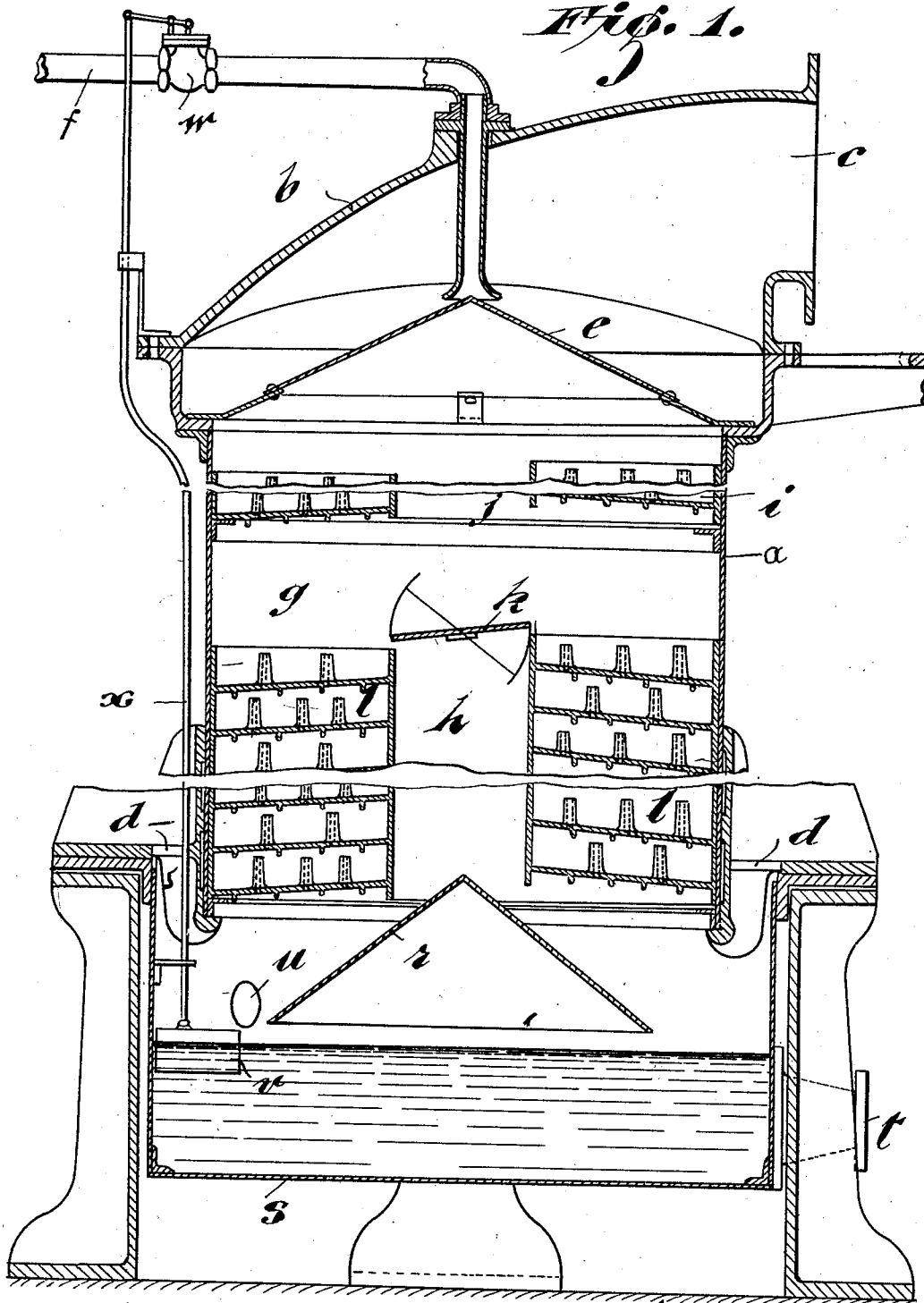


A. SMALLWOOD.
 APPARATUS FOR COOLING LIQUIDS.
 APPLICATION FILED JULY 3, 1917.

1,312,929.

Patented Aug. 12, 1919.
 2 SHEETS—SHEET 1.



Inventor: Alfred Smallwood.
 Atty: R. Dinger.

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Fig. 2.

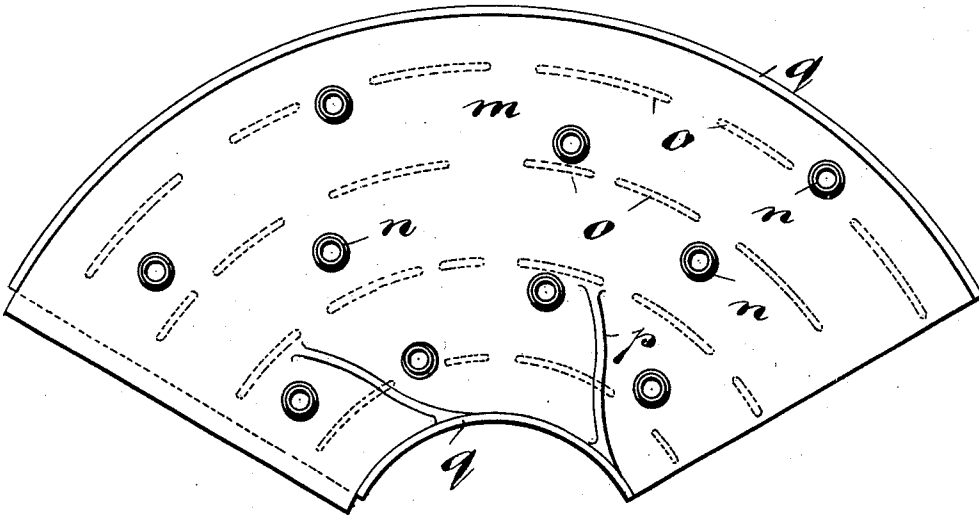
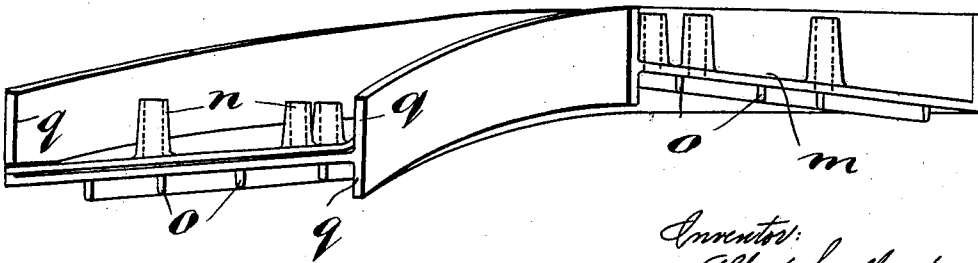


Fig. 3.



Inventor:
Alfred Smallwood.
Atty: B. Singer.

UNITED STATES PATENT OFFICE.

ALFRED SMALLWOOD, OF HIGHGATE, LONDON, ENGLAND.

APPARATUS FOR COOLING LIQUIDS.

1,312,929.

Specification of Letters Patent.

Patented Aug. 12, 1919.

Application filed July 3, 1917. Serial No. 178,379.

To all whom it may concern:

Be it known that I, ALFRED SMALLWOOD, a subject of the Kingdom of Great Britain, residing at 42 Hargrave Park, Highgate, London, N., in the county of Middlesex, England, metallurgist, have invented a new or Improved Apparatus for Cooling Liquids, particularly adapted for the cooling of oil used in the hardening or other heat treatment of steel or other metal, of which the following is a specification.

According to the present invention, the apparatus comprises a chamber or tower in which a helical passage is provided through which cooling air is adapted to ascend. The oil or other liquid to be cooled is adapted to descend within the spiral passage.

In the partition forming the spiral passage, perforations are provided through which a part of the air may pass. These perforations are formed in tubular bosses which project upwardly from the helical surface along which the liquid flows so that the latter is prevented from flowing through the perforations. At the under surface of the helical partition along which the liquid flows, ribs or other surface extensions may be provided to dissipate the heat acquired by the partition.

After descending within the helical passage the oil is adapted to collect in a tank or chamber at the bottom. The oil is supplied at the top by a conduit which is controlled by a regulating valve, and the said regulating valve may be controlled automatically by a float operating upon the surface of the oil in the bath at the foot of the apparatus so that when this oil accumulates to a predetermined depth the regulating valve is closed to prevent admission of any further oil to the apparatus until oil has egressed from the oil bath in which the float operates.

In order that this invention may be clearly understood and readily carried into practice, reference may be had to the appended explanatory sheets of drawings, upon which:—

Figure 1 is a vertical section of a cooling apparatus according to the present invention.

Fig. 2 is a plan, and Fig. 3 an elevation, of a part of the apparatus shown in Fig. 1.

In a convenient embodiment of the present invention, the apparatus comprises a cy-

lindrical casing *a* suitably mounted vertically having at its upper extremity a hood or closure member *b* with a lateral opening *c*. Adapted to be installed in relation to the said opening is a fan or exhauster, by the operation of which air is adapted to be drawn upwardly within the cylindrical casing from suitable inlets *d* at or near the bottom thereof. At the upper extremity of the casing and within the hood or closure member thereof, a cone *e* is incorporated. The oil supply pipe *f* enters the hood or closure member axially and is adapted to admit the oil to the apex of the cone so that the oil is spread by the latter and admitted to the casing *a* in proximity to the circumferential wall thereof.

Axially within the casing there is a hollow flue or air passage *h*. This flue or air passage is encircled by the helical partition. At a mid-point in the height of the chamber the central flue and helical partition may be omitted to form a space *g* in which air admitted by the lower part *h* of the central flue may spread laterally and pass within the helical passage *i* encircling the upper part *j* of the central flue. The upper extremity of the lower part *h* of the central flue may be controlled by a damper *k* so that more or less air may be admitted by the lower part of the central flue or by the helical passage *l* surrounding the same. The upper part *j* of the central flue may if desired be closed or substantially closed or obstructed in order to cause the air, whether admitted by the lower part *h* of the central flue or the helical passage *l* surrounding the same, to pass through the helical passage *i* surrounding the upper part *j* of the vertical flue.

The partition forming the helical passage is made up in a series of segments *m*. At their radial edges these segments may be rabbeted or otherwise adapted to interengage, but leakage of oil or air may or may not be adapted to occur at the joints as may be desired. In cases in which leakage does occur, the joints are staggered in the respective turns of the helix so that the course of any leaking air or oil is thereby prolonged. The upstanding tubular bosses *n* occurring upon the upper surface of the helical partition and the ribs *o* occurring on the lower surface thereof, are cast integrally in the segments. The helical partition slants slightly downwardly from the center to

cause the oil to descend toward the outer wall *a* of the chamber and thus take the longest course in its descent. Tangential or substantially tangential ribs *p* may be provided upon the upper surface of the helical partition sections, extending from the inner edge thereof toward a mid-point in the width of the partition; these tangential projections serve to divert the oil outwardly in its descent. The sections may be formed inwardly and outwardly with ribs or flanges *q* which render them of substantially trough form and confine the oil from flowing either over the inner or outer edge and these flanges are adapted to rest one upon the other when the segments are assembled within the casing *a*.

At the lower extremity of the cylindrical chamber a second cone *r* is incorporated upon which the oil from the helical passage *l* is adapted to fall and flow into the oil bath *s* in which said cone is contained. Said oil bath has a suitable outlet *t* and an overflow *u* and, as aforesaid, contains a float *v* which is adapted to operate a regulating valve *w* appertaining to the oil ingress conduit *f*. For this purpose the float may be connected to a rod *x* which extends vertically externally of the casing within suitable guides and is connected at its upper extremity to the lever of the regulating valve.

The oil bath *s* is adapted to be detached to offer ready access to the interior thereof.

If desired, provision may be incorporated for admitting air directly to the space between the upper and lower helical passages, as for instance by an inlet or inlets in the wall of the cylindrical chamber, adapted to be suitably controlled or regulated.

What I claim as my invention and desire to secure by Letters Patent is:—

1. An apparatus for cooling liquids, comprising a chamber, a partition in said chamber forming a spiral passage through which cooling air is adapted to ascend, said partition being formed with perforations and with tubular bosses projecting upwardly from the helical surface, and means for regulating the volume of ascending air.

2. An apparatus for cooling liquids, comprising a chamber, a helical partition disposed in said chamber and substantially tangential ribs provided on the upper surface of said helical partition.

3. An apparatus for cooling liquids, comprising a chamber, a helical partition disposed in said chamber and constituting a spiral path, a central flue arranged in the lower part of said spiral path, and a damper controlling said central flue.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ALFRED SMALLWOOD.

Witnesses:

ARTHUR H. BROWN,
EDGAR N. WHEELER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."