flush these spraying devices, and thus remove any sediment or solid substances which, being

in the liquid, collect in the delivery-tubes. I do this by quickly opening the spraying devices quite widely and then quickly bringing them back into the operative position, all when the pipe 20 is full of liquid under pressure. The sediment is thus blown out and the delivery-tubes left free. In order to make certain the proper replacement of the cones after flushing, I sometimes make use of the adjustable stop 28 upon the rack-bar 21, or an equivalent device, which, striking upon some stationary object—the rack-support 29 in the case illustrated—limits the motion of the rack and enables the operator to quickly bring the cones to the proper operative position.

I have sometimes found it desirable to swing the pipe 20 upon its axis a few degrees in order to deliver the liquid nearer the middle of the tub 27 than it would otherwise fall, and the structure illustrated in Fig. 1 is especially arranged to allow of this swinging without trouble.

I sometimes place several pipes, 20, with their attached spraying devices over a single tub or vat.

I am aware that some parts of my invention may be advantageously used with other devices than those which are shown in the drawings; and consequently I do not desire to limit myself to making my invention in all respects exactly as there shown.

What I claim as new, and desire to secure by Letters Patent, is—

1. The beer spraying and cooling device, which consists of a main delivery-tube adapted to be attached to a liquid-supply pipe, a main cone-support outside the said delivery-tube and adjustable longitudinally thereon, an outwardly-flaring deflector at the mouth of said delivery-tube, and a cross-bar, sharp upon its upper edge and provided with a support for said deflector, attached to said main cone-support and held thereby below said deflector, substantially as described, and for the purposes specified.

2. The beer-cooling apparatus consisting of a liquid-supply pipe and a delivery-tube attached thereto, a flaring deflector supported

at the mouth of said delivery-tube, a support for said deflector adjustable with respect to said delivery-tube by a screw with which it is provided, a gear connected with said deflector-support and rotating therewith, and a rack longitudinally adjustable with respect to said supply-pipe and engaging with said gear, substantially as described, and for the purposes specified.

3. A delivery-tube adapted to be attached to a liquid-supply pipe and provided with a valve-seat at its mouth, combined with a main cone-support provided with air-inlets near said valve-seat and adjustable longitudinally with respect to said delivery-tube, in connection with which it is supported, and a flaring deflector supported from said main cone-support at the mouth of said delivery-tube, substantially as described, and for the purposes specified.

4. In a beer spraying and cooling device, a supply-pipe and a delivery-tube attached thereto, which is provided with a valve-seat at its mouth, combined with a flaring deflector supported at said mouth, a main support for said deflector adjustable longitudinally with respect to said delivery-tube and provided with air-holes and an air-conduit leading thereto, said air-holes and air-conduit furnishing a means of leading air from a source of supply thereof to the liquid that is discharged from said delivery-tube, substantially as described, and for the purposes specified.

5. The beer-cooling apparatus consisting of a liquid-supply pipe and a spraying device attached thereto, said spraying device being by the rotation of parts thereof adjustable to control the spray it produces and to flush the same, a gear attached to said parts, and a rack engaging with said gear and adapted to be moved from a distance to adjust said gear and thereby control said spray and flush said spraying device, substantially as described, and for the purposes specified.

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Witnesses:

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