

R. O. CROWLEY.
Electrical Apparatus for Regulating Temperature.

No. 219,694.

Patented Sept. 16, 1879.

Fig. 1.

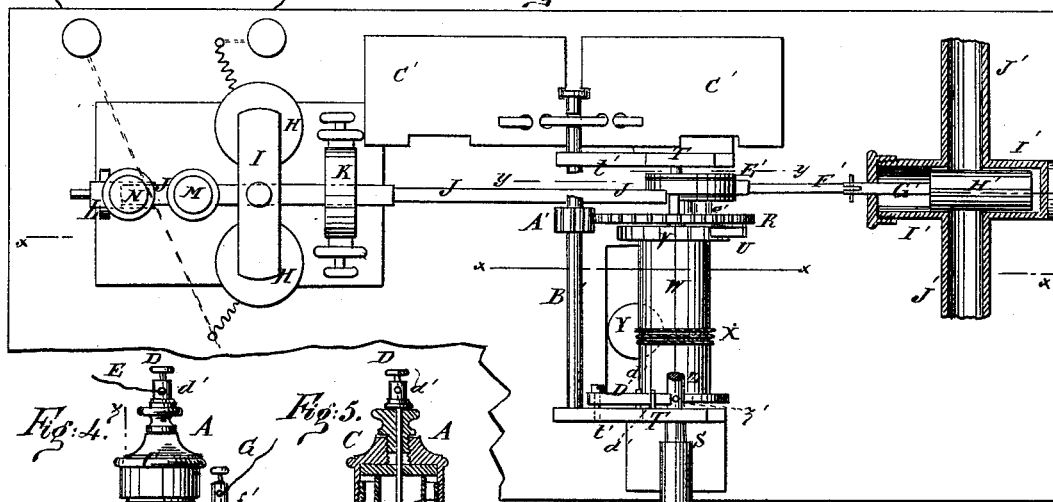


Fig. 4.

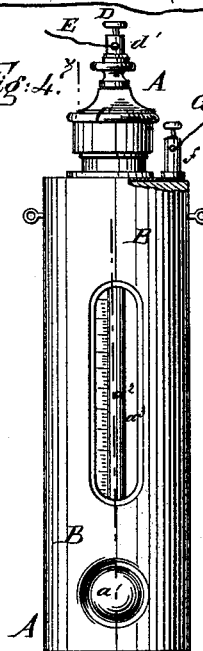


Fig. 5.

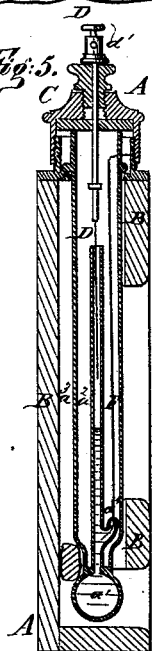


Fig. 3.

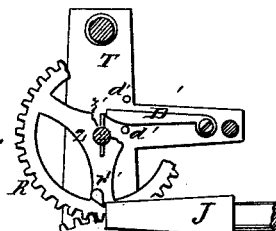
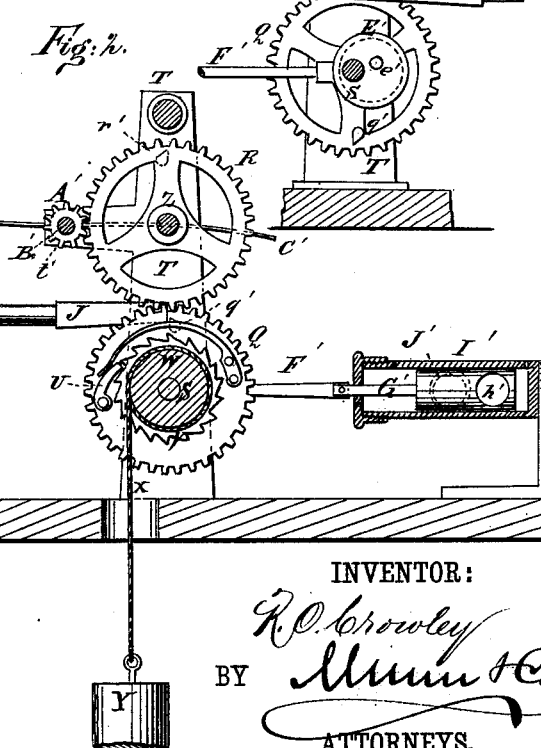


Fig. 2.



WITNESSES:

Chas. H. H. H.
C. Sedgwick

INVENTOR:

R. O. Crowley
BY *M. H. H.*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

ROY O. CROWLEY, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRICAL APPARATUS FOR REGULATING TEMPERATURE.

Specification forming part of Letters Patent No. **219,694**, dated September 16, 1879; application filed June 26, 1879.

To all whom it may concern:

Be it known that I, ROY O. CROWLEY, of the city, county, and State of New York, have invented a new and useful Improvement in Automatic Apparatus for Regulating the Temperature of Liquids, of which the following is a specification.

Figure 1 is a top view of my improved apparatus. Fig. 2 is a side view of the same, partly in longitudinal section, through the line *xxxx*, Fig. 1. Fig. 3 is a detail section of the same, taken through the line *yy*, Fig. 1, part of the upper gear-wheel being broken away to show the stop. Fig. 4 is a front view of the thermostat. Fig. 5 is a detail longitudinal section of the thermostat, taken through the line *zz*, Fig. 4.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved apparatus by the use of which beer, during the process of fermentation, and other liquids, when desired, may be kept at a uniform temperature automatically and without its being necessary to change the temperature of the room, and which shall be simple in construction, convenient in use, and reliable in operation.

The invention consists in the combination of the magnet, the armature, the lever, arm, and spring, the gear-wheels provided with the pins, the shafts, the pawl and ratchet, the drum, cord, and weight, and the eccentric and connecting rod with each other and with the thermostat, and the valve and tube connected with the coil-pipe, for keeping a liquid at a uniform temperature automatically, as hereinafter fully described.

A represents the thermostat, which is inclosed in a case, B, of wood or other material, to protect it from breakage. The thermostat consists of a mercury-bulb, *a*¹, a mercury-tube, *a*², and an outer tube, *a*³, formed in one piece. The tubes *a*² *a*³ are made with open upper ends, and the upper end of the outer tube, *a*³, is closed water-tight by a cap, C, through which passes a wire, D. The lower part of the wire D is made of platinum, and is inserted in the open upper end of the mercury-tube *a*². A scale of degrees is inserted in the outer tube, *a*³, to show how high the mercury rises and to enable the wire D to be adjusted with its lower

end at the proper point. The wire D slides water-tight in the cap C, and is provided at its upper end with a socket or hole, *d*¹, to receive the circuit-wire E of a battery, which battery is not shown in the drawings, as there is nothing new in its construction.

Upon the side of the lower part of the mercury-tube *a*² is formed an arm, *a*⁴, with which is connected the end of a platinum wire, F, in such a position that it may be always in contact with the mercury. The wire F passes up through the tube *a*², and with its upper end is connected a socket, *f*¹, to receive the other circuit-wire, G, and with a set-screw for holding the said wire G in the said socket. The wires and sockets are insulated from each other.

The circuit-wires E G of the battery are also connected with the magnet H, the armature I of which is attached to a lever, J. The lever J is pivoted to points attached to a frame, K. The rear end of the lever J moves up and down between two arms of a standard, L, and its downward movement is limited by a set-screw, M, attached to it, and which strikes against the lower arm of the said standard L. The upward movement of the lever J is limited by a set-screw, N, attached to the upper arm of the standard L, for the said lever to strike against. To the lever J, directly beneath its pivoting-point, is rigidly attached an arm, O, to the lower end of which is attached the forward end of a spiral spring, P. The rear end of the spring P is connected with the standard L adjutably by a rod and nut.

With this construction, as soon as the circuit is broken the spring P moves the lever J and raises the armature I away from the magnet H. The forward end of the lever J projects into such a position as to be opposite the contact-point of the two gear-wheels Q R, which are placed the one directly above the other. To the gear-wheels Q R, in the same relative positions, are attached pins *q*¹ *r*¹, so that the said pins may come opposite the end of the lever J alternately and at each half-revolution of the said gear-wheels Q R. The lower gear, Q, is placed upon a shaft, S, which is pivoted to an upright frame, T. The gear-wheel Q is connected by a pawl, U, and ratchet-wheel V with the shaft S, or with the drum W attached to the said shaft S. To the drum W is attached

the end of a cord, X, which is wound around the said drum, and to its other end is attached a weight, Y. The pawl and ratchet wheel U V allow the shaft S and drum W to be turned to wind up the weight Y without turning the gear-wheels Q R.

The upper gear-wheel, R, is attached to a shaft, Z, which revolves in bearings in the frame T. The teeth of the gear-wheel R mesh into the teeth of the small gear-wheel A', attached to the shaft B', which revolves in bearings in the arms *t'* formed upon or attached to the frame T. To one end of the shaft B' are attached wings C', which by their action upon the air retard and give steadiness to the movement of the gear-wheels Q R, and prevent them from being turned too fast by the weight Y.

To one of the arms *t'* of the frame T is pivoted a pawl, D', the movement of which is limited by two pins, *d'*, attached to the said arm *t'*, and which is held in such a position that its end may be struck by a cross-pin, *z'*, attached to the shaft Z, to prevent the gear-wheels Q R from being turned back by friction when the shaft S and drum W are turned back to wind up the weight Y. When the gear-wheels Q R are turned forward the cross-pin *z'* strikes the lower side of the end of the pawl D', raises it, and passes on without being obstructed.

E' is an eccentric, which rides upon the shaft S, and is rigidly connected with the gear-wheel Q by a pin, *e'*, so that it may be carried around with and by the said gear-wheel Q in its revolution. With the eccentric E' is connected, by an eccentric-strap, the end of a connecting-rod, F', the other end of which is jointed to the end of the valve-stem G'.

H' is a sliding valve, which slides in a cross-tube, I', connected with the pipe J'. The valve H' has a cross-hole, *h'*, formed in it, so that as the said valve is slid forward and back the pipe J' may be alternately opened and closed to allow a stream of cold water or cold air to pass through the said pipe and to shut off the said stream. The pipe J' is connected with a coil of pipe placed in a tank or other vessel containing the beer or other liquid required to be kept at a uniform temperature, and in which the thermostat A is placed.

With this construction, as the temperature of the liquid rises the mercury in the tube *a*² rises and comes in contact with the platinum wire D, which closes the circuit and causes the magnet H to attract the armature I, drawing down the rear end of the lever J and raising the forward end of the said lever J from the pin *q'* of the gear-wheel Q, and into such a position that it will be struck by the pin *r'* of the gear-wheel R when the said gear-wheels Q R have made a half-revolution. As the end of the lever J is raised from the pin *q'* the weight Y revolves the gear-wheels Q R and the eccentric E', and opens the valve H', allowing a stream of cold water or cold air to be forced through the pipe J', cooling the liquid. As the liquid cools, the mercury sinks away from the platinum wire D, breaking the circuit, and allowing the armature I and the rear end of the lever J to rise. This movement of the lever J lowers its forward end away from the pin *r'* of the upper gear-wheel, R, and brings it into position to be struck by the pin *q'* of the gear-wheel Q, to stop the gear-wheels Q R when they have been revolved through half a revolution by the weight Y. This movement of the gear-wheels Q R turns the eccentric E' and closes the valve H', shutting off the stream of cold water or cold air. In this way the liquid will be kept at a uniform temperature by the automatic action of the apparatus.

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

The combination of the magnet H, the armature I, the lever, arm, and spring, J O P, the gear-wheels Q R, provided with the pins *q'* *r'*, the shafts S Z, the pawl and ratchet U V, the drum, cord, and weight, W X Y, and the eccentric and connecting rods E' F', with each other, and with the thermostat A, and the valve H' and tube I' connected with the pipe J', for keeping a liquid at a uniform temperature automatically, substantially as herein shown and described.

ROY O. CROWLEY.

Witnesses:

JAMES T. GRAHAM,
C. SEDGWICK.