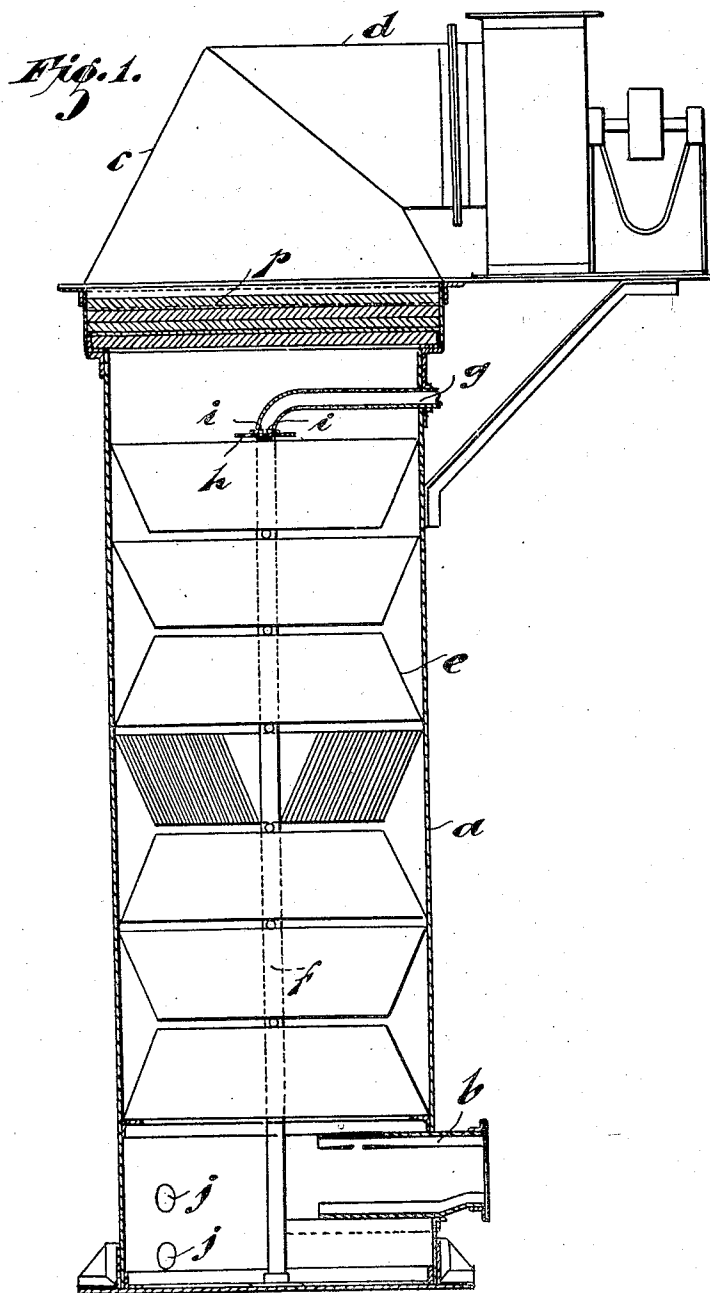


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 APPARATUS FOR COOLING LIQUIDS.
 APPLICATION FILED JAN. 19, 1918.

1,312,930.

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

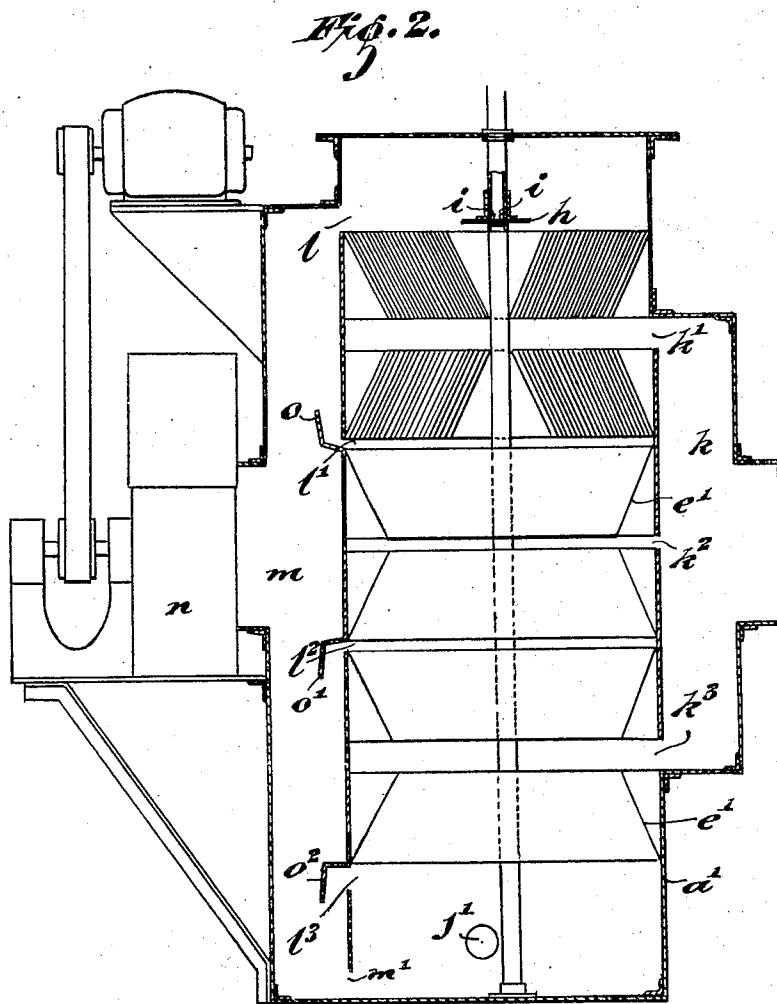


Inventor :-
 Alfred Smallwood.
 By :- B. Auger. Atty.

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UNITED STATES PATENT OFFICE.

ALFRED SMALLWOOD, OF HIGHGATE, LONDON, ENGLAND.

APPARATUS FOR COOLING LIQUIDS.

Specification of Letters Patent.

Patented Aug. 12, 1919.

1,312,930.

Application filed January 19, 1918. Serial No. 212,745.

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, of which the following is a specification.

This invention comprises a new or improved plant or apparatus for cooling liquids by exposing them to air. One purpose for which the present invention may be utilized is the cooling of oil used in the hardening or other heat treatment of steel or other metal. The invention is not, however, restricted to this; it may be utilized for a variety of other purposes.

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

Figure 1 illustrates in sectional elevation, one embodiment of the present invention.

Fig. 2 illustrates in sectional elevation a modified embodiment of the present invention.

In a convenient embodiment of the present invention, as illustrated in Fig. 1, a vertical cylindrical metal casing *a* is suitably installed either permanently or in a manner such that it is portable and may be readily displaced from one position to another. This cylinder is closed at the bottom to form a well or sump. At a position a short distance above the bottom an air inlet *b* is provided. This air inlet may be in the nature of a broad shallow conduit projecting from the periphery of the cylinder *a*.

The cylinder *a* is furnished at the top with a hood *c* which has a lateral conduit *d* in which an exhaustor, fan, pump, or the like is suitably installed. This exhaustor, fan, pump or the like which is adapted to be driven by any appropriate power is adapted to draw air upwardly within the cylinder *a* from the air ingress port *b*.

Within the cylinder *a*, a series of elements are incorporated adapted to present an extended surface. These elements in the embodiment shown in Fig. 1 are designated *e*, and they comprise lengths of sheet metal rolled to the form of a scroll with a narrow space between each turn. Each turn of the scroll is of conical form. The major diameter of the outer turn of the scroll may coincide

with the internal diameter of the cylinder *a*. The minor diameter of the inner turn of the scroll may coincide with the external diameter of a central pipe or rod *f* which is installed axially within the cylinder *a*. The lowermost scroll element *e* may be supported in any suitable manner, as for instance by an angle iron extending around the periphery of the interior of the casing.

A liquid ingress conduit *g* is provided which may enter the upper part of the cylinder *a* laterally, and at a mid-point in said cylinder bend downwardly and adjoin the central member *f*. At the juncture of the conduit *g* with the central member *f*, a spraying device is incorporated. This may consist of a plate *h* which closes the extremity of the conduit *g*, and immediately above the said plate, holes *i* are provided in the conduit *g*, through which the liquid passes laterally, the liquid being distributed by the plate *h* so that it is spread over the upper scroll member *e*. The scroll members *e* or certain of them may be inverted. An appropriate arrangement involves alternately inverted scroll members so that the liquid is adapted to take a substantially zig-zag course in its downward progress through the cylinder *a*. During this progress it is brought into intimate contact with the air flowing in the opposite direction, and the cooled liquid which accumulates in the lower part of the cylinder *a* may egress by an opening or openings such as *j*, *j*.

In order to prevent liquid from being carried away by the air, there may be provided in relation to the top of the chamber *a*, baffling provision. In the embodiment illustrated, a series of layers or strips *p* of sheet metal are incorporated. These may be disposed transversely to the chamber *a*, and arranged in successive layers, the intermediate layers being inclined in a direction opposed to that of the other layers. If desired, the slats of intermediate layers may be disposed transversely to those of the other layers. The said slats may be supported in any suitable manner, as for instance upon ledges provided around the interior of the chamber *a*, or an upward extension thereof.

While in the embodiment shown in Fig. 1 the air is admitted laterally into one side only of the cylinder *a*, in cylinders which are axially shorter, the air may be admitted at a number of inlets distributed around the periphery of the cylinder *a* so that a better

distribution of the air is assured in the initial part of its upward course through the scroll members.

In the modified embodiment of the invention shown in Fig. 2, the air is adapted to flow transversely instead of longitudinally within the cylinder a^1 . A series of members e^1 adapted to offer extended surfaces are appropriately installed in the cylinder a^1 , and a liquid supply spray h, i is incorporated at the top of the chamber a^1 as in the previous embodiment. j^1 is the outlet for the oil.

At the one side of the cylinder a^1 a vertical air chamber or flue k is provided which the air is adapted to enter at any suitable point. Air ingress orifices k^1, k^2, k^3 are provided at intervals in the length of the chamber k , said air ingress orifices admitting air to the interior of the cylinder a^1 at positions between the members e^1 . On the opposite side of the cylinder a^1 , air egress openings l, l^1, l^2, l^3 are provided, these air egress orifices being located at intervals and at points located alternately in the length of the chamber a^1 to the point at which the air ingress openings k^1, k^2 and k^3 are provided. The arrangement may be such that one member e^1 is provided between each of the orifices $l, k^1, l^1, k^2, l^2, k^3$ and l^3 . Air entering at each of the air ingress openings k^1, k^2 or k^3 is thus enabled to flow upwardly and downwardly to the egress openings, respectively, l, l^1, l^2, l^3 and l^2, l^3 . The egress openings l, l^1, l^2, l^3 enter a vertical chamber or flue m which is in communication with a fan n , exhaustor or the like by which the air is appropriately drawn through the apparatus. Baffles, o, o^1, o^2 may be provided externally of the air egress openings; these serve to prevent the liquid from being carried away with the air. The baffles may be so arranged as to cause the egress opening to face the direction of flow of the air. Thus the baffle o may cause the opening l^1 to face upwardly; the result of this is that liquid restrained by the baffle o flows back into the chamber a^1 . The

baffles o^1 and o^2 have the effect of converting the outlets l^2 and l^3 into outlets which face downwardly; the liquid restrained by these baffles o^1, o^2 is enabled to gravitate into the lower part of the chamber m which is in communication with the sump or reservoir by the opening m^1 .

In the drawing the members e^1 are represented similarly to the members e of Fig. 1, and they may comprise conical scrolls of sheet metal installed in any suitable manner. Alternatively, however, the chamber a^1 in Fig. 2 may be square, and the surface members e^1 may consist of straight strips of sheet metal extending transversely and mounted upon suitable ledges or supports. The strips of metal may be inclined in alternate directions in the successive members, but advantageously all of the strips may be disposed transversely to the direction of flow of the air across the interior of the chamber a^1 .

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

1. An apparatus for cooling liquids, comprising a chamber, means for conducting air into said chamber, a series of superposed conical scrolls presenting an extended surface upon which the oil or other liquid is subjected to the cooling influence of air, and means for preventing egress of the liquid together with the air.

2. An apparatus for cooling liquids, comprising a chamber, a series of superposed conical scrolls arranged in said chamber and located at intervals to provide a series of passages whereby cooling air is divided into a number of separate streams, each adapted to diverge in their passage to outlets on the other side of the chamber, and means for preventing the egress of the liquid together with the air.

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

ALFRED SMALLWOOD.

Witnesses:

ARTHUR HENRY BROWN,
EDGAR NORTON WHEELER.