

Nov. 17, 1931.

E. J. GRAHAM

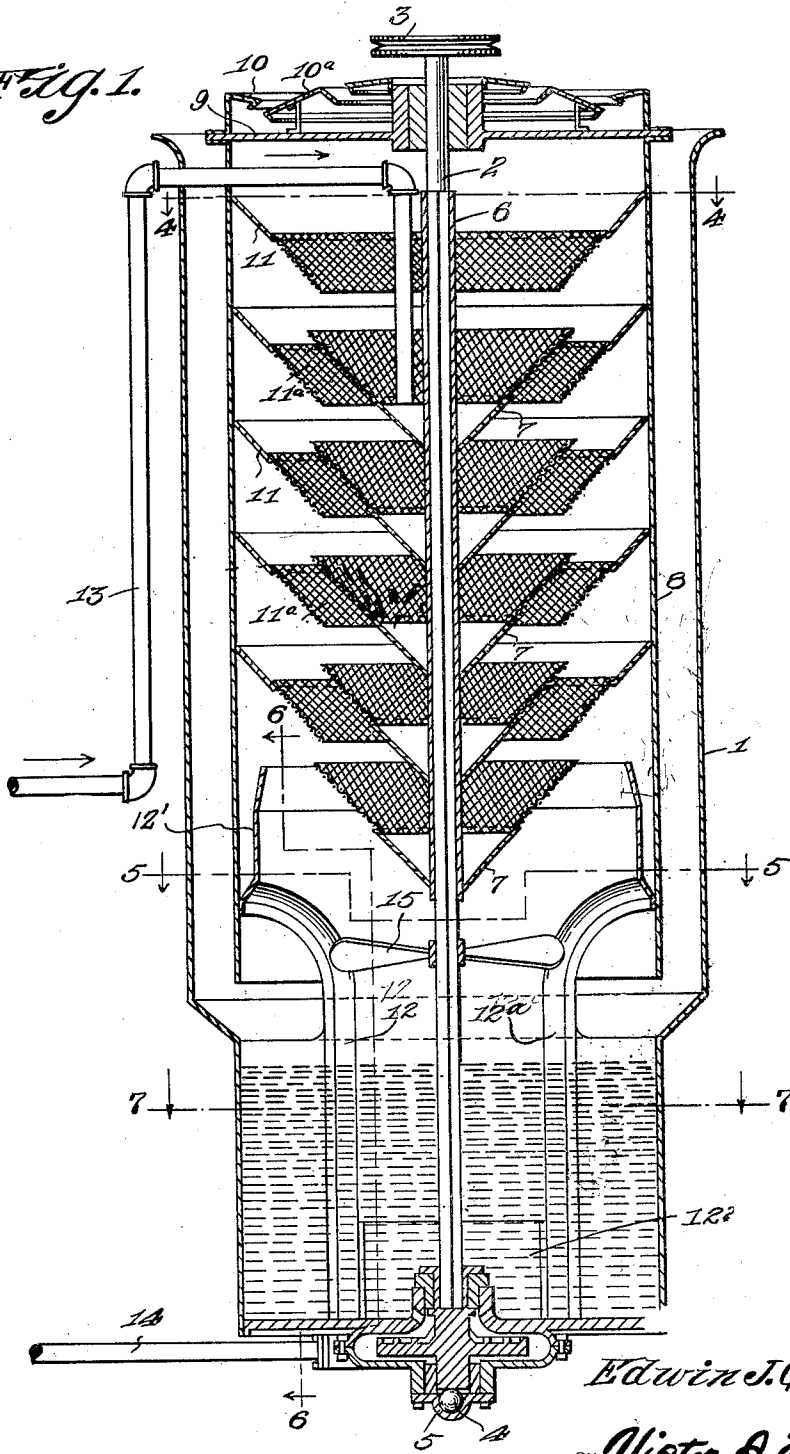
1,832,701

WATER COOLING APPARATUS

Filed Oct. 1, 1928

3 Sheets-Sheet 1

Fig. 1.



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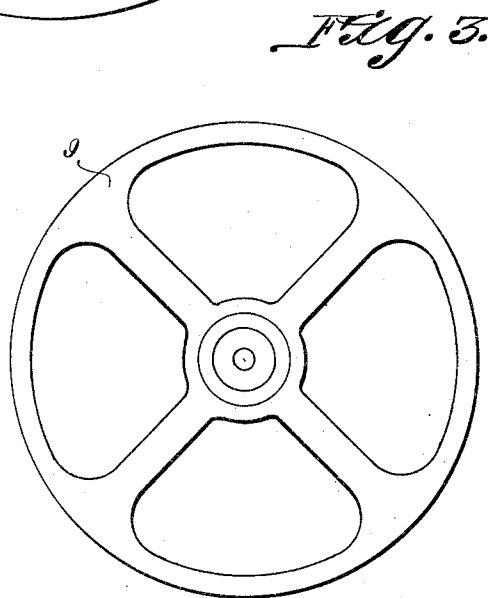
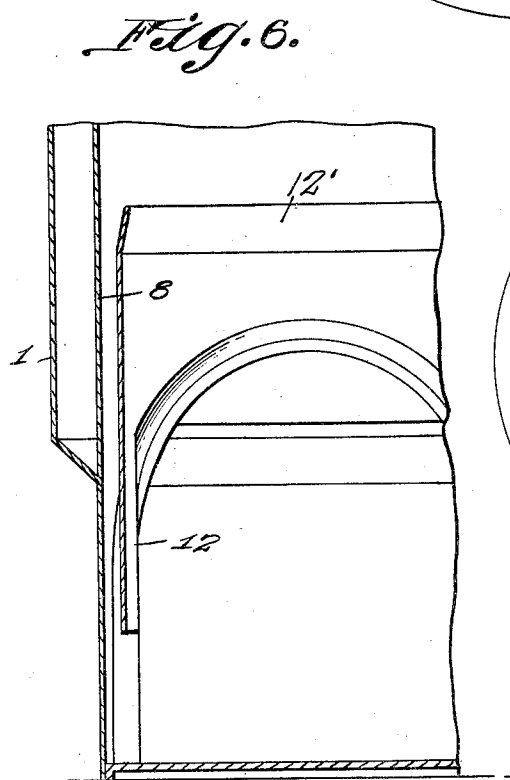
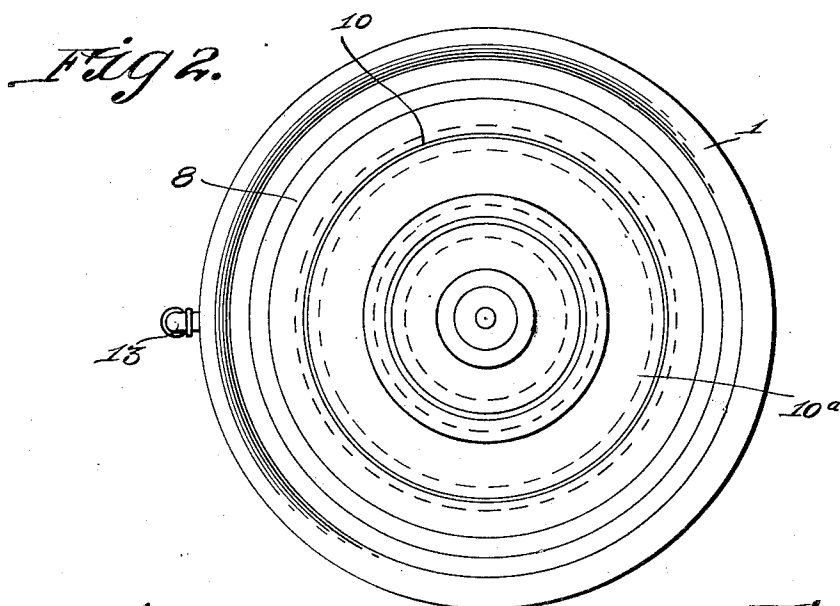
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Fig. 4.

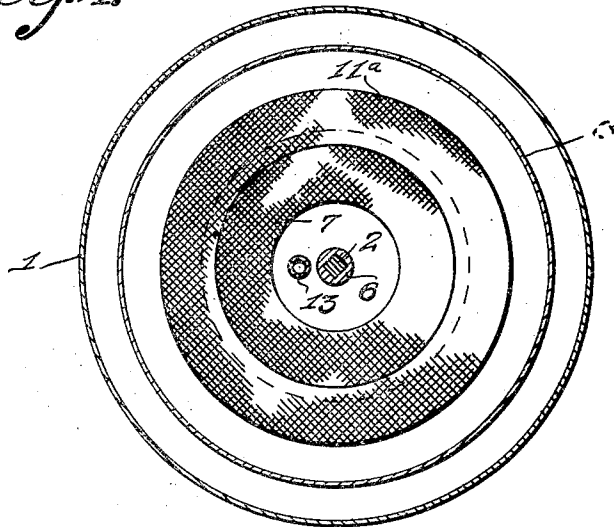


Fig. 5.

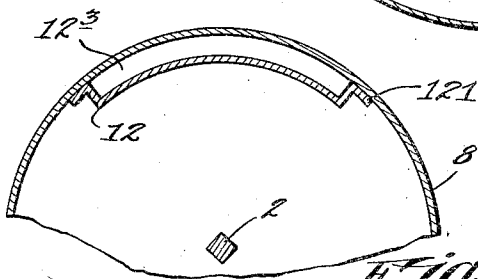
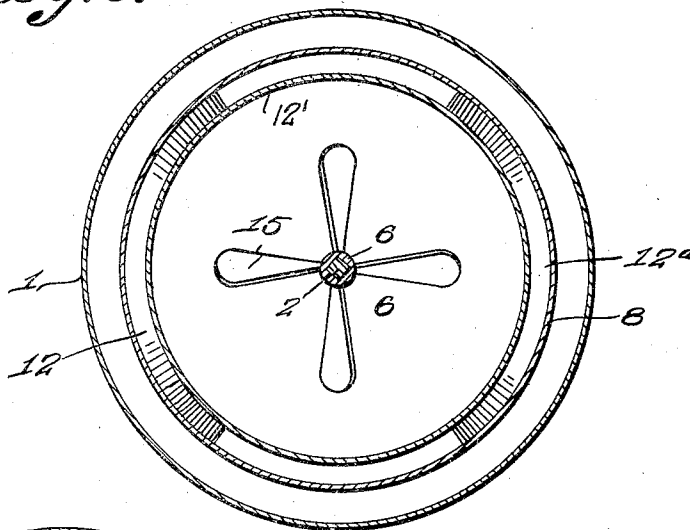


Fig. 6.

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UNITED STATES PATENT OFFICE .

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WATER COOLING APPARATUS

Application filed October 1, 1928. Serial No. 309,439.

This invention relates to means for cooling water, especially water employed for condensing purposes which absorbs heat in the process of condensation and is raised in temperature. My invention is designed to lower the temperature of condensed water, or other water of any ordinary temperature, by a centrifugal apparatus by which the water is raised vertically by rapid rotation and resultant centrifugal action and carried through a vertical series of hopper-like foraminous screens with impervious conical bottom, by which the water is carried over the screens successively and simultaneously subjected to an induced draught of air carried downward over the casing of the cooler, and thereby cooled by the cooler walls and driven vertically centrally of the cooler so as to meet the water dripping from the respective screens in a shower, and thus after a period of operation during which the water is raised and distributed in the form of gradually cooler showers of rain, it is discharged for any desired cooling purpose. The air induced through the apparatus is discharged at the top and during its transit through the machine absorbs heat which is extracted at the expense of the water and is passed away from the machine.

The invention therefore comprises essentially a rapidly driven centrifugal pump for raising water to be cooled, permitting the water to pass through a vertical series of screens, with a conical section at the bottom, and inducing a draught of air through the casing of the cooler and upward therein through the falling water to lower its temperature and thence discharged.

It comprises also other more specific features, the novelty of which will be more fully hereinafter described and will be definitely indicated in the appended claims.

In the accompanying drawings illustrating the invention:

Figure 1 is a vertical longitudinal median section of an apparatus embodying my improvement.

Figure 2 is a top plan view.

Figure 3 represents a detail of the perforated canopy for the cooler.

Figure 4 is a section on the plane 4—4 of Figure 1.

Figure 5 is a section on the plane 5—5 of Figure 1.

Figure 6 is an irregular section on the plane 6—6 of Figure 1.

Figure 7 is a horizontal sectional view taken on line 7—7 of Figure 1.

Referring now in detail to the drawings, 1 represents a sheet metal casing in which is mounted a centrifugal shaft 2 with a drive pulley or gear 3 and put into rapid revolution of 800 to 1,000 turns per minute. The shaft is vertically stepped on a thrust bearing composed of a hardened ball 4 seated in a cap plate 5 forming the base of the cooler. The shaft 2 is squared for part of its length to receive a square metallic tube 6 on which are mounted a succession of cone-shaped screens 7, the upper part of which is reticulated for $\frac{1}{8}$ mesh screen and the bottom section of which is conical and imperforate. Within the casing 1 is a concentric inner casing 8 on which is supported a spider canopy 9 provided with a plurality of overlapping sheet metal diaphragms 10, 10a, etc., to act as a chute for the air employed for refrigeration. Within the inner casing 8 I mount a series of outer screens 11 firmly secured to the inner sides of the inner casing 8, the upper portions of which are imperforate, and the lower portions 11a projecting centrally of the machine are of the same or similar mesh screen to that attached to the centrifugal shaft. The inner casing 8 is mounted on the side flanges 12' of the semi-circular supports 12, 12a which project from the bottom. These semi-circular supports are flared upwardly and inwardly from the casing 8 to direct water and air in an upward course centrally of the casing beyond the peripheral edges of the cone-shaped screens 7 during rotation of the shaft and to subsequently drain through the several screens successively. As evidenced from the illustration of my invention in Figure 1 of the drawings the supports 12 and 12a respectively are provided with openings 12² adjacent their lowermost ends whereby the water precipitating downwardly within the cooling

device through the screens and between the spaces or pockets 12^a formed between the outer casing 1 by the connection of the side flanges 12' therewith will allow said water to seek its level within the lower portion of the casing 1. 13 represents an induction supply pipe for water and 14 an eduction pipe carried from the bottom of the casing, which may be controlled by a valve adjustment to permit a sufficient period of action for the machine to effect the desired lowering of temperature, or the valves may be closed during a desired period during which the machine is maintained in action.

Mounted on a squared section of the shaft 2 is a fan 15 which drives the air vertically and creates a downward draught between the metallic casing 8 and the outer casing 1, the air by its movement and evaporation being cooled and further cooled after the machine has been in operation for a period of time through contact with its walls. The water follows the semi-cylindrical supports of the inner casing 8 and rises through the screens and falls in the form of numerous drops of rain. Some of the water is retained momentarily in the conical cups 7 and by centrifugal force is thrown outward and along the screen, some falling through in drops and more beating against the casing 8 to fall again through the screens and broken into droplets. The broken up distributed water meets with the upwardly flowing air and is much reduced in temperature both by the evaporating effect of the movement through the machine, the water downward, and the air upward.

It is evident that the extent to which the cooling effect is afforded will depend upon the period of exposure of the body of water in the base of the apparatus to the currents of air and to the temperature of the air. For ordinary cooling water for condenser use the temperature of the air at normal atmospheric temperatures may be depended on, or if a lower temperature is desired to be effected in the water the air delivered to the outside casing 1 may be lowered in temperature. Moreover, a variable temperature within a definite range of thermometer may be effected by the period of treatment within the apparatus and the rapidity of supply to the reservoir in the base of the apparatus, which may be regulated by controlling the movement of the water to and from the machine.

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

1. A water cooling apparatus comprising a casing having a rapidly driven centrifugal fan shaft carrying a multiplicity of imperforate conical members each having a reticulated rim portion, an inner casing having perforated and imperforate portions thereof inversely arranged with relation to the reticulated portions of the conical mem-

bers whereby the perforated and reticulated portions are intercalated, a fan mounted upon the shaft, and means included within the bottom of the apparatus for directing a current of air from the fan upwardly through the perforated and reticulated portions of the casing and conical members.

2. A water cooling apparatus comprising an outer casing having a centrally arranged centrifugally operating fan shaft carrying a plurality of conical screens having a multiplicity of frusto-conical shaped screens intercalated therewith to align the perforated portions of the adjacent screens, filling and discharge conduits for the casing, an inner casing carrying the frusto-conical shaped screens, supporting members for the inner casing being spaced throughout the major portions of their lengths from the inner sides of the outer and inner casings, and a drum carried upon the supporting members to direct the water and air through the perforated portions of the screens as the water is discharged by centrifugal force from the conical screens.

3. A water cooling apparatus comprising an outer casing having a centrally arranged centrifugally operating fan shaft carrying a plurality of conical members having reticulated rim portions, an inner casing supporting a multiplicity of frusto-conical shaped screens having reticulated lower portions intercalated with like portions of the conical members, filling and discharge conduits for the outer casing, supporting members for the inner casing being spaced throughout the major portions of their lengths from the inner sides of the outer and inner casings, a drum carried upon the supporting members to direct the water and air through the reticulated portions of the screens and members as the water is discharged by centrifugal force from the portions of the latter, and the supporting members having portions removed in communication with the central portion of the outer casing to permit commingling of the water precipitating downwardly upon the inner wall of the innermost casing with the water in the outer casing proper.

In testimony whereof I affix my signature.
EDWIN J. GRAHAM.